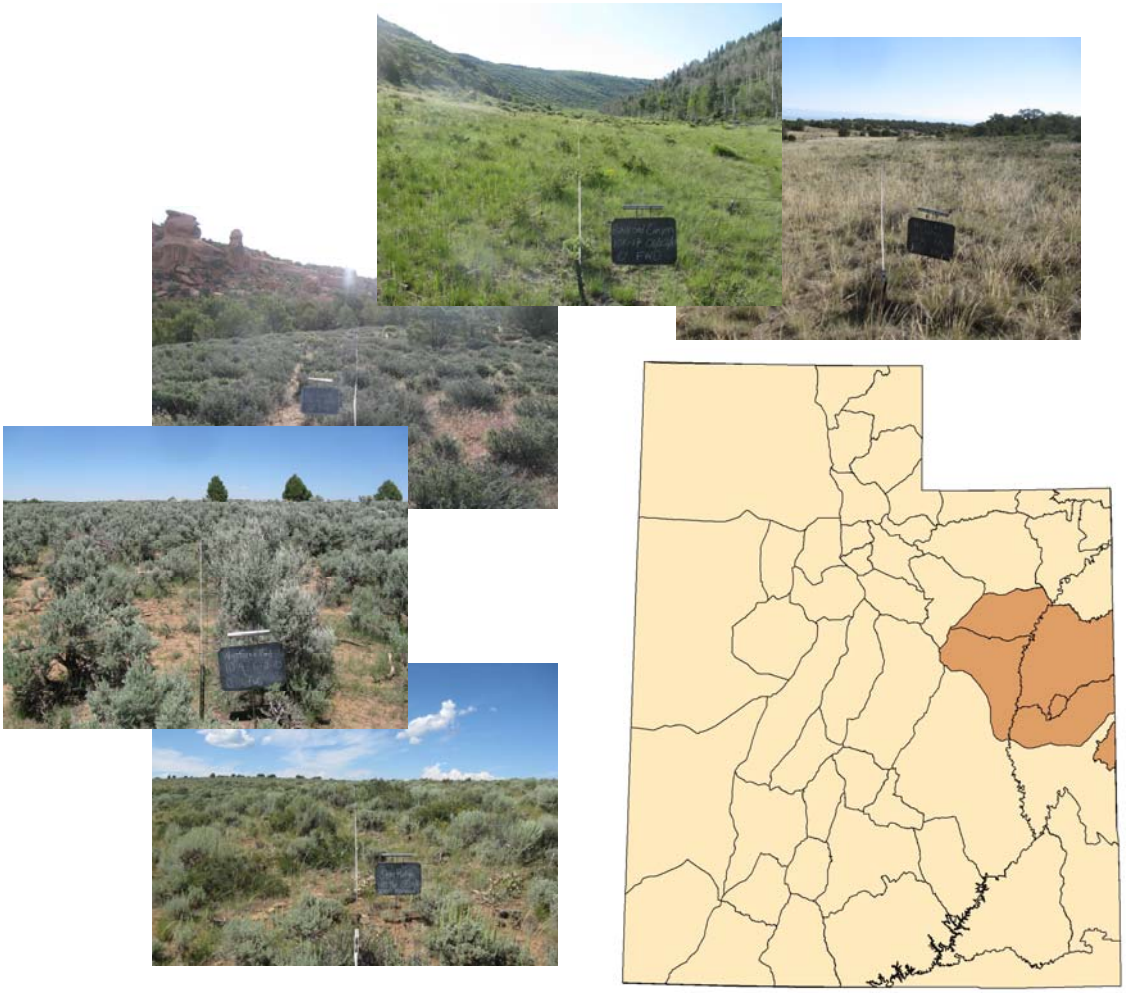
UTAH BIG GAME RANGE TREND STUDIES

2010 Volume II

Northeast & Southeast Regions



PUBLICATION NUMBER 11-15
REPORT FOR FEDERAL AID PROJECT W-82-R-55

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

UTAH BIG GAME
RANGE TREND STUDIES
2010 Volume II

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Performance Report for Federal Aid Project W-82-R-55

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Reports for all regions, with accompanying photographs, are available online at http://wildlife.utah.gov/range/.

PROGRAM NARRATIVE

State: UTAH

Project Number: W-82-R-55

Grant Title: Wildlife Habitat Research and Monitoring

Project Title: Wildlife Habitat Monitoring/Range Trend Studies

Need: The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas. The majority of the permanent range trend studies will be located on deer and elk winter ranges, however on certain management units, studies will be located on spring and/or summer ranges, if vegetation composition on these ranges is the limiting factor for big game populations. Range trend data are used by wildlife biologists for habitat improvement planning purposes, reviewing BLM and USFS allotment management plans, and as one of several sources of information for revising deer and elk herd unit management plans.

Objective: Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers and private landowners of significant changes in plant community composition in these areas.

Expected Results or Benefits: Range trend studies in each region will be reread every five years, and vegetation condition and trend assessments will be made for key areas. DWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database to evaluate the impact of land management programs on big game habitat. Annual reports will be readily available on the Division's website, on CDs, and in hard copies located in DWR regional offices, BLM and USFS offices, and public libraries. Special studies (habitat project monitoring and big game/livestock forage utilization studies) will give DWR biologists and public land managers additional information to address local resource management problems.

REMARKS

The work completed during the 2010 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Northeast and Southeast Regions. Most trend studies surveyed in these management units were established in the 1980's and reread at 5 year intervals.

The following Bureau of Land Management and U.S. Forest Service offices provided information and/or assistance in completion of the trend studies which add to the value of this interagency report:

Bureau of Land Management
- Price Field Office
- Vernal Field Office
- Moab Field Office

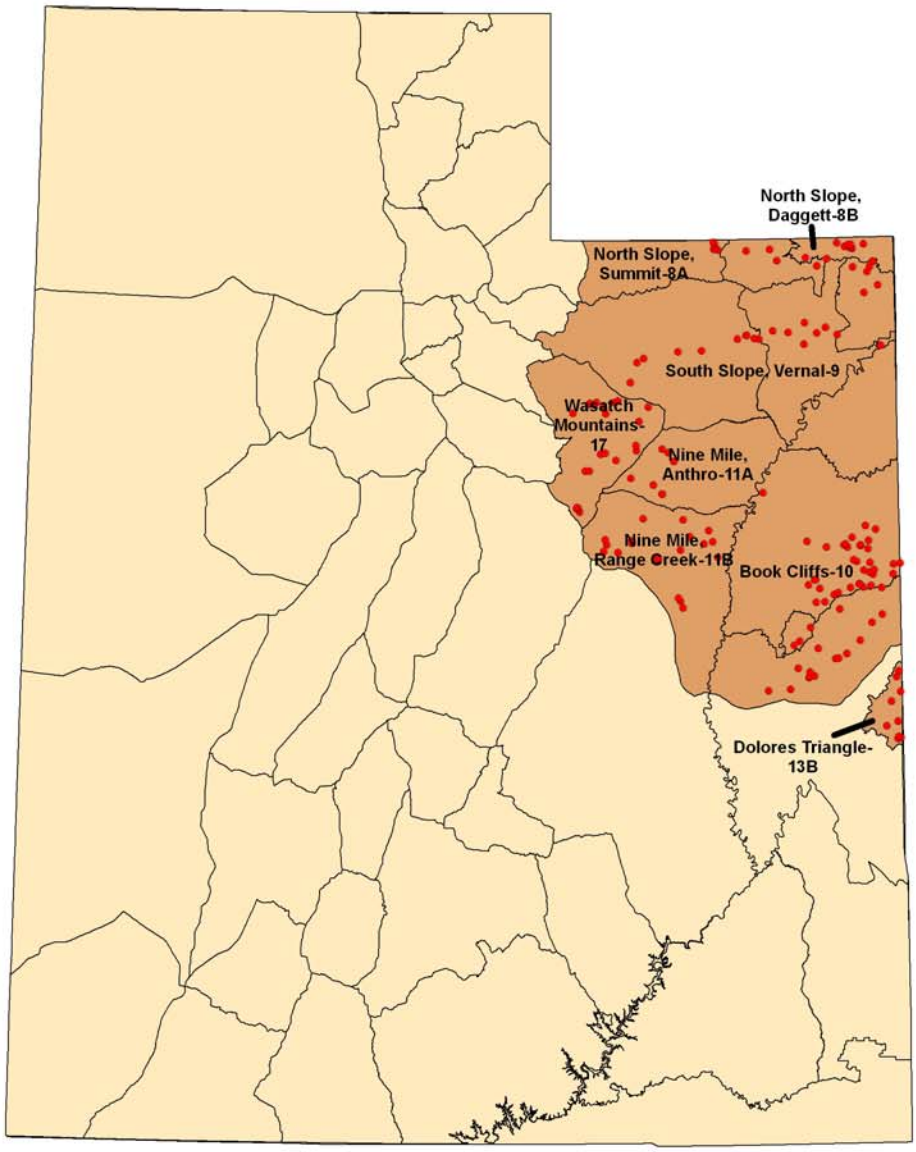
Ashley National Forest
- Vernal Ranger District
- Roosevelt Ranger District
- Duchesne Ranger District
- Flaming Gorge National Recreation Area

Wasatch-Cache National Forest
- Mountain View Ranger District

Ute Indian Tribe Natural Resources
- Fort Duchesne, Utah

Private landowners were cooperative in allowing access to study sites located on their land.

Utah Management Units Surveyed in 2010



RANGE TREND STUDY METHODS

Studies monitoring range trend depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetation or habitat types within a unit, it is necessary to concentrate on specific sites and/or "key" areas within distinct plant communities on big game ranges. These "key" areas should be places where big game has demonstrated a definite pattern of use during normal climatic conditions over a long period of time. Trend studies are located within these areas of high use and/or crucial habitat as agreed upon by DWR, BLM, and USFS personnel. Often, range trend studies are established in conjunction with permanently marked pellet group transects. Once a "key" area has been selected, specific placement for sampling is determined. The sampling grid is carefully placed in order to adequately represent the surrounding area. All sampling baselines are permanently marked by half-high steel fence posts. The first, or "0 foot baseline stake", is marked with a metal tag for proper identification of the transect.

Vegetation Composition

Determining vegetation characteristics for each "key" area is determined by setting up 5 consecutive 100 foot baseline transects in the area of interest. This 500 foot line is the baseline and one, 100 foot belt is placed perpendicular to each 100 foot section of the baseline at random foot marks and centered on the 50 foot mark. The beginning of each belt is marked by a rebar stake to ensure a more precise alignment of the originally sampled belt. A 1/4 m^2 quadrat is centered every 5 feet along the same side of the belt, starting at the 5 foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all plant species occurring within a quadrat, including annual species. However, prior to 1992 no data was collected for annual species.

Percent Cover: Cover is determined using an ocular cover estimation procedure using 7 cover classes (Bailey and Poulton 1968, Daubenmire 1959). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100% (Figure 1). For example, to estimate vegetation cover with this method, an observer would visualize which cover class all the vegetation would fit into if the plants were moved together until they were touching. To quantify percent cover for bare ground, litter, rock, pavement, and cryptogams, the observer would visually estimate which cover class could accommodate all of the specified cover type within the quadrat. These numbers are then recorded. To determine percent cover for each belt, the midpoint for each cover class value observed is summed and divided by the number of sampling quadrats (20). The mean for the five belts is the average for a given site.

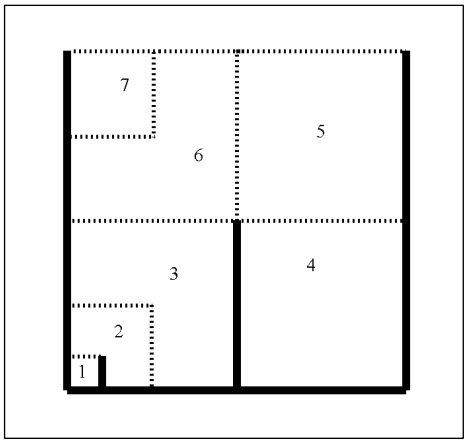


Figure 1. Cover classes of the 1/4 m^2 sampling quadrat.

Total canopy cover of shrubs or trees is estimated using the line-intercept method ([1]U.S. Department of Interior Bureau of Land Management 1999). The distance along each belt covered by a particular species of tree or shrub is divided by the total length of the line to give percent canopy cover. Prior to 2002, only canopy cover above eye level was estimated. After 2002 all canopy cover both above and below eye level was estimated.

Nested Frequency: Nested frequency values for the quadrat range from 1-5 according to which area or sub-quadrat the plant species or cover type is rooted in. The notation for each sub-quadrat is as follows: 5 = 1% of the area, 4 = 5% of the area, 3 = 25% of the area, 2 = 50% of the area, and 1 = the remainder of the quadrat. Each time a particular plant species or cover type occurs within the quadrat, it is scored relative to which of the smallest nested quadrats it is rooted in (in the case of vegetation) or where it first occurs (for all other cover

types). The highest possible score is 5 for each quadrat occurrence and 100 per belt, for a possible score of 500 for each species or cover type at a given site (Figure 2).
Higher nested frequency scores represent a higher abundance for that plant species or cover type. These summed values are used to help determine changes in trend and composition through time. Nested frequency has been found to be a more sensitive measurement for changes taking place within plant communities than quadrat frequency (Smith et al. 1987, Smith et al. 1986, Mosley et al. 1986). Plant cover and density values are not reliable indicators of trend for herbaceous species and can fluctuate greatly with precipitation and time of season sampled. Therefore, plant cover and density values can be misleading if used independently and do not necessarily indicate changes in composition and/or distribution of key plant species.

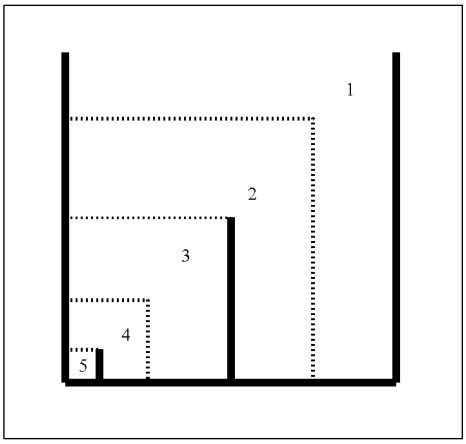


Figure 2. Nested frequency sub-quadrats of the 1/4 m^2 sampling quadrat.

Nested frequency and average percent cover data for individual grass and forb species are summarized in the "Herbaceous Trends" table of each study discussion. Nested frequency and average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground are summarized in the "Basic Cover" table of each study discussion.

Shrub Density & Characterization: Shrub densities are estimated using five, 1/100th acre strips centered over the length of each 100 foot belt. All shrubs rooted within each strip are counted and categorized using a modified Cole Browse Method ([2]U.S. Department of Interior Bureau of Land Management 1999):

Seedling: Plants up to three years old which have become firmly established, usually less than 1/8-inch diameter.
Young: Larger with more complex branching. Does not show signs of maturity. Usually between 1/8 and 1/4-inch diameter.
Mature: Complex branching, rounded growth form, larger size, seed is produced on healthy plants. Generally larger than 1/4-inch diameter.
Decadent: Plant, regardless of age, that is in a state of decline, usually evidenced by 25% or more dead branches.
Dead: A plant which is no longer living.

Shrubs are also rated according to their availability and the amount of use they display, and placed in one of nine form classes:

1. All available, lightly hedged.
2. All available, moderately hedged.
3. All available, heavily hedged.
4. Largely available, lightly hedged.
5. Largely available, moderately hedged.
6. Largely available, heavily hedged.
7. Mostly unavailable.
8. Unavailable due to height.
9. Unavailable due to hedging.

Lightly hedged: 0 to 40 percent of twigs browsed.
Moderately hedged: 41 to 60 percent of twigs browsed.
Heavily hedged: Over 60 percent of twigs browsed. Degree of hedging is based on leader use over the past three years: current annual growth is not included.
Largely available: One-third to two-thirds of plant available to animal.
Mostly unavailable: Less than one-third of plant available to animal.
Unavailable: In classifying browse to a form class, unavailability may be the result of height, location, or density.

Shrubs are also rated on their health and placed into one of four vigor classes:

1. Normal and vigorous.

2. Insect infested or diseased.

3. Poor vigor - chlorotic or discolored leaves, smaller than normal stems or leaves, flowering restricted, partially trampled, pulled up, or otherwise damaged. Stunted growth, partial crown death.

4. Dying - substantial portion of crown dead (more than 50%), more extreme than 3 above. Probably an irreversible condition.

In addition, each mature shrub species closest to every 10 foot mark along a sampling belt is measured to determine average height and crown. This allows a maximum sample of 50 plants per species to be measured at a given site depending on their respective densities. Annual leader growth is estimated for key browse species at each study site. This is done by measuring five leaders on the closest mature shrub in each quarter (similar to point-center quarter method) from 3 stakes along the study site baseline (0', 200' and 400' stakes). These numbers are then averaged. Tree density is determined using the point-center quarter method (Cottam and Curtis 1956) at 100 foot intervals along the baseline measuring to a maximum of 15 meters. If trees are rare due to a treatment or wildfire, the sampling area is extended to 200 foot intervals measuring to a maximum of 30 meters, and 300 feet is added to the end of the transect so that five, 200 foot point-quarter centers can be read. This allows sampling trees on a much larger scale. The strip method that is used to estimate shrub density can, in most cases, effectively inventory seedling and young tree densities. However, the strip method is less effective at estimating densities of mature trees that are often widely disbursed.

Prior to 1992, shrub frequency was determined using the nested frequency method that was previously described. It was found that nested frequency of shrubs did not usually reflect accurate trends in shrub populations which had particularly low or high densities. Therefore, beginning in mid-1992, each 1/100th acre shrub strip is divided into 20, five foot segments. To give a more accurate measure of shrub frequency, presence or absence of shrub species is determined within these strip segments, and this measurement is termed strip frequency. For example, if a species was rooted in 25 of the 100 shrub strips, strip frequency for this species would be 25%. This data along with shrub cover is recorded in the “Browse Trends” table.

Trend Determination

The methods described above rely on relative and absolute measurements of plant composition as determined from the frequency, cover, and density data. In addition, estimates of plant vigor, average height and crown diameter, form class, and age class are utilized to characterize shrub populations.

Browse: Particular attention is given to woody plants and their important role as indicators on crucial big game winter ranges. A variety of parameters are used to help determine trend for key browse species through time. These include:

1) changes in density or number of plants/acre
2) proportion of cover contributed by key species
3) recruitment or proportion of young plants in population
4) proportion of decadent plants
5) proportion of plants in poor vigor
6) changes in height and crown diameter measurements for mature age class
7) changes in browse species composition
8) strip frequency values

Herbaceous Understory: Trends in herbaceous plants as a group or as a single "key" species are determined by comparing the sum of nested frequency values between readings. Attention is also given to changes in species composition of grasses and forbs through time. A non-parametric statistical test, the Friedman test (analogous to analysis of variance) (Conover 1980), is conducted on nested frequencies of each species to determine significant changes at alpha = 0.10.

Soil: Ground cover parameters are analyzed and compared in the discussions of the reread studies, but no actual trend is determined. Beginning in 2002, an erosion condition class assessment adapted from the Bureau of Land Management was also completed on each study site to provide additional qualitative information on soil condition.

Data Interpretation

The following tables and partial tables are taken from study number 13A-1 to help illustrate how to read the data and some basic comparisons that can be made with the data.

Herbaceous Understory: The "Herbaceous Trends" table summarizes the average cover and nested frequency data for individual grass and forb species. The table contains all the grass and forb species that have been sampled on study 13A-1. Readings prior to mid-1992 include only nested frequency data for **perennial** species. Beginning in mid-1992, all trend studies have data for **perennial** and **annual** species, as well as cover estimates for individual species. In the following example, trend is determined using the change in the sum of nested frequency and cover of perennial grasses, and the change in composition of grasses determined by each species nested frequency and cover.

As shown in the "Herbaceous Trends" table, the undesirable species bulbous bluegrass (*Poa bulbosa*) was the most common species in nested frequency on the site in all sample years. The subscript letters indicate that the nested frequency value for *P. bulbosa* declined significantly between 1999 and 2004. Cover of *P. bulbosa* was estimated at a high of 8.01% in 1999 to a low of 2.43% in 2004. Trend for this grass species is down over the life of the study due to a significant decline in sum of nested frequency and a decrease in cover, though the decrease in this species is desirable for the grass trend of the site. The more desirable species crested wheatgrass (*A. cristatum*) has also decreased in nested frequency over the life of the study, but the decrease was only significant between the 1987 and 2009 sample years. Grasses had a combined total cover value of 11.52% in 1994, 13.89% in 1999, 11.35% in 2004 and 7.32% in 2009. These changes would indicate a slightly downward perennial grass trend over the life of the study. The forb trend can be determined in a similar manner.

HERBACEOUS TRENDS--
Management unit 13A, Study no: 1

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{b}$135	$_{ab}$106	$_{ab}$100	$_{ab}$112	$_{a}$81	2.46	2.50	4.81	2.00
G	Agropyron intermedium	-	-	3	2	3	-	.03	.00	.03
G	Bouteloua gracilis	15	19	17	13	17	1.07	.14	.53	.30
G	Bromus inermis	75	67	63	68	92	.63	2.40	1.00	1.35
G	Bromus tectorum (a)	-	-	3	-	-	-	.00	-	-
G	Hilaria jamesii	-	-	-	2	-	-	-	.03	-
G	Koeleria cristata	$_{b}$61	$_{a}$3	$_{a}$19	$_{a}$3	$_{a}$-	.03	.18	.01	-
G	Oryzopsis hymenoides	-	3	3	3	8	.00	.00	.03	.07
G	Poa bulbosa	$_{b}$220	$_{b}$256	$_{b}$250	$_{a}$129	$_{a}$136	7.14	8.01	2.43	2.86
G	Poa fendleriana	$_{a}$-	$_{b}$16	$_{d}$53	$_{cd}$55	$_{bc}$24	.06	.38	1.24	.33
G	Sitanion hystrix	6	1	-	-	-	.00	-	-	-
G	Stipa comata	$_{b}$48	$_{a}$14	$_{bc}$24	$_{bc}$30	$_{a}$21	.11	.23	1.24	.36
Total for Annual Grasses		0	0	3	0	0	0	0.00	0	0
Total for Perennial Grasses		560	485	532	417	382	11.52	13.89	11.35	7.32
Total for Grasses		560	485	535	417	382	11.52	13.90	11.35	7.32
F	Astragalus convallarius	$_{b}$40	$_{bc}$17	$_{ab}$25	$_{b}$37	$_{a}$9	.10	.42	.99	.10
F	Calochortus nuttallii	8	-	-	1	-	-	-	.00	-
F	Castilleja chromosa	$_{b}$38	$_{a}$4	$_{a}$-	$_{a}$-	$_{a}$-	.01	-	-	-
F	Castilleja linariaefolia	-	2	1	-	-	.01	.03	-	-
F	Comandra pallida	-	-	-	3	-	-	-	.01	-
F	Cordylanthus sp. (a)	-	-	-	5	5	-	-	.16	.01
F	Crepis acuminata	$_{b}$14	$_{a}$6	$_{a}$-	$_{a}$-	$_{a}$-	.03	-	-	-
F	Erigeron flagellaris	-	-	3	-	1	-	.15	-	.00
F	Erigeron pumilus	$_{b}$111	$_{a}$21	$_{a}$43	$_{a}$20	$_{a}$12	.07	.51	.53	.08
F	Eriogonum racemosum	$_{b}$63	$_{a}$30	$_{a}$34	$_{a}$25	$_{a}$28	.14	.30	.35	.21
F	Hymenoxys acaulis	3	-	3	1	-	-	.00	.03	-
F	Lomatium triternatum	$_{b}$31	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
F	Lupinus argenteus	$_{d}$162	$_{c}$57	$_{b}$20	$_{a}$-	$_{a}$-	3.64	.14	-	-
F	Machaeranthera canescens	1	-	2	-	-	-	.01	-	-
F	Penstemon caespitosus	85	2	6	6	5	.01	.03	.07	.02
F	Petradoria pumila	-	-	5	-	-	-	.06	-	-
F	Phlox longifolia	$_{c}$67	$_{bc}$53	$_{ab}$31	$_{a}$7	$_{a}$17	.14	.06	.05	.10
F	Polygonum douglasii (a)	-	-	-	-	6	-	-	-	.01
F	Senecio multilobatus	-	1	1	-	-	.00	.00	-	-
F	Sphaeralcea coccinea	58	55	52	49	48	1.24	.38	.60	.59
F	Tragopogon dubius	6	-	-	-	-	-	-	-	-
F	Trifolium gymnocarpon	-	3	3	2	-	.00	.00	.00	-
F	Zigadenus paniculatus	-	-	3	-	1	-	.00	.00	.03
Total for Annual Forbs		0	0	0	5	11	0	0	0.15	0.01
Total for Perennial Forbs		693	251	232	151	121	5.43	2.15	2.66	1.15
Total for Forbs		693	251	232	156	132	5.43	2.15	2.82	1.17

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

Browse: The following "Browse Trends" table summarizes strip frequency and cover for all shrub species occurring on this site. All of the shrubs encountered at study number 13A-1 are listed. For example, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana)* had a strip frequency of 86 out of a possible 100 in 1994, 82 in 1999 and 85 in 2004 and 2009. Average cover is determined using cover classes in conjunction with the 1/4m^2 quadrat and estimating the percent of the quadrat covered. In this case, mountain big sagebrush cover was estimated to be 16.28% in 1994, 9.40% in 1999, 10.65% in 2004 and 9.94% in 2009.

BROWSE TRENDS--
Management unit 13A, Study no: 1

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	18	18	16	20	2.25	3.74	6.50	5.30
B	Artemisia tridentata vaseyana	86	82	85	85	16.28	9.40	10.65	9.94
B	Chrysothamnus depressus	12	26	23	23	.66	.72	1.46	.87
B	Chrysothamnus viscidiflorus viscidiflorus	86	81	72	72	3.62	4.96	5.00	6.14
B	Coryphantha vivipara arizonica	0	2	5	5	-	.00	.00	.00
B	Eriogonum microthecum	10	16	10	9	.01	.53	.12	.12
B	Gutierrezia sarothrae	0	4	8	4	.01	.04	.15	.03
B	Juniperus osteosperma	0	0	0	0	-	-	-	.15
B	Opuntia sp.	36	35	41	45	.32	.56	1.12	1.33
B	Pinus edulis	0	16	14	10	2.92	3.53	7.21	8.53
B	Purshia tridentata	0	1	1	1	-	.00	.00	.00
B	Quercus gambelii	0	3	3	2	.76	.63	1.48	.76
B	Symphoricarpos oreophilus	3	2	4	2	.00	.00	.00	.00
Total for Browse		251	286	282	278	26.86	24.13	33.72	33.20

To more accurately estimate canopy cover of trees and shrubs, the line-intercept method is used along each 100 foot belt. This data is reported in the "Canopy Cover, Line Intercept" table. For example, mountain big sagebrush had a cover of 13.21% in 2004 and 13.93% in 2009. Compare this to the cover determined using the 1/4m^2 quadrat cover class method. Prior to 2002, only trees species were sampled in the line-intercept transect above eye level. Beginning in 2002, all woody species were included in the line-intercept transect and a total canopy cover (above and below eye level) value for each was determined.

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 1

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	.80	7.25	9.48
Artemisia tridentata vaseyana	-	13.21	13.93
Chrysothamnus depressus	-	1.04	.58
Chrysothamnus viscidiflorus viscidiflorus	-	4.73	7.25
Eriogonum microthecum	-	.11	.06
Opuntia sp.	-	.65	.71
Pinus edulis	3.59	11.86	13.43
Quercus gambelii	-	1.23	1.43
Symphoricarpos oreophilus	-	-	.08

Beginning in 2002, annual leader growth of the key browse species is measured to get an idea of shrub production and vigor. This data is displayed in the "Key Browse Annual Leader Growth" table. For example, annual leaders on serviceberry (*Amelanchier utahensis*) averaged 1.8 inches and 1.7 inches in length in 2004 and 2009, respectively, while mountain big sagebrush leaders averaged 1.3 inches in both sample years.

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 1

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	1.8	1.7
Artemisia tridentata vaseyana	1.3	1.3

The following "Point-Quarter Tree Data" table displays tree density estimates using the point-center quarter method which better estimates density of widely disbursed trees than the shrub density strips. Average basal diameter is also listed in inches. Point-quarter tree data for pinyon estimated 201 trees/acre in 1999, 175 tree/acre in 2004 and 213 trees/acre in 2009, with average basal diameters of 2.1 inches, 2.8 inches and 3.2 inches, respectively.

POINT-QUARTER TREE DATA--
Management unit 13A, Study no: 1

Species	Trees per Acre		
	'99	'04	'09
Pinus edulis	201	175	213

Average diameter (in)		
'99	'04	'09
2.1	2.8	3.2

The "Browse Characteristics" table summarizes characteristics of the shrub community. Only mountain big sagebrush is included in this example. The sagebrush population is characterized by age class, vigor, utilization, and average height and crown for mature plants. Total density in plants/acre for mountain big sagebrush, excluding seedlings, was 3,198 plants/acre in 1987, 4,800 plants/acre in 1994, 4080 plants/acre in 1999, 3,800 plants/acre in 2004 and 3,820 plants/acre in 2009. Seedlings are excluded from the population estimate because with summer drought, many will die by late fall causing great fluctuations in population estimates between sampling dates. Since mid-1992, a larger shrub sample area (more than three times larger) was used to better characterize the shrub populations. Therefore, changes in density (before and after 1992) may not necessarily indicate changes in trend, especially shrub populations that characteristically are clumped and/or have discontinuous distributions. The earlier smaller sample could easily either overestimate or underestimate shrub populations. Other characteristics like percent decadence, percent of the population displaying poor vigor, percent heavy hedging, young recruitment, etc., are given more weight in determining shrub trend when comparing survey years where sample sizes are different.

BROWSE CHARACTERISTICS--
Management unit 13A, Study no: 1

		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									
87	**3198**	8	79	12	-	42	8	2	13/17
94	**4800**	4	54	42	940	13	2	10	18/32
99	**4080**	13	63	24	360	41	3	3	21/31
04	**3800**	5	73	22	-	33	10	9	15/24
09	**3820**	6	68	26	60	34	17	22	17/25

The data for mountain big sagebrush from study 13A-1 shows the proportion of decadent shrubs in the population was highest in 1994 at 42%, but has been more moderate at an average of 24% since 1999. More seedlings were also encountered in 1994, but recruitment of young plants has been low (< 10%) in all sample years except for 1999. The percentage of plants displaying poor vigor was low in most sample years, but increased to 22% in 2009. Considering all these factors, trend for sagebrush over the life of the study is stable.

Soil: The "Basic Cover" table summarizes average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground. Average cover prior to mid-1992 adds up to only 100%, while cover with the current method (post mid-1992) estimates several layers of plant and ground cover and will usually exceed 100%. For vegetation cover, the previous method only determined basal vegetation cover (15.25% in 1987), while the new method estimates the vertical projection of the crown, or aerial cover (33.38% in 1994, 39.61% in 1999, 42.08% in 2004 and 42.20% in 2009). Therefore, comparisons can be made for all cover measurements except for general vegetation cover.

BASIC COVER--
Management unit 13A, Study no: 1

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	15.25	33.38	39.61	42.08	42.20
Rock	0	.02	.00	.00	.00
Pavement	0	.03	.04	.05	.03
Litter	61.00	46.05	40.37	45.25	50.69
Cryptogams	3.50	1.50	8.07	2.74	2.00
Bare Ground	20.25	32.20	29.56	34.09	22.93

A summary of the soil data is found in the "Soil Analysis Data" table. Effective rooting depth is an average of 25 soil penetrometer readings, 5 of the deepest probes possible near each of the 5 baseline starting stakes. The effective rooting depth is a relative index that can be used for site comparisons with regard to individual species differences, site preferences, and abundance. Chemical and textural characteristics are also listed and were determined by laboratory analysis of a composite soil sample taken near each of the 5 baseline starting stakes.

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 1, Study Name: Two Mile Chaining

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11	6.5	48.2	30.6	21.3	2	8	105.6	0.4

The descriptive terms used for ranges in pH are as follows:

Ultra acidic	< 3.5
Extremely Acidic	3.5-4.4
Very Strong Acidic	4.5-5.0
Strongly Acidic	5.1-5.5
Moderately Acidic	5.6-6.0
Slightly Acidic	6.1-6.5
Neutral	6.6-7.3
Slightly Alkaline	7.4-7.8
Moderately Alkaline	7.9-8.4
Strongly Alkaline	8.5-9.0
Very Strongly Alkaline	> 9.1

Percent organic matter (% OM) refers to the amount of organic matter in the top 12 inches of the soil profile. Parts per million (ppm) of phosphorus (P) and potassium (K) are also included. Values for phosphorus and potassium less than 6 ppm and 60 ppm, respectively, are considered to have low availability for plant growth and development (Tiedemann and Lopez 2004).

The electrical conductivity of the soil is reported in decisiemens per meter (dS/m). Electrical conductivity is related to the amount of salts more soluble than gypsum in the soil. The following classes can be used as a reference.

Non saline	0-2
Very slightly saline	2-4
Slightly saline	4-8
Moderately saline	8-16
Strongly saline	>16

Utilization: The "Pellet Group Data" table summarizes the frequency of animal pellets sampled within the 100 quadrats placed along the sampling belts as well as data from a pellet group transect read parallel to the study site baseline. Quadrat frequency of wildlife and livestock droppings is included in reports done prior to mid-1992. For example in 1994, rabbit pellets were found in 44% of the quadrats placed on study 13A-1, decreasing to just 6% in 1999 and 2004, then increasing again to 34% in 2009. Quadrat frequency of rabbit or big game pellets indicates a relative amount of use by that particular animal. This data can help characterize changes in wildlife use patterns on the site.

It was determined that additional information on pellet groups was necessary. Therefore, a pellet group transect is now sampled in conjunction with the vegetation transects. The pellet group transect utilizes 50, $100ft^2$ circular plots which are placed through the study area. These are usually two parallel transects of 25 plots on each side of the vegetation transect which runs 400 feet to 500 feet in length. The number of recent pellet groups for wildlife (usually deer and elk) and pats for cattle are recorded. That number is then converted to days use per acre (hectare). Rabbit pellet groups are not included in this sample. In the example, elk days use/acre was estimated at 70 in 1999 and decreased steadily to 4 elk days use/acre in 2009.

PELLET GROUP DATA--
Management unit 13A, Study no: 1

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	44	6	6	34	-	-	-
Elk	28	26	11	3	70 (173)	27 (68)	4 (10)
Deer	14	28	15	9	32 (79)	16 (40)	25 (63)
Cattle	-	2	-	1	6 (14)	4 (11)	4 (9)

Desirable Components Index: The desirable components index (DCI) for deer was created by Range Trend Program personnel as a tool to address condition and/or value of winter ranges for mule deer. This index is meant to be a companion to, not a replacement for, the site specific range trend assessments that are found in the annual Utah Big Game Range Trend Studies report. This index was designed to score mule deer winter range based upon several important vegetation components (ie., preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, cover of annual grasses and cover of noxious weeds). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be a good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the Federal land management agencies. Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grasses cover, 5% perennial forb cover, and less than 5% annual grass cover. Based on these criteria, communities are scored in a 100 point scale using the following system:

Preferred Browse (60 points)
(Preferred Browse species are favorable or crucial to deer and are broken into three categories; Highly Preferred, Preferred and Key).

Preferred Browse Cover (30 pts. possible)

- Highly Preferred species = 1.5 points for each 1% of cover, Preferred species = 1.25 points for each 1% of cover and Key species = 1 point for each 1% of cover (maximum 30 points)

Percent Decadence (15 points possible)

- 0.3 points for each 1% under 50% decadence and -0.3 points for each 1% over 50% decadence (maximum 15 points or minimum -15 points)

Percent Young (15 points possible)

- 0.5 points for each 1% of young

Herbaceous Understory (40 points)

Perennial Grass Cover (30 points possible)

- 2 points for each 1% cover

Perennial Forb Cover (10 points possible)

- 2 points for each 1% cover

Annual Grass Cover (-20 points possible)

- -0.75 points for each 1%cover

Noxious Weeds (State List)

- -2 points for each species present

The Desirable Components Index Ratings are divided into three categories because of different ecological potentials of communities. These categories include low potential (Wyoming Big Sagebrush – Cliffrose – Desert shrubs), mid-level potential (Mountain Big Sagebrush) and high potential (Mountain Brush) categories. The three categories are scored based on the above criteria as follows:

Low potential scale (Wyoming Big Sagebrush – Cliffrose – Desert shrubs)

> 65	Excellent
45-64	Good
25-44	Fair
10-24	Poor
< 10	Very Poor

Mid-level potential scale (Mountain Big Sagebrush)

> 80	Excellent
79-65	Good
64-50	Fair
49-35	Poor
< 35	Very Poor

High potential scale (Mountain Brush)

> 90	Excellent
89-70	Good
69-55	Fair
54-40	Poor
< 39	Very Poor

Black sagebrush (*Artemisia nova*) and Basin big sagebrush (*A. tridentata* ssp. *tridentata*) communities are placed within the low potential or mid-level potential scales based on precipitation and elevation.

Other Information: Management background information, photographs, and knowledgeable plant identification add to the database for each site. Management and background information for each site is obtained from the administering agency. Permanently located photographs are taken including a general view down and back up the baseline. A close-up of each half-high baseline post further characterizes individual sites. Correct plant identification is critical for a complete and accurate site analysis. Species identification mostly follows "A Utah Flora" (Welsh et al. 2003). In some cases, most notably *Agropyron spp.* and *Purshia spp.*, the species names used by the Range Trend Study Plant Species List (Giunta 1983), Intermountain Flora (Cronquist et al. 1977) and the Intermountain Range Plant Names and Symbols (Plummer et al. 1977) are retained to maintain continuity and alleviate confusion with earlier published reports.

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REPORT FORMAT

An introductory segment at the beginning of each wildlife management unit categorizes the trend studies and provide references to further information on winter range limits, land ownership patterns, livestock management practices, and management unit objectives.

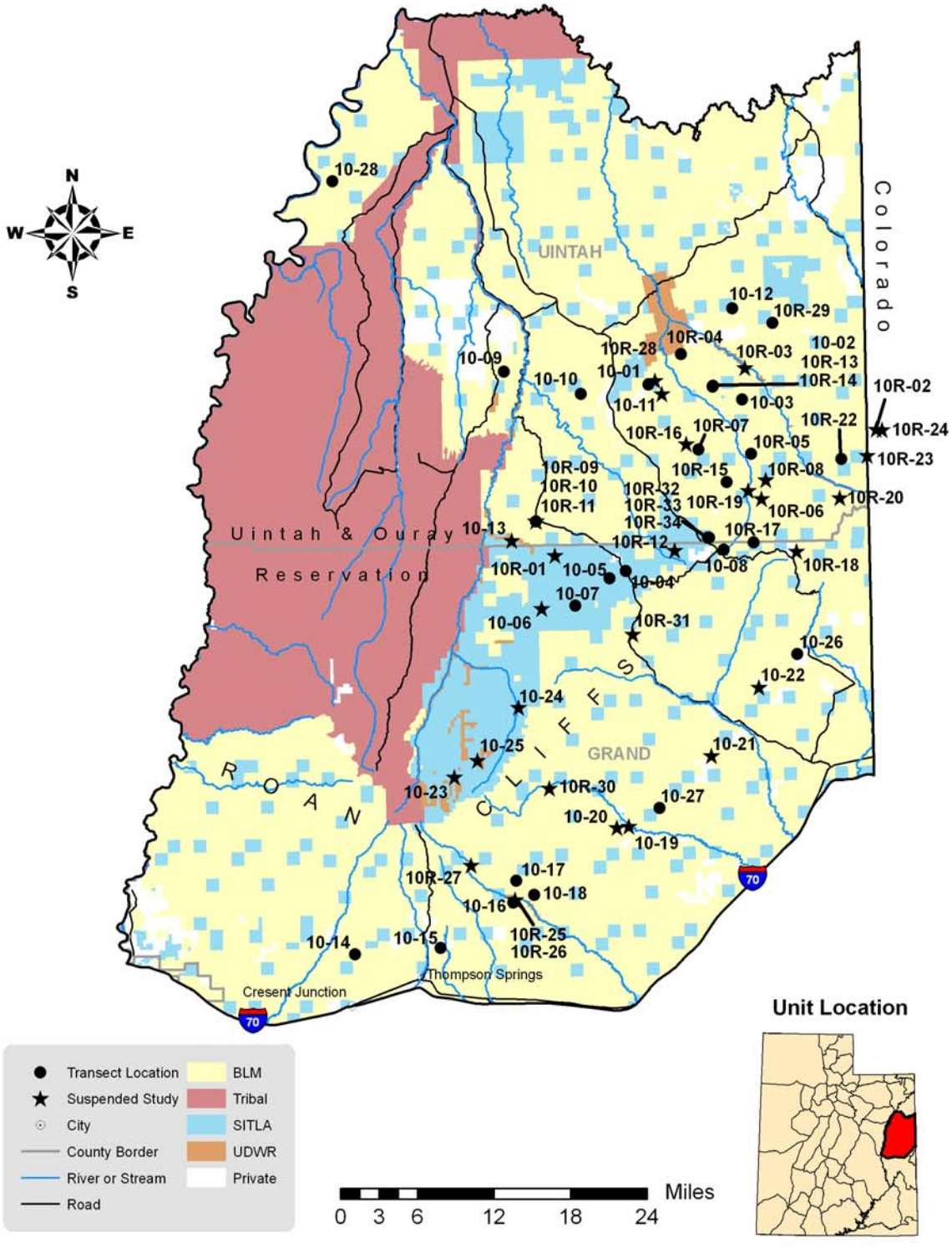
The name and directions for locating the site are given on the location page. Also included on this page are the vegetation type, range type, NRCS ecological site description, land ownership, elevation, aspect, slope, arrangement and diagrammatic sketch of the baseline, and the location on a topographical map. The 7.5 minute topographical map name and public land survey description are located below the map. In addition, UTM coordinates follow the public land survey location. Compass bearings are in degrees relative to magnetic north, unless specified as true north (T).

A discussion of the study site includes descriptions of the site's historic characteristics, soil, ground cover, vegetation community, and species composition. The trend assessment is based upon the comparison of the recent year and the previous years data. Additional assessment is made by comparing photographs from year to year.

Tables with the compiled data follow the study discussions. A computer-generated data summary presents the pooled data for nested frequency, quadrat frequency, basic ground cover, soil characterization, shrub density, and shrub characterization. A nonparametric statistical analysis, the Friedman test, is performed on the nested frequency values between years. This analysis indicates significance levels between species over time at alpha = 0.10. Significant changes are indicated in the herbaceous trends table with subscript letters.

Summaries and evaluations at the end of each management unit address range trends in these key areas. This report will serve to identify and verify changes that are occurring on key areas for big game.

Management Unit 10



WILDLIFE MANAGEMENT UNIT - 10 BOOK CLIFFS

Boundary Description

Uintah and Grand Counties - Boundary begins at Interstate 70 and the Green River in Green River; northeast along the Green River to the White River; east along the White River to the Utah-Colorado state line; south along the Utah-Colorado state line to I-70; southwest along I-70 to the Green River and beginning point.

Management Unit Description

The Book Cliffs Management Unit includes both the North Book Cliffs and the South Book Cliffs. Of the entire land area of the Book Cliffs, about 1.7 million acres are classified as deer range. Of this 1.7 million acres 68% is classified as deer winter range, 10% as deer summer range and 22% as deer year-long range. Approximately 1.7 million acres in the Book Cliffs are also classified as elk range with 63% of this being elk winter range, 19% elk summer range and 18% elk year-long range. The Bureau of Land Management (BLM) manages 63% of all the area classified as mule deer ranges and 53% of all the area classified as elk ranges. State of Utah Trust Lands and Native American Trust Lands make up most of the remainder of deer and elk ranges on the Book Cliffs.

On the North Book Cliffs, areas such as Lower McCook Ridge, Big Park, the Crows Roost, Sunday School Canyon, Indian Ridge and Atchee Ridge, all support concentrations of wintering deer. Elk utilize many of the same areas, especially McCook Ridge. The winter range is composed of several main vegetation types including pinyon-juniper, salt desert shrub and Wyoming big sagebrush. The consensus is that the quantity and quality of the summer range are the most limiting factors on this unit. Vegetation composition on the summer range is principally sagebrush/grass and mountain brush, with isolated patches of conifer and aspen. During the late 1990's, the BLM completed several thousand acres of prescribed burning in the mountain big sagebrush and mountain brush zones to help improve herbaceous vegetation on summer ranges.

The South Book Cliffs is valuable mainly as deer winter range. With a maximum elevation of just over 9,000 feet, the unit contains only small amounts of fawning areas and summer range, with few deer residing in the unit year-round. However, many deer that spend the summer on higher ranges in the northern portion of the unit migrate annually to winter ranges in the southern portion of the unit. Terrain between the higher summer ranges and lower winter ranges in the south is steep and rugged, and is used primarily as a travel corridor with limited migration occurring over a short period of time. The upper limits of the normal winter range are found normally between 8,000 and 8,500 feet, depending on the slope and exposure. During severe winters the upper limits are usually lowered to about the 7,000 feet. The lower limits of the winter range are bordered by the salt desert type at approximately 5,000 feet. There are concentrations of wintering deer at Horse Pasture, Nash Wash, Cottonwood Ranch, and the Pear Park area. Due to the steep, rough terrain at the upper elevations of the winter range, these lower critical areas have been historically over-utilized by livestock and game for a long period of time.

Pictographs and petroglyphs found in the unit historically indicate the presence of bighorn sheep, deer, bison and elk in the area before settlement by Europeans. Large herds of cattle and sheep were brought into the area around Moab in the mid-1870's and the 1890's. During this time, livestock use on the South Book Cliffs was limited to the stock of local settlers. This changed in the 1920's when Colorado sheepmen began wintering large herds on the South Book Cliffs. During this period, as many as 200,000 sheep were using the range each winter (Carter 1983). Wild horses are also found in the Winter Ridge and Hill Creek areas. In cooperation with local ranchers, the BLM has been working on fences, water developments, and other improvements to encourage more uniform use of the range by livestock (Carter 1983).

Following the liberal hunting regulations of the late 1950's and 1960's, deer numbers were low and recovery has been slow. The buck only (1974-77) and 4-point-or-better (1978-84) restrictions have played a role in

increases in deer numbers and hunter success. Between 1986 and 1993, however, the harvest of bucks slowly declined. Drought conditions and the harsh winter of 1992-93 had detrimental effects on the deer population in the Book Cliffs and throughout the state. Deer hunting was closed in the unit in the mid-1990's due to low population numbers, and re-opened again in 1999 as a limited entry hunting area. Currently, both deer and elk hunting are on a limited entry basis. Pronghorn are also hunted on the Book Cliffs unit. Bison were also reintroduced in the North Book Cliffs in the winter of 2009.

Management concerns on Unit 10 principally revolve around low fawn production, summer range condition and/or quality (especially fawn rearing habitat), drought impacts on winter range browse species, and the increasing demands for oil and gas development with its associated habitat fragmentation. There is also the possibility at some later date that oil shale and tar sands will be developed.

Range Trend Studies

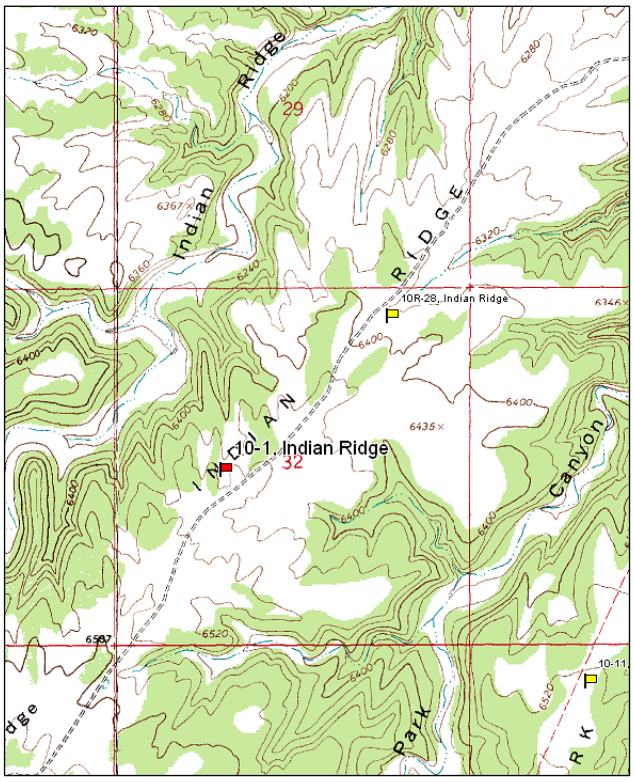
Thirtyone interagency range trend studies were sampled in Unit 10 during the summer of 2010. In the North Book Cliffs, five studies were established in 1982. Two of these studies [Indian Ridge (10-1) and McCook Ridge Exclosure (10-2)] sample desert shrub communities, one study [McCook Ridge Chaining (10-3)] samples a chained and seeded pinyon/juniper community, one study [Wirefence Point (10-4)] samples a mountain brush community and one study [Willow Flat (10-5)] samples a mountain big sagebrush community. Another five studies were established in the South Book Cliffs in 1986. Four of these studies [East Floy Bench (10-14), West Horse Pasture (10-15), East Calf Canyon (10-17) and East Horse Pasture (10-18)] sample Wyoming big sagebrush communities and one study [East Thompson Bench (10-15)] samples a juniper community. A further five studies were established in the North Book Cliffs in 1988. Of these studies, two studies [Agency Draw (10-9) and Sunday School (10-10)] sample desert shrub communities, one study [Cherry Mesa (10-7)] samples a chained and seeded pinyon/juniper community, one study [Black Horse (10-8)] samples a mountain brush community and one study [Wolf Den (10-12)] samples a Wyoming big sagebrush community. One study [Bitter Creek (10-26)] was established in 2000 and another study [Long Canyon (10-27)] was established in 2005 in the South Book Cliffs. Both of these studies sample Wyoming big sagebrush communities. Another study [Wild Horse Bench (10-28)] was established in 2010 in the North Book Cliffs and samples a black sagebrush community in bison range. An additional 31 special studies were established in the North Book Cliffs during the summers of 1997, 1998 and 1999 to address conflicts over elk ad livestock use in the Book Cliffs. Many of these sites have been suspended, but ten of the studies were monitored in 2010. Of these ten studies, two of the studies [McCook Ridge Livestock Exclosure (10R-13 and McCook ridge Total Exlcosure (10R-14)] sample an exclosure complex in conjunction with study 10-2, three studies [Winter Ridge Exclosure Out (10R-9), Railroad Canyon (10R-17) and Rathole Ridge (10R-22)] sample mountain big sagebrush communities, two studies [Lower Tom Patterson Point (10R-5) and Monument Ridge (10R-7)] sample two chained and burned communities, one study [Massey Junction (10R-29)] samples a desert shrub community and one study [Two Water WMA (10R-4)] samples a black sagebrush community. Three further studies [PR Spring Total Exclosure (10R-32), PR Spring Livestock Exclosure (10R-33) and PR Spring Exclosure Outside (10R-34)] were established in 2002 to monitor an exclosure complex in a mountain brush community. As mentioned above, many studies on Unit 10 have been suspended for various reasons and were not monitored in 2010. For further info on suspended studies, refer to past reports at http://wildlife.utah.gov/range/.

INDIAN RIDGE - TREND STUDY NO. 10-1-10

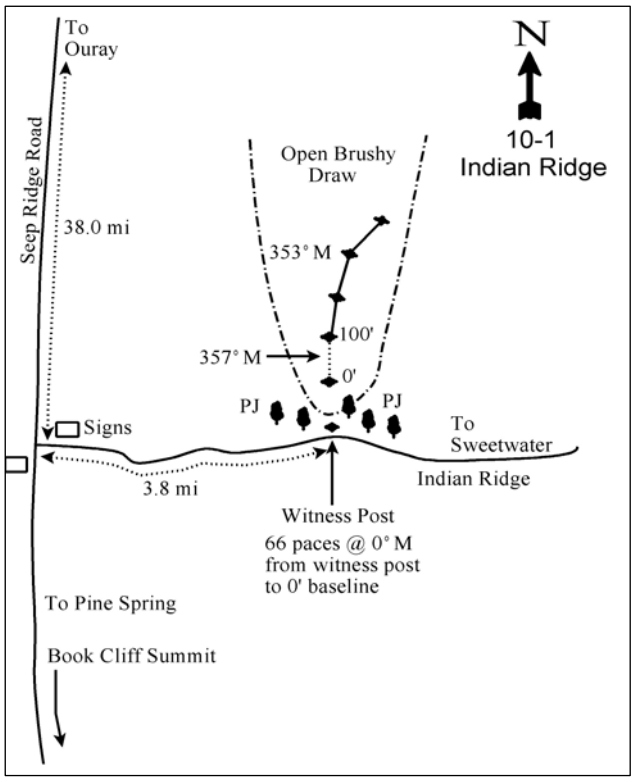
Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Silt Loam (Fourwing Saltbush-Winterfat), R034XY329UT
Land Ownership: SITLA
Elevation: 6450 ft. (1966 m)
Aspect: North
Slope: 6%
Transect bearing: 357° magnetic
Belt placement: line 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 towards Sweetwater Canyon and McCook Ridge for 3.8 miles. Stop by the head of a small sagebrush-saltbush draw, marked by a 20 inch tall fencepost on the left. Walk down the draw 60 paces to the 0-foot baseline stake. The 0-foot baseline stake is marked by a red browse tag.

Map Name: Cooper Canyon



Diagrammatic Sketch:



Township: 13S Range: 23E Section: 32

GPS: NAD 83, UTM 12S 639853 E 4389381 N

Site Information

Site Description: The study is located in a shallow draw on the north side of Indian Ridge. The area is principally deer winter range with the vegetation dominated by desert shrub with an understory of cheatgrass (*Bromus tectorum*). Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*) surround the draw and provide thermal and escape cover. The area is administered by the Utah State Institutional Trust Lands Administration (SITLA). Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Sunday School Allotment. Pellet group data indicated moderate deer use in 2000, with heavier use in 2005 and 2010. A deer carcass was found on the site in 2005. Estimated elk and cattle use were also moderate in 2000, but were light in 2005 and 2010 (Table - Pellet Group Data).

Browse: The key browse species at this site are fourwing saltbush (*Atriplex canescens*), winterfat (*Ceratoides lanata*) and black sagebrush (*Artemisia nova*). Fourwing saltbush has provided over 50% of the browse cover in each reading ranging from 5% to 8% cover since 1995 (Table - Browse Trends). Recruitment of young plants has been good since 1988. There was a steady increase in decadence from 1995 to 2005, but decadence decreased again in 2010. Drought conditions have likely been a key factor in the increased decadence of fourwing saltbush. Utilization of fourwing saltbush has been mostly light to moderate, but had moderate to heavy use in 2005. Winterfat is a preferred browse species, but is low growing and during severe winters could be covered by snow and largely unavailable. Winterfat density was fairly stable from 1982 to 1995, but has steadily decreased since then. Use of winterfat has been mostly light, with the exception of mostly heavy use in 2005. Utilization is difficult to determine on these shrubs due to abundant annual leader growth. Decadence of winterfat has been low and vigor has been good, but recruitment has been low to moderate in most sample years. A small population of black sagebrush was sampled with the increased sample size used after 1992. Recruitment of young plants has been low with a moderate amount of decadence in the population. Plants displaying poor vigor also increased substantially in 2005. Fringed sagebrush (*Artemisia frigida*), a "sub" shrub, is also moderately abundant on the site (Table - Browse Characteristics). Other browse species encountered on the site include basin big sagebrush (*A. tridentata* ssp. *tridentata*) and broom snakeweed (*Gutierrezia sarothrae*).

Herbaceous Understory: Cheatgrass is by far the most abundant understory species found at this site. Photos from 1982, 1988, and 1995 indicate that cheatgrass steadily increased in abundance. Prior to 1991, data for annual species were not collected so it is unknown exactly how abundant it was. Since 1995, nested frequency and cover of cheatgrass have remained very high. Several perennial grass species have been sampled, with thickspike wheatgrass (*Agropyron dasystachyum*), blue grama (*Bouteloua gracilis*) and sand dropseed (*Sporobolus cryptandrus*) being the most abundant. Forbs are very rare on the site. Perennial species are few with no more than four species being sampled in any year. Scarlet globemallow (*Sphaeralcea coccinea*) is the most commonly occurring perennial forb (Table - Herbaceous Trends).

Soil: Soils are alluvial deposited from limestone parent material with a loam texture and a slightly alkaline soil reaction (pH 7.8). Phosphorus has limited availability for plant growth and development at only 2.4 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Erosion is generally outweighed by soil sedimentation coming from the surrounding woodland slopes. Protective ground cover is adequate to limit erosion due to the abundance of thickspike wheatgrass and cheatgrass (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1982 to 1988 - slightly up (+1):** The density of fourwing saltbush nearly doubled and the density of winterfat increased by 11%. Decadence is low and vigor is good. Recruitment of young plants

increased for both species and was good for fourwing saltbush at 11% and excellent for winterfat at 41%.

- **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 the decadence or vigor of either fourwing saltbush or winterfat. Recruitment of young saltbush plants increased markedly to 57% of the population, but recruitment of young winterfat plants decreased to 8%. Black sagebrush was sampled for the first time with the larger sample area.
- **1995 to 2000 - slightly down (-1):** All three of the key browse species; fourwing saltbush, winterfat and black sagebrush, decreased in density. Cover of saltbush and black sagebrush remained similar, but winterfat cover decreased from 3% to 2%. Decadence increased slightly in fourwing saltbush and black sagebrush, and recruitment of young plants decreased for all three species. Even with the decrease, recruitment was still good at 19% for fourwing saltbush.
- **2000 to 2005 - slightly down (-1):** The density of fourwing saltbush has increased by 18%, but cover decreased from 8% to 5% and decadence increased from 15% to 30%. Saltbush plants displaying poor vigor increased from 8% to 18%. The density of winterfat decreased by 29% and recruitment of young plants remained poor.
- **2005 to 2010 - slightly down (-1):** The densities of fourwing saltbush and winterfat decreased markedly, but cover remained similar for both species. Black sagebrush density increased substantially, though cover decreased slightly. Decadence of black sagebrush and fourwing saltbush decreased and both species had moderate decadence at 20%.

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 - down (-2):** The sum of nested frequency of perennial grasses decreased by 23% with a significant decrease in the nested frequency of thickspike wheatgrass and sand dropseed.
- **1995 to 2000 - stable (0):** There was a 16% decrease in the sum of nested frequency of perennial grasses, though cover increased from 4% to 8%. Much of the decrease in frequency was due to a significant decrease in the nested frequency of sand dropseed. Most of the increase in perennial grass cover was due to a significant increase in the nested frequency of thickspike wheatgrass and a subsequent increase in cover from 1% to 6%. Cheatgrass also had a significant decrease in nested frequency and cover decreased from 52% to 22%, but cheatgrass is still very prevalent.
- **2000 to 2005 - stable (0):** The sum of nested frequency of perennial grasses increased to 1995 levels, but cover also decreased to 1995 levels. Cheatgrass increased significantly in nested frequency and cover increased to 49%.
- **2005 to 2010 - stable (0):** The perennial grass sum of nested frequency changed little, with a slight increase in cover. Cheatgrass frequency and cover also remained similar.

Forb:

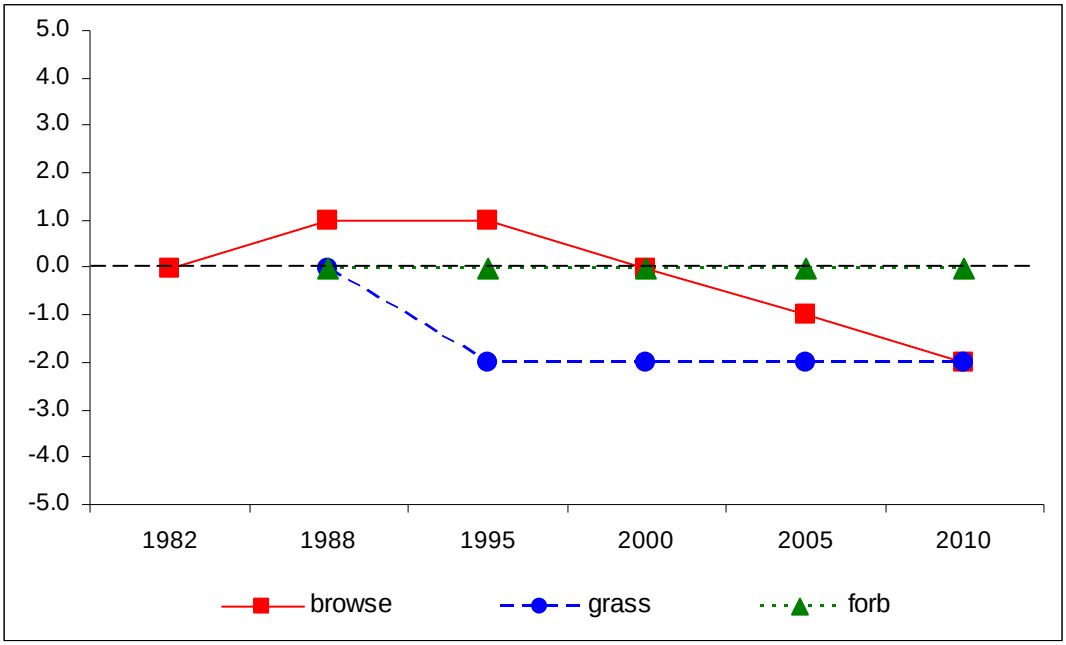
- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for forbs are available from 1982, so no trend was given.
- **1988 to 1995 - stable (0):** Forbs are very rare and provide little forage.
- **1995 to 2000 - stable (0):** Forbs are very rare and provide little forage.
- **2000 to 2005 - stable (0):** Forbs are very rare and provide little forage.
- **2005 to 2010 - stable (0):** Forbs are very rare and provide little forage.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 1

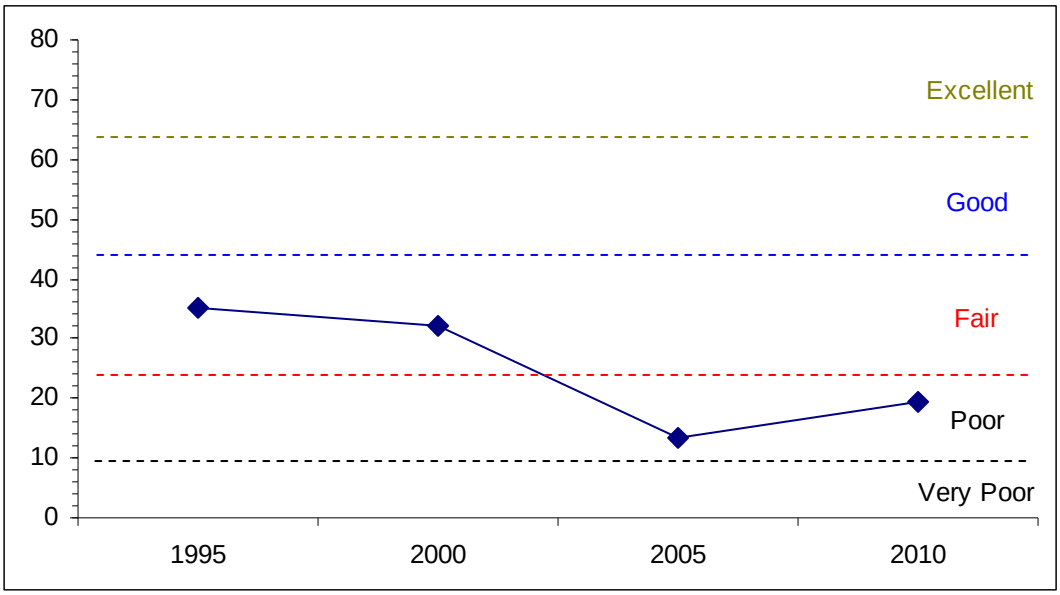
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	17.9	13.6	15.0	7.5	-20.0	1.2	0.0	**35.2**	Fair
00	15.0	9.8	6.9	16.1	-16.5	0.6	0.0	**32.0**	Fair
05	12.0	6.5	5.6	7.5	-20.0	1.7	0.0	**13.3**	Poor
10	12.8	9.7	6.4	9.6	-20.0	0.9	0.0	**19.4**	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 1



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10, Study no: 1



HERBACEOUS TRENDS--
Management unit 10, Study no: 1

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	b75	a38	b77	b83	ab66	1.29	6.28	1.87	1.12
G	Bouteloua gracilis	a8	ab26	ab25	b38	b47	1.01	.76	1.23	2.35
G	Bromus tectorum (a)	-	c379	a302	b344	b329	51.80	22.05	49.03	44.27
G	Oryzopsis hymenoides	a-	ab10	ab4	ab7	b8	.09	.04	.07	.07
G	Poa fendleriana	9	16	14	4	14	.21	.07	.06	.17
G	Sitanion hystrix	a-	b10	ab7	b14	ab3	.10	.19	.18	.01
G	Sporobolus cryptandrus	c161	b94	a37	ab53	ab64	1.04	.66	.35	1.06
G	Stipa comata	-	1	-	-	-	.00	-	-	-
Total for Annual Grasses		0	379	302	344	329	51.80	22.05	49.03	44.27
Total for Perennial Grasses		253	195	164	199	202	3.76	8.03	3.77	4.79
Total for Grasses		253	574	466	543	531	55.57	30.08	52.81	49.07
F	Astragalus sp.	-	1	-	-	-	.00	-	-	-
F	Cryptantha sp.	-	-	-	3	9	-	-	.00	.06
F	Descurainia pinnata (a)	-	ab4	a-	b14	ab4	.01	-	.09	.01
F	Draba sp. (a)	-	3	-	1	-	.00	-	.00	-
F	Lappula occidentalis (a)	-	b57	a5	bc81	c117	.48	.07	.87	1.16
F	Schoencrambe linifolia	-	6	1	6	6	.04	.00	.01	.01
F	Sphaeralcea coccinea	a20	b48	a19	ab30	a24	.58	.23	.82	.35
F	Tragopogon dubius	5	-	5	-	1	-	.07	-	.00
F	Trifolium dubium	6	-	-	-	-	-	-	-	-
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	64	5	96	121	0.50	0.07	0.97	1.17
Total for Perennial Forbs		32	55	25	39	40	0.62	0.31	0.83	0.43

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
Total for Forbs		32	119	30	135	161	1.12	0.37	1.80	1.61

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

BROWSE TRENDS--
Management unit 10, Study no: 1

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia frigida	75	9	9	7	1.36	.09	.04	.34
B	Artemisia nova	11	9	9	9	2.27	2.53	3.11	2.12
B	Artemisia tridentata tridentata	1	1	1	0	.01	-	-	-
B	Atriplex canescens	56	51	58	47	7.87	7.57	5.21	6.85
B	Ceratoides lanata	86	73	58	35	3.09	1.86	1.23	1.02
B	Gutierrezia sarothrae	10	15	11	18	.12	1.01	.13	.81
B	Pinus edulis	0	1	0	0	-	.00	-	.00
Total for Browse		239	159	149	116	14.73	13.08	9.72	11.17

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 1

Species	Percent Cover	
	'05	'10
Artemisia frigida	-	.21
Artemisia nova	3.40	3.54
Atriplex canescens	5.91	9.30
Ceratoides lanata	.28	.36
Gutierrezia sarothrae	.06	1.21

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 1

Species	Average leader growth (in)	
	'05	'10
Atriplex canescens	4.5	3.3
Ceratoides lanata	4.5	2

BASIC COVER--
Management unit 10, Study no: 1

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	2.25	8.75	65.86	46.86	58.90	62.64
Rock	1.25	.50	1.08	.32	.76	.01
Pavement	13.50	4.75	3.41	3.73	8.00	5.23
Litter	73.00	79.50	62.46	60.58	25.20	63.46
Cryptogams	0	0	.39	1.19	.06	.01
Bare Ground	10.00	6.50	8.80	12.56	17.90	6.59

SOIL ANALYSIS DATA --

Management unit 10, Study no: 1, Study Name: Indian Ridge

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
22.8	7.8	36.0	38.0	26.0	1.7	2.4	275.2	0.6

PELLET GROUP DATA--

Management unit 10, Study no: 1

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	6	21	48	20
Elk	2	11	14	8
Deer	9	8	36	26
Cattle	6	3	4	6

Days use per acre (ha)		
'00	'05	'10
-	-	-
28 (70)	10 (25)	8 (20)
27 (68)	52 (129)	68 (167)
23 (56)	9 (23)	12 (30)

BROWSE CHARACTERISTICS--

Management unit 10, Study no: 1

		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	**3799**	33	67	-	733	0	0	0	9/9
88	**266**	50	50	-	266	0	0	0	13/5
95	**6000**	16	84	-	520	0	0	0	14/7
00	**420**	19	81	-	160	33	5	0	4/5
05	**300**	40	60	-	-	27	7	0	5/5
10	**760**	3	97	-	-	0	0	0	5/8
Artemisia nova									
82	**0**	0	0	0	-	0	0	0	-/-
88	**0**	0	0	0	-	0	0	0	-/-
95	**960**	13	69	19	80	31	52	0	9/17
00	**820**	5	61	34	-	15	0	22	10/23
05	**780**	5	59	36	-	44	5	28	12/25
10	**1080**	2	78	20	-	9	7	20	8/22
Artemisia tridentata tridentata									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**40**	100	0	-	20	0	0	0	41/69
00	**20**	0	100	-	-	0	100	0	15/16
05	**20**	0	100	-	-	0	100	0	30/60
10	**0**	0	0	-	-	0	0	0	31/74

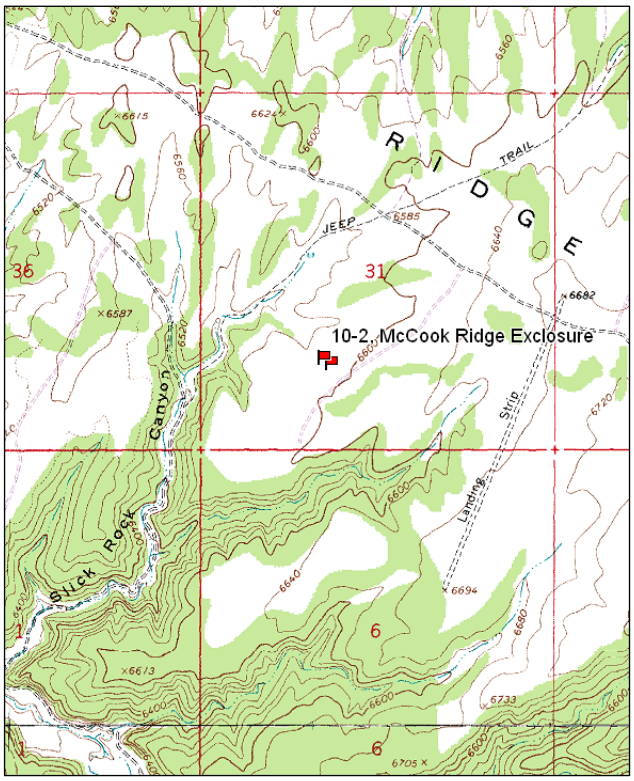
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Atriplex canescens									
82	**399**	0	100	0	-	50	0	0	30/31
88	**599**	11	89	0	-	0	0	0	49/70
95	**2180**	57	40	3	320	.91	0	0	38/46
00	**1780**	19	66	15	-	13	1	8	33/44
05	**2100**	16	54	30	40	31	50	18	29/35
10	**1480**	16	64	20	160	61	3	15	31/44
Ceratoides lanata									
82	**7132**	17	83	0	399	2	0	0	12/9
88	**7931**	41	58	1	66	24	7	0	15/10
95	**6240**	8	91	1	100	.32	0	1	13/9
00	**3980**	5	91	4	120	62	3	3	10/11
05	**2820**	6	91	4	-	15	78	3	8/8
10	**1180**	17	80	3	-	7	3	5	9/9
Gutierrezia sarothrae									
82	**66**	0	100	0	-	0	0	0	7/11
88	**0**	0	0	0	-	0	0	0	-/-
95	**380**	16	84	0	20	0	0	0	10/6
00	**1440**	4	85	11	-	0	0	15	6/8
05	**680**	38	62	0	60	0	0	0	8/7
10	**2880**	3	95	1	240	0	0	.69	7/9
Pinus edulis									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	40	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	20	0	0	0	-/-

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

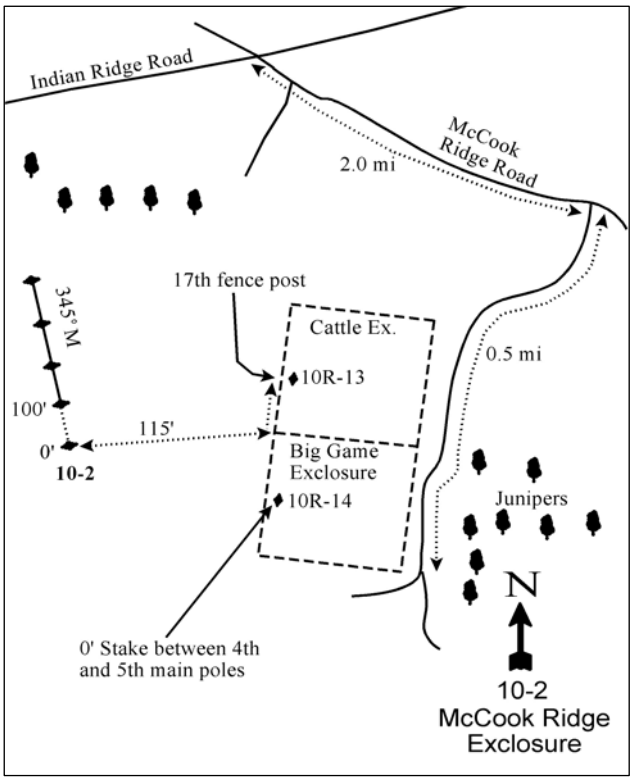
Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R034XY334UT
Land Ownership: BLM
Elevation: 6560 ft. (2000 m)
Aspect: Northwest
Slope: 4%
Transect bearing: 345° magnetic
Belt placement: line 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 exclosure can be seen off the south side of the road.). Turn right and drive approximately 0.5 miles to the exclosure. From the northwest side of the deer fence on the lower McCook Ridge Exclosure, the 0-foot baseline stake is approximately 40 paces away bearing 263°M.

Map Name: Cooper Canyon



Diagrammatic Sketch:



Township: 13S Range: 24E Section: 31

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 exclosure complex constructed in 1964 on Lower McCook Ridge. Studies in the livestock exclosure (10R-13) and total exclosure (10R-14) were established in 1997. This study was read in conjunction with the exclosure 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 littler 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.

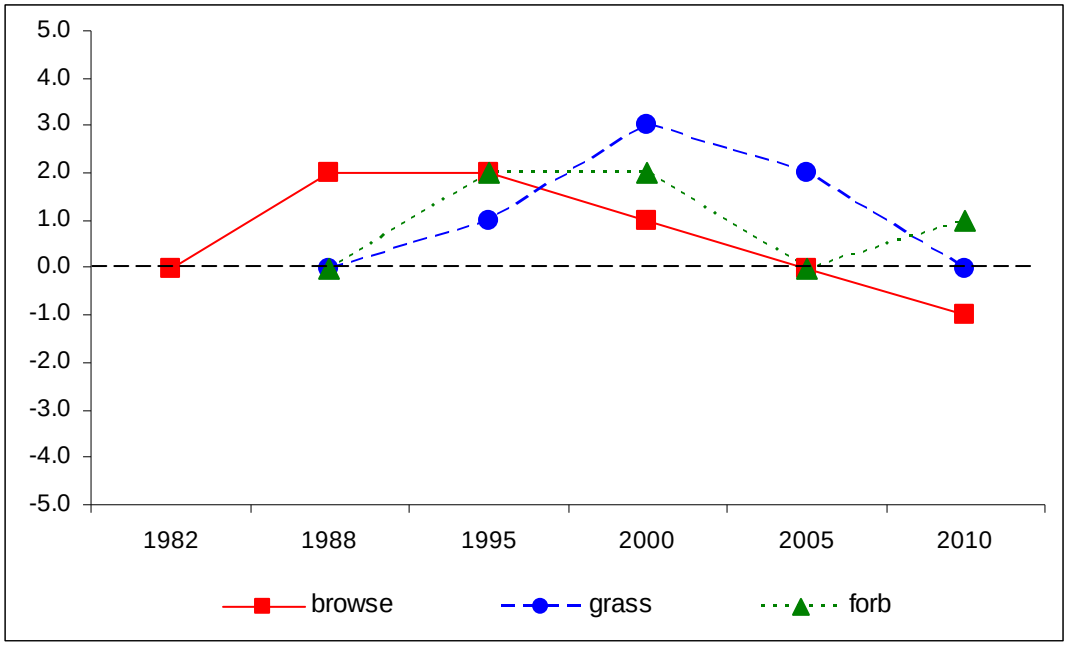
- **1988 to 1995 - up (+2):** Perennial forb sum of nested frequency increased by 34%.
- **1995 to 2000 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, but cover increased from 1% to 3% due to a large increase in cover of scarlet globemallow.
- **2000 to 2005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

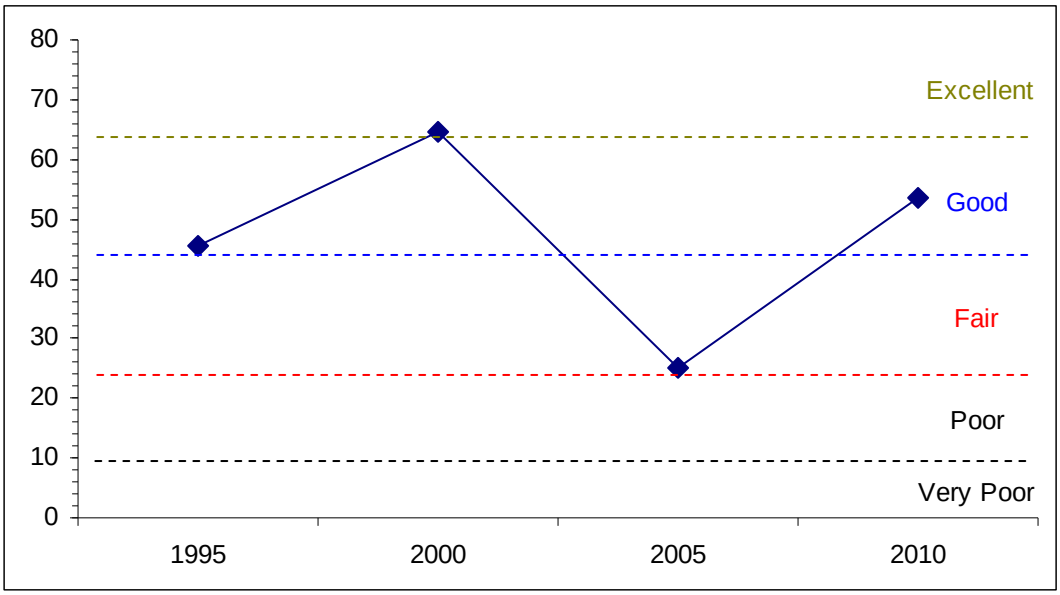
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	23.9	13.0	12.7	5.6	-11.9	2.2	0.0	**45.4**	Fair-Good
00	27.4	9.2	9.8	15.9	-3.1	5.4	0.0	**64.5**	Good-Excellent
05	17.9	5.8	2.8	6.9	-10.3	2.1	0.0	**25.2**	Poor-Fair
10	19.3	10.7	15.0	8.0	-3.7	4.2	0.0	**53.4**	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	Agropyron dasystachyum	a-	a-	a-	ab4	b15	b26	-	-	.38	.22	.93
G	Bromus tectorum (a)	-	d288	d263	b171	c191	b148	15.91	5.44	4.17	13.75	4.95
G	Festuca ovina	4	-	-	1	-	-	-	-	.00	-	-
G	Oryzopsis hymenoides	1	7	15	10	10	15	.24	.22	.62	.06	.43
G	Poa secunda	a30	b103	b120	b118	c128	b98	2.04	1.35	4.42	1.79	2.00
G	Sitanion hystrix	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	Allium sp.	-	2	-	2	-	-	.00	-	.00	-	-
F	Calochortus nuttallii	-	2	-	-	-	-	.00	-	-	-	-
F	Chaenactis douglasii	-	-	-	-	1	-	-	-	-	.00	-
F	Chenopodium leptophyllum(a)	-	-	-	-	1	5	-	-	-	.00	.01
F	Cymopterus sp.	-	-	-	-	2	-	-	-	-	.00	-
F	Delphinium nuttallianum	-	2	2	-	-	-	.00	.00	-	-	-
F	Descurainia pinnata (a)	-	b32	ab13	a-	b30	a6	.29	.08	.00	.29	.01
F	Draba sp. (a)	-	b11	a-	a-	ab7	ab1	.02	-	-	.02	.00
F	Erigeron flagellaris	-	1	-	-	-	-	.01	-	-	-	-
F	Erigeron pumilus	bc32	c40	c42	bc33	a-	b11	.25	.40	.29	-	.36
F	Lappula occidentalis (a)	-	c55	bc38	b21	d108	d124	.27	.29	.20	1.46	.54
F	Medicago sativa	-	-	-	-	-	9	-	-	-	-	.01
F	Penstemon sp.	-	-	2	-	-	-	-	.03	-	-	-
F	Schoencrambe linifolia	a-	b25	a2	a-	a-	ab12	.05	.00	-	-	.03
F	Sisymbrium altissimum (a)	-	6	-	-	-	-	.07	-	-	-	-

Type	Species	Nested Frequency						Average Cover %				
		'88	'95	'97	'00	'05	'10	'95	'97	'00	'05	'10
F	Sphaeralcea coccinea	98	100	105	119	96	90	.75	.95	2.24	1.03	1.67
F	Tragopogon dubius	a-	a2	a-	b21	a-	a-	.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	Artemisia frigida	69	53	70	46	69	3.04	2.94	6.44	.48	4.30
B	Artemisia tridentata tridentata	56	57	58	54	58	10.39	9.15	12.00	10.66	9.66
B	Atriplex canescens	27	10	24	25	20	1.99	.73	2.55	1.04	.26
B	Atriplex confertifolia	0	0	0	0	1	-	-	-	-	-
B	Ceratoides lanata	71	62	61	66	49	4.31	2.08	2.20	2.25	2.05
B	Gutierrezia sarothrae	39	31	40	20	49	1.41	.38	.95	.25	3.02
B	Opuntia sp.	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
Artemisia frigida	.28	3.13
Artemisia tridentata tridentata	10.51	9.73
Atriplex canescens	.95	.90
Ceratoides lanata	2.40	2.06
Gutierrezia sarothrae	-	1.76
Opuntia sp.	.06	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 2

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata tridentata	3.3	1.2
Ceratoides lanata	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				
	'95	'97	'00	'05	'10
Rabbit	11	3	15	68	19
Elk	18	26	24	26	6
Deer	17	21	18	37	34
Cattle	-	1	-	4	1

Days use per acre (ha)			
'97	'00	'05	'10
-	-	-	-
51 (126)	28 (68)	8 (20)	19 (46)
38 (94)	27 (67)	86 (212)	19 (48)
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)
Artemisia frigida									
82	**299**	0	100	0	33	0	0	0	7/3
88	**1199**	19	81	0	233	0	0	0	7/5
95	**9680**	31	69	0	2520	.82	.82	0	12/10
97	**7900**	14	86	0	80	0	0	0	10/8
00	**9800**	10	87	2	8040	17	7	.40	4/7
05	**2680**	31	68	1	560	4	0	.74	5/6
10	**7960**	25	74	2	8360	0	0	2	5/8
Artemisia tridentata tridentata									
82	**3965**	15	79	6	166	5	0	6	24/33
88	**5865**	44	26	30	1766	47	14	2	24/30
95	**3860**	31	58	11	1720	53	3	3	22/30
97	**3040**	14	66	20	160	55	9	4	21/28
00	**3980**	32	43	26	20	26	13	9	19/29
05	**3500**	5	59	35	-	41	37	24	24/31
10	**3940**	32	46	22	480	10	26	23	23/32

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

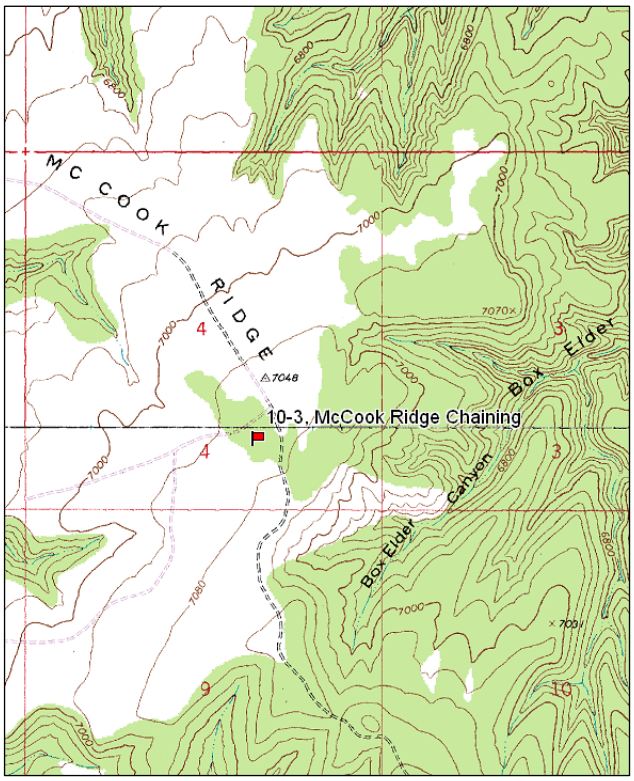
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pinus edulis									
82	**0**	0	0	-	-	0	0	0	-/-
88	**33**	100	0	-	33	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
97	**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	-/-

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

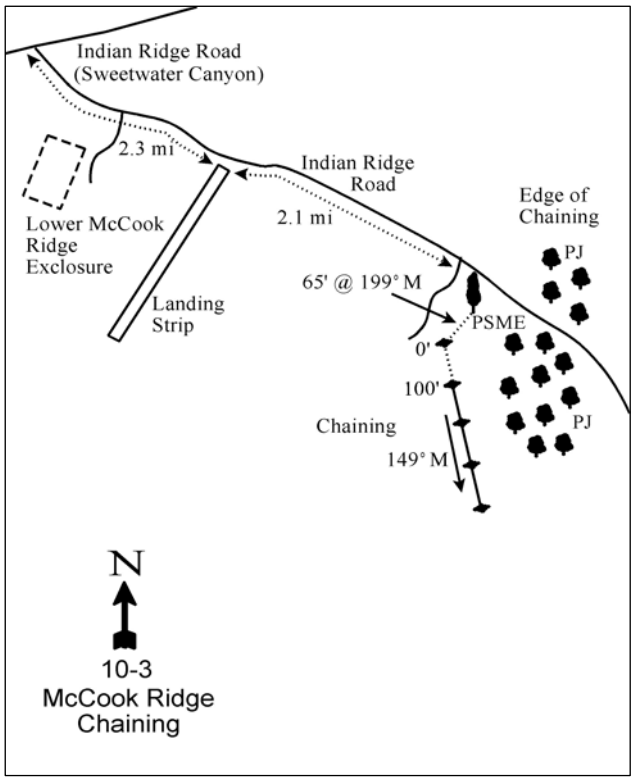
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R034XY334UT
Land Ownership: BLM
Elevation: 7030 ft. (2143 m)
Aspect: Southwest
Slope: 5%
Transect bearing: 149° magnetic
Belt 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:

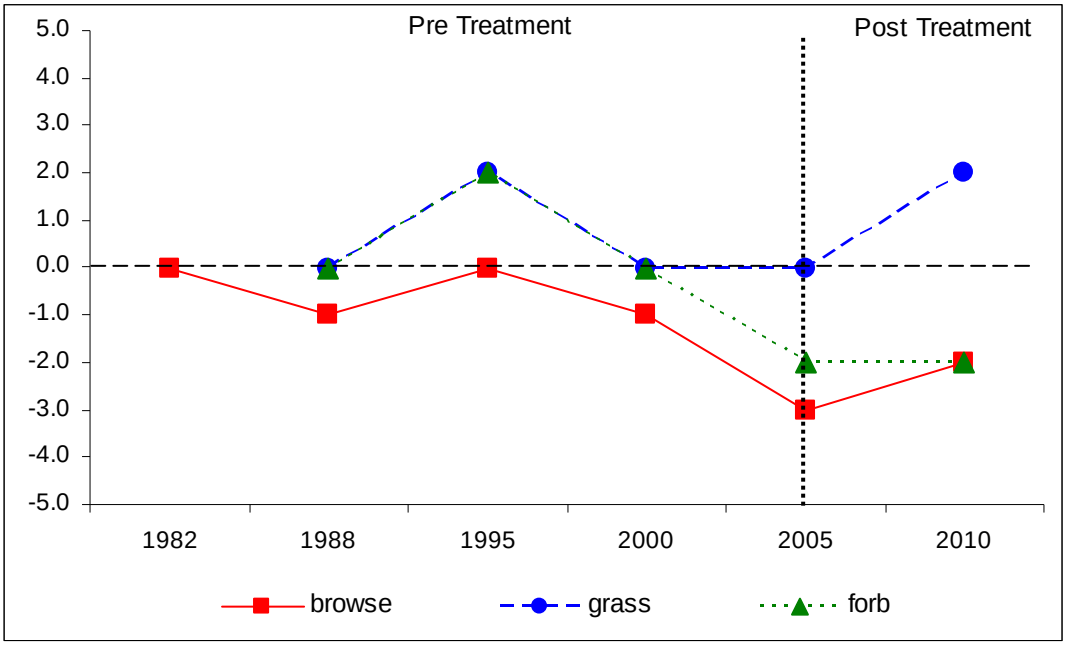
- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for forbs are available from 1982, so no trend was given.
- **1988 to 1995 - up (+2):** The sum of nested frequency of perennial forbs increased 60% and the number of species sampled increased from 9 to 17. Few annual forbs were sampled.
- **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

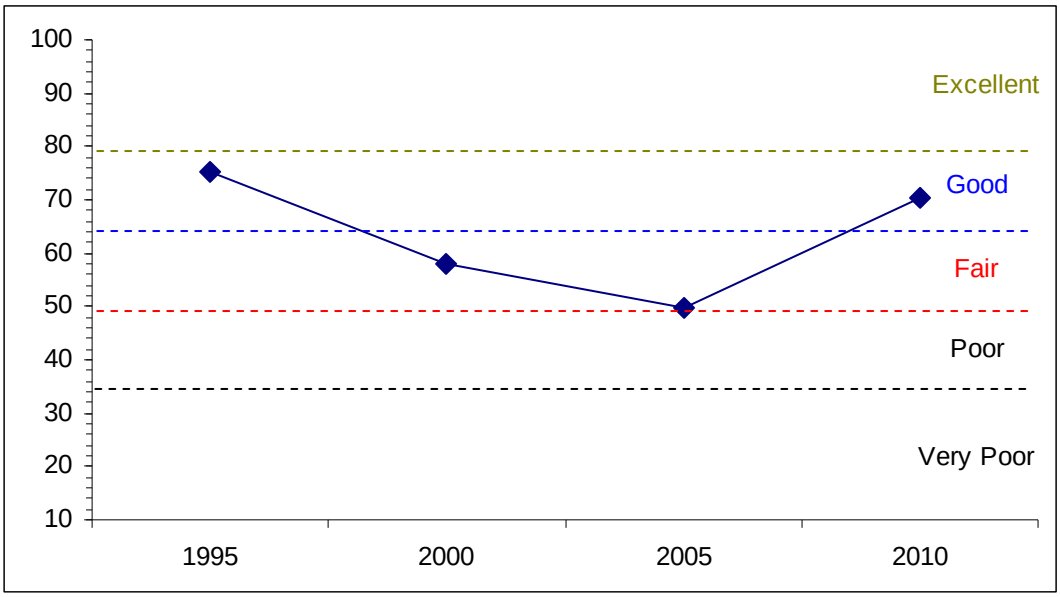
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	14.0	14.5	14.3	24.3	0.0	8.0	0.0	**75.1**	Good
00	16.0	6.9	3.4	29.0	0.0	2.7	0.0	**57.9**	Fair
05	11.6	10.3	1.5	24.8	0.0	1.8	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				Average diameter (in)			
	'95	'00	'05	'10	'95	'00	'05	'10
Juniperus osteosperma	88	147	65	43	7.5	2.5	3.4	0.8
Pinus edulis	106	127	42	22	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

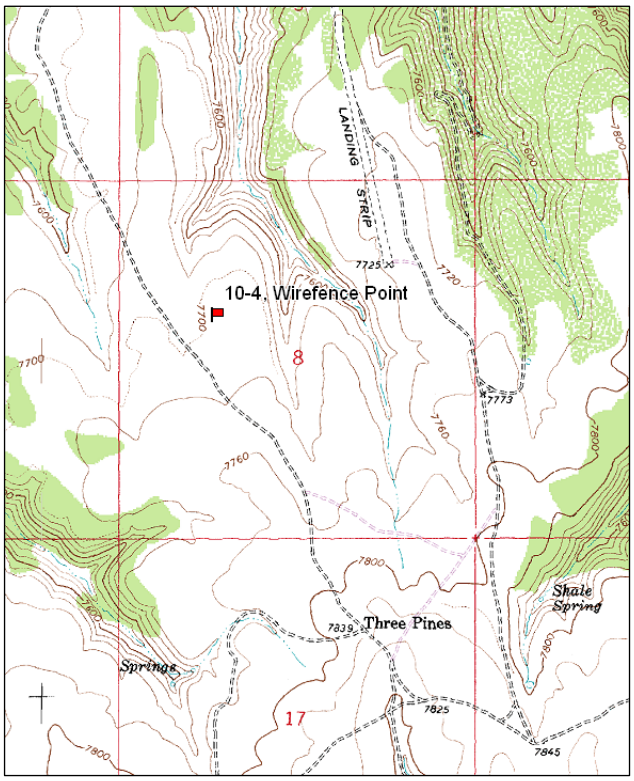
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Juniperus osteosperma									
82	**66**	100	0	0	-	0	0	0	-/-
88	**132**	50	50	0	66	50	0	0	118/79
95	**0**	0	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	-/-

WIREFENCE POINT - TREND STUDY NO. 10-4-10

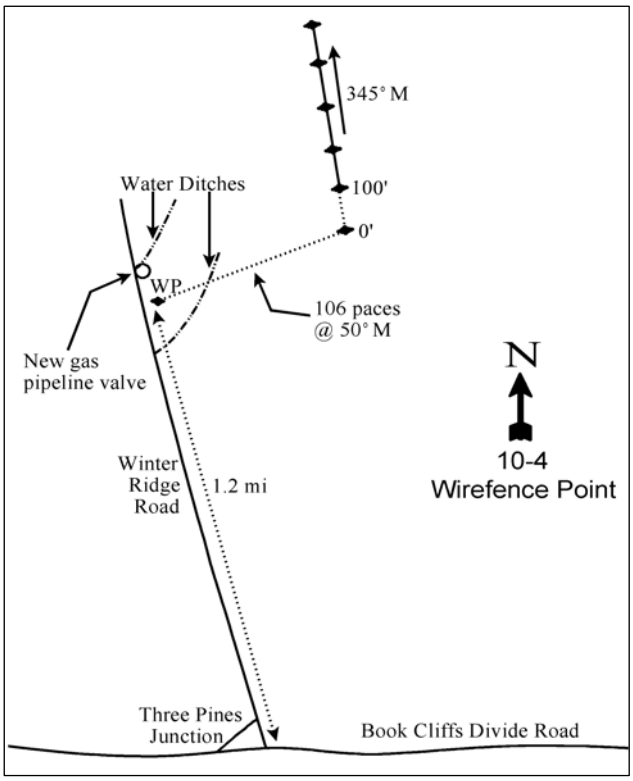
Vegetation Type: Mountain Brush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Upland Loam (Wyoming Big Sagebrush), R034XY306UT
Land Ownership: SITLA
Elevation: 7640 ft. (2329 m)
Aspect: Southwest
Slope: 0-5%
Transect bearing: 345° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). 0' stake has no browse tag.

Directions:
From the Book Cliffs Divide road near Three Pines, turn right on the Winter Ridge Road. Travel 1.2 miles toward Winter Ridge to a witness point. There may be an old drainage ditch or faint fork on the right hand side of the road. From the witness post, walk out 106 paces bearing 50°M to the 0-foot baseline stake.

Map Name: Cedar Camp Canyon



Diagrammatic Sketch:



Township: 16S Range: 23E Section: 8

GPS: NAD 83, UTM 12S 636989 E 4365905 N

Site Information

Site Description: The study is located on summer range near the head of Wirefence Canyon and the Three Pines intersection. The vegetation composition of the site is a mixture of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), perennial grasses and perennial forbs. A 2,4-D herbicide treatment was done in the 1980's to thin sagebrush, however, sagebrush is again the dominant overstory species. The study site marker stakes could not be located in 1995, so new posts were placed as closely as possible to the old baseline using photographs from previous readings. A lop and scatter treatment was done in the fall of 2008 to remove young, encroaching pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees as part of the Three Pines L and S (WRI Project #1078). Large, mature trees were not removed. Grazing in the area is administered by the Utah State Institutional Trust Lands Administration (SITLA) and as part of the Bookcliffs Pasture allotment. This area is grazed by cattle on a rotation deferred system between spring and summer and elk appear to use this area during mild winters. Pellet group data has indicated light to moderate use by deer and elk, and light use by cattle since 2000 (Table - Pellet Group Data). Wild horses are also found in the area and were observed in 2005.

Browse: In 1988, there was little evidence of the herbicide thinning treatment of browse with only a few sagebrush skeletons or sprouting serviceberry being observed. Mountain big sagebrush is again the dominant species and most abundant browse species on the site in both cover (Table - Browse Trends) and density. The sagebrush population is comprised of mostly mature plants with fluctuating, but good, recruitment of young plants over the course of the study. Decadence of sagebrush has increased since 1995, but was still moderately low in 2010. Utilization of sagebrush has been mostly light to moderate with heavy use noted in 1988 and 2010 (Table - Browse Characteristics).

Other browse species present in the area include: squaw apple (*Peraphyllum ramosissimum*), snowberry (*Symphoricarpos oreophilus*), Utah serviceberry (*Amelanchier utahensis*), bitterbrush (*Purshia tridentata*), dwarf rabbitbrush (*Chrysothamnus depressus*) and gray horsebrush (*Tetradymia canescens*). These species occur in low densities and some were not sampled in the shrub density strips, but were measured for height/crown. Squaw apple and dwarf rabbitbrush are the next most abundant preferred browse after sagebrush. Squaw apple utilization has been mostly moderate with several years of heavy use. Dwarf rabbitbrush appears to have a fairly stable density with the majority of the population consisting of mature plants (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are diverse and fairly abundant on the site. The dominant grass species are thickspike wheatgrass (*Agropyron dasystachyum*), mutton bluegrass (*Poa fendleriana*), Sandberg bluegrass (*P. secunda*), Kentucky bluegrass (*P. pratensis*), prairie junegrass (*Koeleria cristata*) and needle-and-thread (*Stipa comata*). Composition of grasses has fluctuated with changes in these species frequencies and cover, with species being more abundant in some sample years and less abundant in others. Forbs are also diverse and have accounted for more than half of the herbaceous cover with each reading. Unfortunately, the most common forbs are low growing with little forage value such as rose pussytoes (*Antennaria rosea*), mat penstemon (*Penstemon caespitosus*), desert phlox (*Phlox austromontana*) and lanceleaved sedum (*Sedum lanceolatum*) (Table - Herbaceous Trends).

Soil: Soils are a clay loam with a neutral soil reaction (pH 6.7) (Table - Soil Analysis Data). The soil surface is cracked from drying, indicating the abundance of clay in the soil. Bare ground cover is moderately high with protective cover being provided primarily by vegetation and litter (Table - Basic Cover). There was some evidence of overland flow and slight pedestaling around shrubs in several of the sample years. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1982 to 1988 - up (+2):** The density of the primary browse species, mountain big sagebrush, increased by 66% from 4,665 plants/acre to 7,731 plants/acre due to a marked increase in the recruitment of young plants. Young plants comprised over half of the population.
- **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. Decadence of sagebrush remained low, vigor was good and recruitment of young plants remained high.
- **1995 to 2000 - stable (0):** There was a 9% increase in the density of sagebrush from 5,180 plants/acre to 5,640 plants/acre, and cover remained similar. There was a slight decrease in the recruitment of young plants, but recruitment remained excellent at 29%.
- **2000 to 2005 - stable (0):** The density of sagebrush decreased by 11% to 5,000 plants/acre, but cover increased from 13% to 17%. It appears that the population is maturing and infilling with a decrease in the recruitment of young plants. Recruitment remained good at 12%.
- **2005 to 2010 - stable (0):** There was little change in the density or cover of sagebrush. Decadence of sagebrush has increased since 1995, but is still moderately low at 26%. Recruitment of young plants increased slightly to 19%.

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 down (-1):** There was a 13% decrease in the sum of nested frequency primarily due to a large and significant decrease in the nested frequency of needle-and-thread.
- **1995 to 2000 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses, though composition has changed. There was a large decrease in cover and a significant decrease in the nested frequency of thickspike wheatgrass, and a large increase in cover and a significant increase in the nested frequency of mutton bluegrass.
- **2000 to 2005 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 18%, though cover increased markedly from 9% to 13%. Much of the increase in cover was due to a significant increase in the nested frequency of Kentucky bluegrass with a large subsequent increase in cover.
- **2005 to 2010 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover decreased to 8%. Prairie junegrass decreased significantly in nested frequency.

Forb:

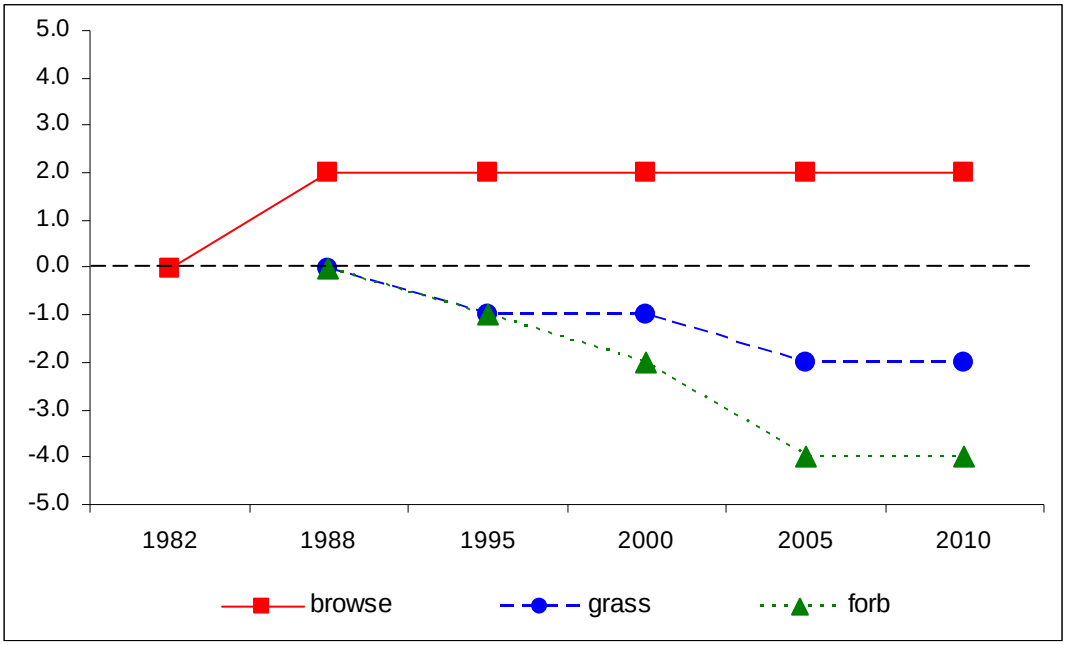
- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for forbs are available from 1982, so no trend was given.
- **1988 to 1995 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 13% with a significant decrease in the nested frequency of many of the predominant perennial forbs.
- **1995 to 2000 - slightly down (-1):** The perennial forb sum of nested frequency decreased by 16% and cover decreased slightly from 18% to 16%.
- **2000 to 2005 - down (-2):** There was a 20% decrease in the sum of nested frequency of perennial forbs and cover decreased to 13%.
- **2005 to 2010 - stable (0):** The sum of nested frequency of perennial forbs changed little, though cover decreased slightly.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 10, study no: 4

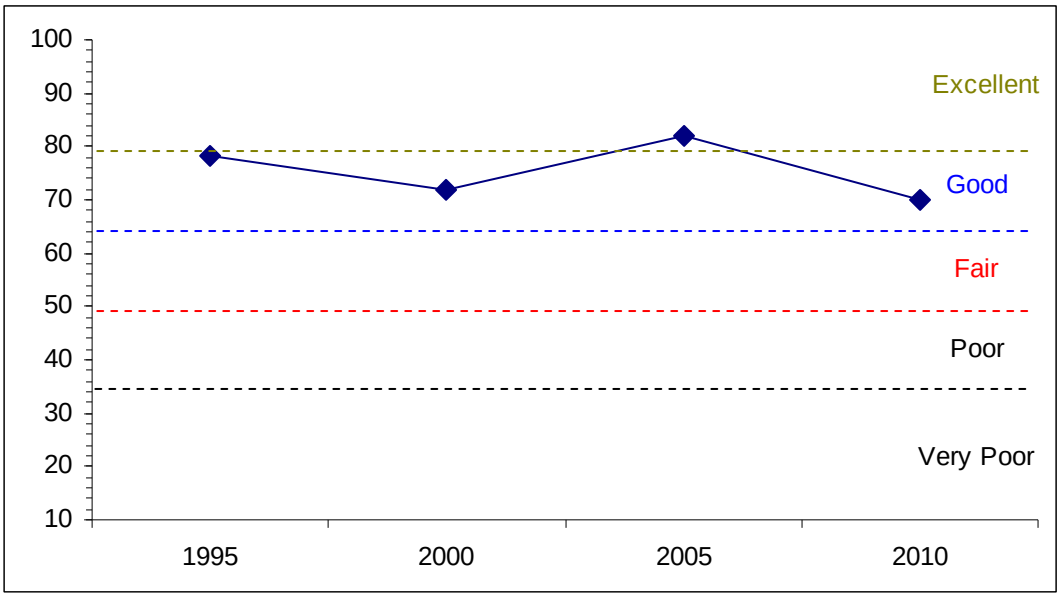
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	21.9	13.5	15.0	17.8	0.0	10.0	0.0	**78.2**	Good-Excellent
00	20.2	10.6	13.1	18.0	0.0	10.0	0.0	**71.9**	Good
05	27.5	10.7	8.1	25.7	0.0	10.0	0.0	**82.1**	Excellent
10	27.0	8.4	8.0	16.6	0.0	10.0	0.0	**70.0**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 10, Study no: 4



HERBACEOUS TRENDS--
Management unit 10, Study no: 4

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	$_{b}$195	$_{b}$174	$_{a}$74	$_{a}$47	$_{a}$81	1.58	.48	.31	.78
G	Bouteloua gracilis	$_{b}$25	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
G	Carex sp.	$_{b}$53	$_{a}$22	$_{ab}$33	$_{a}$16	$_{ab}$33	.05	.39	.05	.48
G	Koeleria cristata	$_{a}$92	$_{b}$172	$_{b}$168	$_{b}$143	$_{a}$83	2.52	2.50	3.34	1.48
G	Oryzopsis hymenoides	-	-	1	1	-	-	.00	.00	-
G	Poa fendleriana	$_{a}$-	$_{bc}$84	$_{d}$182	$_{c}$118	$_{b}$63	1.37	4.40	2.84	.64
G	Poa pratensis	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$81	$_{b}$72	-	-	4.25	2.44
G	Poa secunda	$_{c}$133	$_{c}$137	$_{b}$85	$_{a}$10	$_{a}$20	2.75	.69	.12	.37
G	Sitanion hystrix	-	-	2	1	-	-	.01	.00	-
G	Stipa comata	$_{c}$225	$_{ab}$42	$_{a}$37	$_{ab}$60	$_{b}$83	.58	.50	1.91	2.08
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		723	631	582	477	435	8.89	9.00	12.86	8.28
Total for Grasses		723	631	582	477	435	8.89	9.00	12.86	8.28
F	Agoseris glauca	$_{a}$-	$_{b}$25	$_{bc}$35	$_{b}$21	$_{c}$51	.11	.18	.19	.50
F	Androsace septentrionalis (a)	-	$_{b}$65	$_{a}$16	$_{b}$52	$_{a}$28	.18	.05	.39	.05
F	Antennaria rosea	$_{c}$196	$_{b}$99	$_{b}$103	$_{ab}$95	$_{a}$57	2.40	3.19	2.44	1.20
F	Arabis sp.	$_{b}$47	$_{a}$5	$_{a}$1	$_{a}$-	$_{a}$-	.01	.00	-	-
F	Arenaria congesta	$_{c}$256	$_{ab}$66	$_{b}$96	$_{b}$74	$_{a}$39	.82	1.68	1.12	.55
F	Aster sp.	$_{a}$-	$_{b}$11	$_{b}$10	$_{b}$11	$_{b}$12	.08	.08	.07	.05
F	Astragalus convallarius	$_{a}$1	$_{ab}$19	$_{b}$33	$_{b}$21	$_{b}$33	.07	.42	.41	.26
F	Astragalus sp.	5	11	1	4	3	.59	.03	.01	.04
F	Astragalus spatulatus	-	1	5	-	4	.03	.06	-	.18
F	Calochortus nuttallii	$_{a}$-	$_{b}$9	$_{a}$-	$_{ab}$1	$_{ab}$3	.02	-	.00	.01
F	Castilleja flava	$_{a}$8	$_{b}$41	$_{ab}$22	$_{a}$5	$_{ab}$26	.31	.19	.04	.19

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	Castilleja linariaefolia	-	-	-	1	-	-	-	.00	-
F	Chaenactis douglasii	$_{a}$-	$_{a}$4	$_{a}$4	$_{ab}$15	$_{b}$25	.00	.01	.43	.31
F	Chenopodium fremontii (a)	-	-	-	-	3	-	-	-	.00
F	Cirsium sp.	3	-	-	-	-	-	-	-	-
F	Collinsia parviflora (a)	-	$_{b}$30	$_{a}$-	$_{b}$16	$_{b}$20	.12	-	.03	.09
F	Comandra pallida	$_{c}$222	$_{ab}$97	$_{b}$127	$_{a}$62	$_{a}$75	.45	1.39	.61	.33
F	Cordylanthus sp. (a)	-	-	-	-	1	-	-	-	.00
F	Crepis acuminata	$_{a}$6	$_{b}$56	$_{b}$45	$_{b}$56	$_{b}$42	.36	.54	.54	.42
F	Cryptantha sp.	7	-	-	8	1	-	-	.01	.00
F	Cymopterus sp.	-	1	-	8	3	.01	-	.03	.03
F	Delphinium nuttallianum	-	6	-	5	-	.01	-	.01	-
F	Erigeron eatonii	$_{a}$-	$_{a}$-	$_{b}$31	$_{b}$36	$_{c}$65	-	.18	.42	.63
F	Erigeron pumilus	$_{d}$174	$_{c}$109	$_{b}$35	$_{a}$3	$_{a}$-	.58	.25	.00	-
F	Eriogonum alatum	$_{a}$-	$_{b}$17	$_{b}$10	$_{ab}$9	$_{b}$12	.15	.05	.05	.10
F	Eriogonum racemosum	-	-	4	-	5	-	.01	-	.01
F	Eriogonum umbellatum	$_{ab}$41	$_{b}$55	$_{ab}$30	$_{a}$22	$_{a}$22	.98	.25	.36	.36
F	Gayophytum ramosissimum(a)	-	1	-	4	-	.00	-	.01	-
F	Hymenopappus filifolius	$_{a}$-	$_{b}$31	$_{b}$31	$_{a}$-	$_{a}$-	.71	.47	-	-
F	Hymenoxys richardsonii	-	-	2	5	3	-	.03	.01	.03
F	Lesquerella ludoviciana	$_{a}$-	$_{b}$39	$_{ab}$21	$_{b}$33	$_{b}$41	.23	.05	.57	.31
F	Linum lewisii	$_{a}$-	$_{c}$40	$_{ab}$9	$_{b}$17	$_{b}$16	.18	.05	.10	.19
F	Lithospermum sp.	-	6	-	-	-	.01	-	-	-
F	Lupinus argenteus	$_{a}$31	$_{b}$59	$_{ab}$45	$_{a}$19	$_{a}$28	1.80	.92	.08	1.49
F	Orthocarpus sp. (a)	-	1	3	1	-	.00	.00	.00	-
F	Penstemon caespitosus	$_{a}$30	$_{c}$99	$_{bc}$70	$_{bc}$65	$_{b}$62	3.32	1.24	2.04	1.64
F	Penstemon sp.	$_{a}$-	$_{a}$2	$_{b}$12	$_{a}$-	$_{a}$-	.00	.36	-	-
F	Phlox austromontana	$_{a}$58	$_{c}$137	$_{bc}$124	$_{bc}$110	$_{ab}$107	1.89	3.11	2.36	1.61
F	Phlox longifolia	36	47	29	26	30	.19	.07	.17	.09
F	Polygonum douglasii (a)	-	$_{b}$85	$_{a}$3	$_{b}$61	$_{b}$70	.25	.00	.22	.30
F	Sedum lanceolatum	$_{d}$164	$_{bc}$111	$_{c}$113	$_{ab}$80	$_{a}$63	2.38	1.13	.83	.77
F	Senecio integerrimus	$_{a}$-	$_{ab}$17	$_{a}$1	$_{b}$21	$_{ab}$10	.06	.00	.38	.07
F	Senecio multilobatus	$_{a}$-	$_{b}$15	$_{a}$-	$_{a}$-	$_{a}$-	.22	-	-	-
F	Sphaeralcea coccinea	-	4	-	-	2	.01	-	-	.00
F	Taraxacum officinale	$_{ab}$1	$_{b}$14	$_{ab}$4	$_{a}$-	$_{a}$-	.05	.01	-	-
F	Zigadenus paniculatus	-	3	-	6	5	.01	-	.04	.03
Total for Annual Forbs		0	182	22	134	122	0.57	0.06	0.67	0.45
Total for Perennial Forbs		1286	1256	1053	839	845	18.17	16.05	13.42	11.49
Total for Forbs		1286	1438	1075	973	967	18.74	16.12	14.09	11.94

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

BROWSE TRENDS--
Management unit 10, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata vaseyana	84	87	88	88	13.93	13.30	16.91	17.26
B	Ceratoides lanata	3	0	0	0	-	-	-	-
B	Chrysothamnus depressus	66	65	65	67	1.72	1.26	2.71	2.31
B	Chrysothamnus viscidiflorus viscidiflorus	57	44	36	35	.82	.65	.79	.77
B	Gutierrezia sarothrae	10	2	10	12	.51	-	.33	.01
B	Juniperus scopulorum	0	1	1	1	.03	.15	.15	-
B	Pediocactus simpsonii	0	2	4	0	.03	.03	.00	-
B	Peraphyllum ramosissimum	9	10	13	13	2.31	1.95	3.00	2.57
B	Pinus edulis	0	1	1	0	-	-	-	-
B	Symphoricarpos oreophilus	1	1	1	0	-	-	-	-
B	Tetradymia canescens	4	9	4	8	-	.07	.21	.03
Total for Browse		234	222	223	224	19.38	17.41	24.12	22.96

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 4

Species	Percent Cover	
	'05	'10
Artemisia tridentata vaseyana	24.66	27.21
Chrysothamnus depressus	2.90	2.38
Chrysothamnus viscidiflorus viscidiflorus	.93	.88
Gutierrezia sarothrae	.33	.03
Juniperus scopulorum	.40	-
Peraphyllum ramosissimum	2.09	2.43
Pinus edulis	.08	-
Tetradymia canescens	.06	.16

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 4

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	1.6	1.2
Peraphyllum ramosissimum	3.5	2.4

BASIC COVER--
Management unit 10, Study no: 4

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	7.25	12.25	47.23	43.97	41.97	43.59
Rock	0	0	.16	.04	.03	0
Pavement	0	0	.56	.85	.23	.62
Litter	61.50	56.75	44.75	46.00	28.64	40.60
Cryptogams	0	8.00	1.20	2.07	1.21	.16
Bare Ground	39.00	23.00	26.94	35.99	41.28	35.12

SOIL ANALYSIS DATA --
Management unit 10, Study no: 4, Study Name: Wirefence Point

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.6	6.7	31.8	32.4	35.8	2.4	6.9	124.8	0.5

PELLET GROUP DATA--
Management unit 10, Study no: 4

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	1	19	12	5
Horse	-	-	1	1
Elk	4	13	6	10
Deer	18	21	25	20
Cattle	4	1	-	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	1 (3)
19 (47)	8 (20)	19 (48)
33 (82)	20 (50)	21 (53)
5 (13)	2 (5)	9 (22)

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 4

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
82	**66**	0	100	-	-	100	0	0	26/10
88	**66**	100	0	-	-	0	100	100	-/-
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	-/-
Artemisia tridentata vaseyana									
82	**4665**	31	69	0	6666	0	0	0	29/29
88	**7731**	60	29	10	1666	35	16	0	27/24
95	**5180**	40	54	6	1680	20	.77	1	30/35
00	**5640**	29	57	14	300	26	1	8	31/34
05	**5000**	12	70	18	2800	14	4	9	28/35
10	**4860**	19	55	26	1520	29	26	7	29/37

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Ceratoides lanata									
82	**0**	0	0	0	-	0	0	0	-/-
88	**0**	0	0	0	-	0	0	0	-/-
95	**100**	20	60	20	-	60	0	20	-/-
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Chrysothamnus depressus									
82	**11666**	0	100	0	-	0	0	0	3/8
88	**3665**	38	47	15	66	20	4	5	4/5
95	**5780**	6	92	2	-	0	0	.69	5/8
00	**4680**	10	87	3	-	.42	0	3	4/7
05	**5760**	5	94	1	-	14	.34	.69	4/8
10	**5360**	3	96	0	20	21	13	.37	4/9
Chrysothamnus viscidiflorus viscidiflorus									
82	**0**	0	0	0	-	0	0	0	-/-
88	**0**	0	0	0	-	0	0	0	-/-
95	**2700**	36	64	0	-	0	0	0	9/11
00	**1780**	39	58	2	-	0	0	1	9/10
05	**1240**	11	85	3	-	2	0	0	8/11
10	**1480**	19	81	0	140	0	0	0	9/10
Gutierrezia sarothrae									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**500**	4	96	-	-	0	0	0	6/7
00	**80**	0	100	-	-	0	0	0	3/6
05	**840**	5	95	-	-	0	0	0	5/8
10	**300**	47	53	-	-	0	0	0	7/8
Juniperus osteosperma									
82	**66**	100	0	-	-	0	0	0	-/-
88	**66**	100	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	20	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Juniperus scopulorum									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**20**	100	0	-	-	0	0	100	-/-

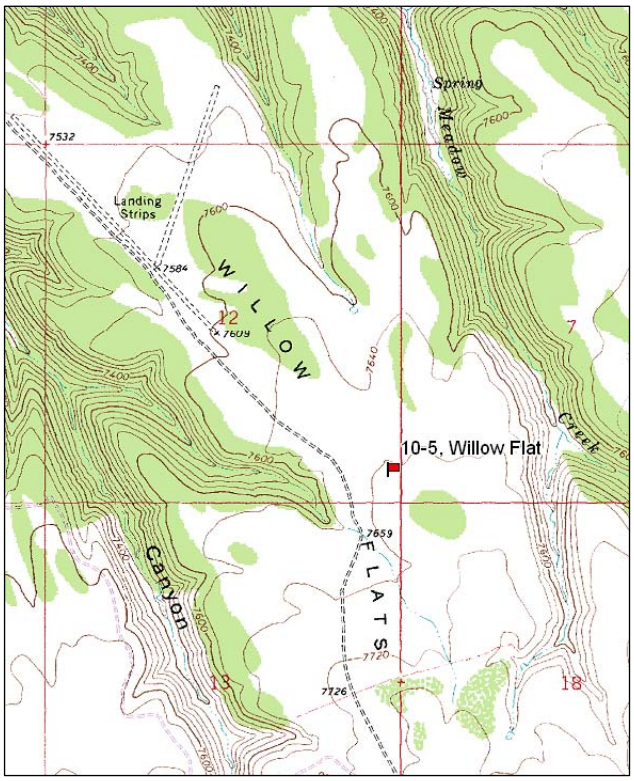
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pediocactus simpsonii									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**40**	50	50	-	-	0	0	0	2/4
05	**100**	20	80	-	-	0	0	0	2/4
10	**0**	0	0	-	-	0	0	0	-/-
Peraphyllum ramosissimum									
82	**466**	0	29	71	-	0	0	0	31/28
88	**598**	44	44	11	-	22	11	0	26/25
95	**220**	9	91	0	-	45	9	0	24/30
00	**220**	18	55	27	-	45	0	18	26/34
05	**400**	50	45	5	-	40	35	0	21/32
10	**280**	7	79	14	-	21	57	14	26/32
Pinus edulis									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Purshia tridentata									
82	**0**	0	0	-	66	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	14/20
00	**0**	0	0	-	-	0	0	0	11/24
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	12/17
Symphoricarpos oreophilus									
82	**199**	0	100	-	-	0	0	0	8/12
88	**798**	75	25	-	-	25	0	8	20/12
95	**20**	0	100	-	-	0	0	0	7/10
00	**20**	0	100	-	-	0	0	0	13/19
05	**20**	100	0	-	-	0	0	0	8/10
10	**0**	0	0	-	-	0	0	0	8/9
Tetradymia canescens									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**120**	33	67	-	-	0	17	0	7/13
00	**260**	8	92	-	-	0	0	0	7/10
05	**160**	0	100	-	-	0	0	0	7/9
10	**300**	13	87	-	-	33	0	0	9/11

WILLOW FLAT - TREND STUDY NO. 10-5-10

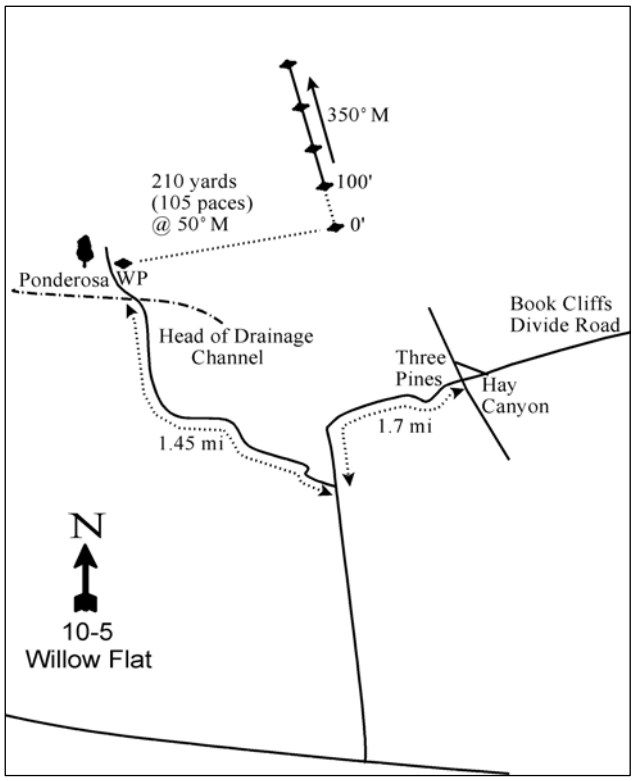
Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Upland Loam (Wyoming Big Sagebrush), R034XY306UT
Land Ownership: SITLA
Elevation: 7680 ft. (2341 m)
Aspect: North
Slope: 2%
Transect bearing: 350° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
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. Continue straight for 1.7 miles to a road on the right to Willow Flat. Turn right here and go 1.45 miles until you see a large ponderosa pine (*Pinus ponderosa*) (with other conifers at the head of a small canyon) on the left side of the road and a witness post on the right side. From the witness post, walk 210 yards at 50°M to the 0-foot baseline stake.

Map Name: Cedar Camp Canyon



Diagrammatic Sketch:



Township: 16S Range: 22E Section: 12

GPS: NAD 83, UTM 12S 634969 E 4365004 N

Site Information

Site Description: The study samples sagebrush flat on Willow Flats located on state owned land. This area was sprayed to kill sagebrush sometime prior to 1982. The area was treated again with the herbicide Spike (tebuthiuron) at 5 lbs. active ingredient per acre over 225 acres in the area in 2005 to rejuvenate the sagebrush stand. There was also a lop-and-scatter treatment to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees less than 10 inches in diameter that occurred just prior to the reading in 2010 as part of the Cedar Camp Lop and Scatter (WRI Project #1337). The area is administered by the Utah State Institutional Trust Lands Administration (SITLA) with grazing occurring within the Bureau of Land Management (BLM) Bookcliffs Pasture allotment. The area is used by deer, elk and livestock during the summer and elk may use it during mild winters. Pellet group data has estimated elk use to be moderate since 2000. Estimated deer use was light in 2000 and 2005, but more moderate in 2010. Estimated cattle use has been light since 2000 (Table - Pellet Group Data). Wild horses also use this area with several adults and a colt seen near the site in 2010.

Browse: Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the dominant browse species on the site, even after being sprayed in the early 1980's and retreated in 2005. When the study was established in 1982, there was a high percentage of dead sagebrush from the original spraying treatment, but the population rebounded quickly with high recruitment of young plants from 1982 to 2000 (Table - Browse Characteristics) and a steady increase of cover from 1995 to 2005. By 2005, it appears that the population had to become overly mature with increases in decadence and decreases in recruitment. Following the treatment in 2005, density of sagebrush decreased markedly with a large increase in the number of dead plants sampled. Recruitment also increased substantially indicating the population may rebound quickly again. Utilization of sagebrush has been mostly light with some moderate use over the course of the study. The only other abundant browse species is dwarf rabbitbrush (*Chrysothamnus depressus*), which has a mostly mature population and light to moderate use (Table - Browse Characteristics). Other browse species encountered on the site less frequently include: rubber rabbitbrush (*Chrysothamnus nauseosus*), low rabbitbrush (*C. viscidiflorus*), broom snakeweed (*Gutierrezia sarothrae*) and snowberry (*Symphoricarpos oreophilus*).

Prior to the lop-and-scatter treatment in 2010, pinyon and juniper trees were beginning to encroach into the sagebrush flat, though trees were still relatively sparse. This can be seen by comparing photos from 1988 and 2005. Point-center quarter data also showed an increase in the density of pinyon and juniper from 1995 to 2005, but only one juniper tree was sampled in 2010 (Table - Point-Quarter Tree Data).

Herbaceous Understory: Grasses are abundant, but only marginally diverse on the site. The most abundant grasses include: thickspike wheatgrass (*Agropyron dasystachyum*), mutton bluegrass (*Poa fendleriana*), Sandberg bluegrass (*P. secunda*), prairie junegrass (*Koeleria cristata*) and needle-and-thread (*Stipa comata*). Forbs are abundant and diverse on the site. Forty-three forb species, most of which are perennial, have been sampled in at least one reading since 1988.

Soil: Soils at the site are a clay loam texture with a neutral soil reaction (pH 7.1). Phosphorus has limited availability for plant growth and development at just 1.8 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover has been moderate to high over the course of the study with most protective ground cover provided by vegetation and litter cover (Table - Basic Cover). Most of the shrub interspaces are bare while the majority of the preferred herbaceous species are protected under shrub crowns. Erosion appeared to be slight with some evidence of pedestaling and overland flow being noted in 2000. The erosion condition was classified as slight in 2005 due to pedestaling and rills up to one inch deep. The erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **1982 to 1988 - up (+2):** There was a substantial increase in the density of the key browse species, mountain big sagebrush, due to a marked increase in the recruitment of young sagebrush plants.
- **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 no change in decadence or vigor of sagebrush. Recruitment of young sagebrush plants decreased, but remained excellent at 43%.
- **1995 to 2000 - slightly up (+1):** The density of mountain big sagebrush increased 14% from 8,840 plants/acre to 10,060 plants acre and cover increased from 16% to 20%. There was also, however, an increase in decadence from 1% to 15% and recruitment decreased, but is still good, to 29%.
- **2000 to 2005 - stable (0):** The mountain big sagebrush stand appears to be maturing as density decreased by 21% to 7,940 plants/acre, but cover increased to 25%. Recruitment of young sagebrush plants also decreased to 7% of the population.
- **2005 to 2010 - down (-2):** A herbicide treatment in 2005, after that years reading, reduced the density of sagebrush by 69% to 2,480 plants/acre and reduced cover to 4%. There was a large increase in the number of dead plants sampled, as well. Recruitment of young plants increased and comprised 37% of the population, so it appears the population may reestablish quickly, as it did previously.

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 - down (-2):** There was a 21% decrease in the nested frequency of perennial grasses with a significant decrease in the nested frequency of thickspike wheatgrass and sedge (*Carex sp.*).
- **1995 to 2000 - stable (0):** The sum of nested frequency and cover of perennial grasses changed little.
- **2000 to 2005 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 24%, but cover increased to 10%. The increase in cover was due to an increase in cover of prairie junegrass and Sandberg bluegrass.
- **2005 to 2010 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, but composition changed slightly with a significant decrease in the nested frequency of prairie junegrass and a significant increase in nested frequency of thickspike wheatgrass and needle-and-thread. Cover increased to 15% with a large increase in the cover of thickspike wheatgrass and needle-and-thread, as well.

Forb:

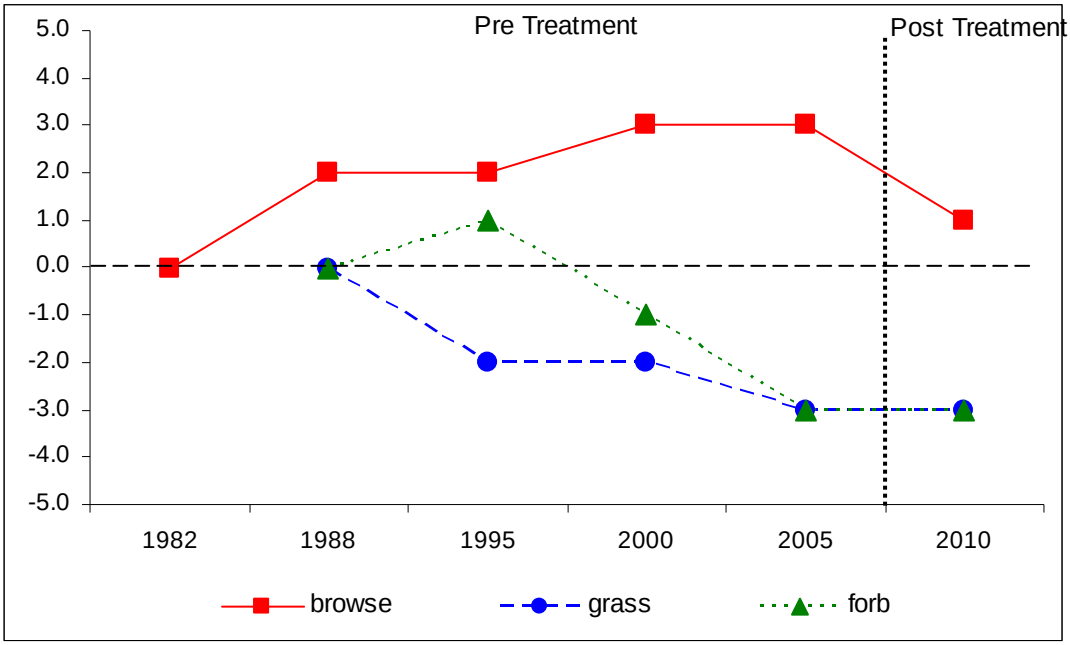
- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for forbs are available from 1982, so no trend was given.
- **1988 to 1995 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 16%.
- **1995 to 2000 - down (-2):** The perennial forb sum of nested frequency decreased by 29% and cover decreased from 13% to 7%.
- **2000 to 2005 - down (-2):** There was a 27% decrease in the sum of nested frequency of perennial forbs and cover decreased to 5%.
- **2005 to 2010 - stable (0):** The sum of nested frequency of perennial forbs decreased slightly, but cover increased to 9%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 10, study no: 5

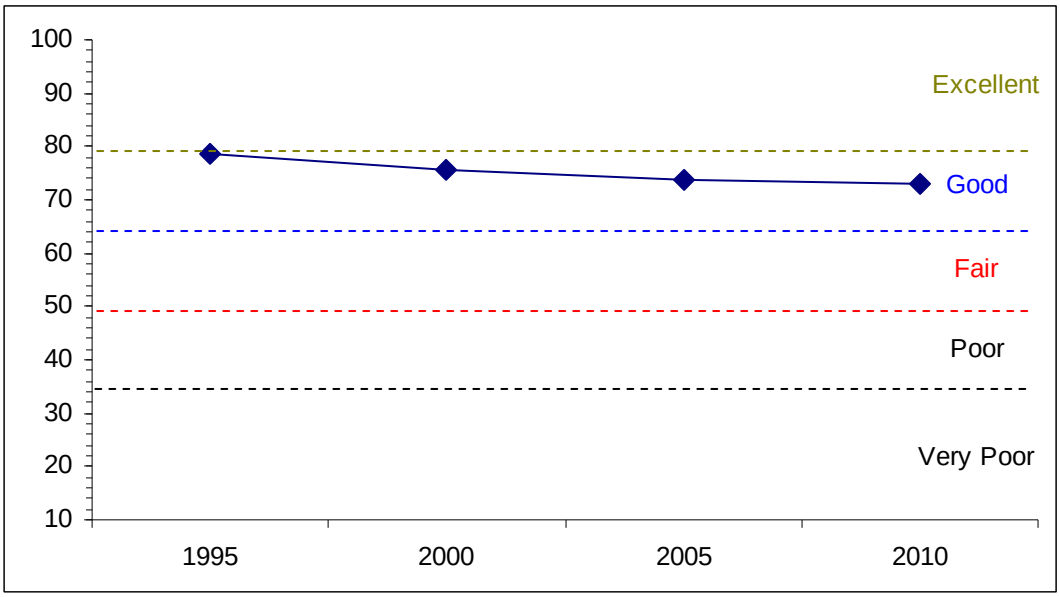
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	24.3	14.8	15.0	14.5	0.0	10.0	0.0	**78.5**	Good-Excellent
00	28.0	10.7	13.7	13.5	0.0	10.0	0.0	**75.8**	Good
05	30.0	9.7	3.3	20.7	0.0	10.0	0.0	**73.8**	Good
10	8.4	13.1	11.5	30.0	0.0	10.0	0.0	**73.0**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 5



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 10, Study no: 5



HERBACEOUS TRENDS--
Management unit 10, Study no: 5

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	$_{d}$195	$_{b}$131	$_{bc}$147	$_{a}$69	$_{cd}$179	.78	.84	.29	3.86
G	Carex sp.	$_{b}$52	$_{a}$11	$_{a}$4	$_{a}$3	$_{a}$3	.05	.00	.00	.03
G	Koeleria cristata	$_{c}$159	$_{bc}$115	$_{ab}$79	$_{bc}$122	$_{a}$67	1.95	.84	3.05	1.61
G	Poa fendleriana	$_{b}$126	$_{b}$135	$_{b}$154	$_{a}$78	$_{a}$42	1.93	2.50	2.10	.62
G	Poa nevadensis	$_{a}$-	$_{a}$-	$_{b}$25	$_{c}$52	$_{a}$-	-	.35	1.26	-
G	Poa pratensis	$_{a}$-	$_{a}$1	$_{a}$-	$_{a}$-	$_{b}$13	.00	-	-	.46
G	Poa secunda	$_{b}$142	$_{ab}$120	$_{ab}$130	$_{ab}$100	$_{a}$93	1.89	1.56	3.06	1.50
G	Stipa comata	$_{bc}$73	$_{bc}$75	$_{ab}$55	$_{a}$29	$_{c}$92	.60	.64	.57	6.99
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		747	588	594	453	489	7.23	6.75	10.37	15.08
Total for Grasses		747	588	594	453	489	7.23	6.75	10.37	15.08
F	Agoseris glauca	$_{a}$-	$_{ab}$6	$_{ab}$2	$_{b}$8	$_{ab}$6	.02	.04	.03	.01
F	Allium sp.	-	2	-	-	-	.00	-	.00	-
F	Androsace septentrionalis (a)	-	$_{c}$79	$_{a}$10	$_{b}$39	$_{ab}$32	.23	.20	.20	.35
F	Antennaria rosea	$_{c}$203	$_{c}$163	$_{b}$102	$_{a}$46	$_{a}$31	4.20	1.38	.32	1.54
F	Arabis drummondi	$_{a}$-	$_{b}$10	$_{ab}$2	$_{ab}$8	$_{a}$-	.02	.00	.01	-
F	Artemisia dracunculus	-	-	-	-	1	-	-	-	.00
F	Aster sp.	$_{b}$92	$_{b}$77	$_{a}$41	$_{a}$10	$_{a}$39	.87	.27	.09	.67
F	Astragalus convallarius	5	15	15	4	5	.18	.10	.04	.01
F	Astragalus miser	12	23	28	8	14	.39	.42	.06	.27
F	Astragalus spatulatus	-	8	2	5	-	.21	.03	.03	-
F	Astragalus utahensis	-	-	7	3	3	-	.04	.03	.00
F	Calochortus nuttallii	$_{a}$-	$_{b}$17	$_{a}$-	$_{b}$17	$_{ab}$3	.03	-	.08	.00
F	Castilleja flava	$_{bc}$58	$_{c}$85	$_{ab}$39	$_{a}$-	$_{a}$13	.63	.34	-	.17

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	Crepis acuminata	$_{a}$-	$_{b}$37	$_{b}$33	$_{b}$24	$_{b}$26	.28	.30	.23	.49
F	Cruciferae	-	3	-	-	-	.01	-	-	-
F	Cryptantha sp.	$_{b}$57	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
F	Delphinium nuttallianum	$_{a}$-	$_{c}$61	$_{a}$1	$_{b}$30	$_{a}$8	.19	.00	.11	.05
F	Erigeron eatonii	$_{d}$145	$_{bc}$84	$_{c}$88	$_{a}$48	$_{ab}$54	1.25	.60	.35	.40
F	Eriogonum alatum	$_{a}$-	$_{b}$14	$_{b}$21	$_{ab}$9	$_{ab}$6	.08	.11	.05	.18
F	Eriogonum racemosum	1	-	-	3	4	-	-	.03	.00
F	Eriogonum umbellatum	18	24	27	34	19	.39	.26	.56	.30
F	Gayophytum ramosissimum(a)	-	$_{a}$-	$_{a}$-	$_{a}$8	$_{b}$44	-	-	.02	.65
F	Ipomopsis aggregata	1	5	-	9	-	.06	-	.02	-
F	Lappula occidentalis (a)	-	-	3	-	7	-	.00	-	.01
F	Lesquerella ludoviciana	$_{a}$19	$_{bc}$62	$_{bc}$65	$_{c}$88	$_{ab}$36	.83	.29	1.25	.58
F	Linum lewisii	7	5	12	4	8	.04	.08	.00	.04
F	Lomatium sp.	-	6	-	1	3	.01	-	.01	.00
F	Lupinus argenteus	$_{ab}$49	$_{b}$60	$_{ab}$43	$_{a}$22	$_{b}$60	1.40	.74	.09	3.41
F	Lygodesmia sp.	-	-	1	-	-	-	.00	-	-
F	Orthocarpus sp. (a)	-	1	1	-	-	.00	.03	-	-
F	Penstemon caespitosus	3	3	6	7	9	.09	.15	.16	.09
F	Penstemon sp.	15	6	10	2	4	.04	.10	.04	.06
F	Phlox austromontana	$_{c}$52	$_{c}$60	$_{a}$-	$_{c}$45	$_{b}$21	1.10	-	.94	.54
F	Phlox longifolia	$_{b}$44	$_{b}$50	$_{b}$101	$_{a}$14	$_{b}$51	.18	1.68	.11	.36
F	Polygonum douglasii (a)	-	$_{d}$227	$_{a}$-	$_{b}$70	$_{c}$125	.80	-	.21	1.31
F	Potentilla gracilis	-	3	4	3	8	.18	.06	.15	.04
F	Sedum lanceolatum	4	5	11	5	2	.03	.02	.06	.01
F	Senecio integerrimus	$_{a}$-	$_{b}$29	$_{a}$1	$_{b}$32	$_{a}$6	.07	.00	.48	.07
F	Senecio multilobatus	-	5	2	-	-	.01	.00	-	-
F	Sphaeralcea coccinea	7	2	-	-	-	.00	-	-	-
F	Taraxacum officinale	$_{b}$20	$_{a}$12	$_{a}$4	$_{a}$2	$_{a}$4	.42	.04	.00	.03
F	Tragopogon dubius	-	-	3	-	1	-	.03	-	.00
F	Zigadenus paniculatus	-	-	-	-	5	-	-	-	.01
Total for Annual Forbs		0	307	14	117	208	1.04	0.23	0.43	2.32
Total for Perennial Forbs		812	942	671	491	450	13.27	7.19	5.39	9.43
Total for Forbs		812	1249	685	608	658	14.32	7.42	5.82	11.75

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

BROWSE TRENDS--
Management unit 10, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata vaseyana	95	99	94	62	16.11	20.49	25.01	3.87
B	Chrysothamnus depressus	60	66	51	63	3.34	1.88	2.56	2.82
B	Chrysothamnus nauseosus	1	0	1	0	-	-	-	-
B	Chrysothamnus viscidiflorus	17	11	11	15	.02	.18	.36	.03
B	Gutierrezia sarothrae	8	5	6	2	.21	.03	.18	.03
B	Juniperus osteosperma	0	2	1	0	.48	.94	.56	-
B	Pediocactus simpsonii	1	3	7	1	.00	-	.03	-
B	Peraphyllum ramosissimum	0	0	0	1	-	-	-	.00
B	Pinus edulis	0	2	1	0	-	.03	.00	.03
B	Symphoricarpos oreophilus	1	2	2	1	.38	.30	.18	.03
Total for Browse		183	190	174	145	20.54	23.87	28.89	6.81

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 5

Species	Percent Cover	
	'05	'10
Artemisia tridentata vaseyana	27.58	4.38
Chrysothamnus depressus	1.63	3.75
Chrysothamnus viscidiflorus	-	.30
Gutierrezia sarothrae	.10	.03
Juniperus osteosperma	.73	.05
Symphoricarpos oreophilus	.01	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 5

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	1.6	1.2
Peraphyllum ramosissimum	3.5	2.4

POINT-QUARTER TREE DATA--
Management unit 10, Study no: 5

Species	Trees per Acre				Average diameter (in)			
	'95	'00	'05	'10	'95	'00	'05	'10
Juniperus osteosperma	20	27	55	-	4.6	6.0	3.9	-
Pinus edulis	5	7	21	-	2.8	2.7	3.5	-

BASIC COVER--
Management unit 10, Study no: 5

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	7.50	16.75	40.15	39.23	39.87	38.38
Rock	0	0	.66	.04	.11	.04
Pavement	0	0	.34	.66	1.11	.62
Litter	53.50	46.75	34.04	34.51	22.88	36.18
Cryptogams	.75	1.50	3.01	3.45	.38	.12
Bare Ground	38.25	35.00	34.59	53.58	51.52	40.20

SOIL ANALYSIS DATA --
Management unit 10, Study no: 5, Study Name: Willow Flat

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.8	7.1	30.0	40.0	30.0	2.3	1.8	204.8	0.8

PELLET GROUP DATA--
Management unit 10, Study no: 5

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	3	9	14	3
Horse	-	-	1	1
Elk	14	20	33	13
Deer	7	6	10	19
Cattle	-	2	2	1

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	1 (3)
19 (47)	8 (20)	19 (48)
33 (82)	20 (50)	21 (53)
5 (13)	2 (5)	9 (22)

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 5

		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	**2532**	13	87	0	5199	26	0	0	24/17
88	**16797**	90	8	1	1333	4	0	1	30/22
95	**8840**	43	56	1	1620	9	.45	.22	25/28
00	**10060**	29	55	15	600	22	.39	.39	24/28
05	**7940**	7	74	19	3500	27	3	9	24/28
10	**2480**	37	52	11	180	3	0	7	19/19
Chrysothamnus depressus									
82	**10599**	8	92	0	-	14	3	0	4/9
88	**9598**	48	33	19	533	27	16	7	4/6
95	**5400**	13	87	0	-	0	0	0	5/7
00	**5340**	10	82	8	60	12	0	3	3/8
05	**4660**	3	93	3	20	44	0	2	4/9
10	**4620**	4	96	0	-	1	4	0	5/12

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**20**	100	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	7/7
10	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus viscidiflorus									
82	**1199**	0	100	0	-	56	0	0	9/12
88	**798**	58	25	17	-	33	33	0	8/6
95	**500**	8	92	0	-	0	0	0	8/11
00	**320**	6	75	19	-	0	0	0	7/8
05	**300**	13	80	7	-	0	0	0	8/9
10	**560**	7	93	0	-	0	0	4	10/12
Gutierrezia sarothrae									
82	**0**	0	0	-	-	0	0	0	-/-
88	**133**	0	100	-	-	0	0	0	5/1
95	**360**	17	83	-	-	0	0	0	6/7
00	**120**	17	83	-	-	0	0	0	4/3
05	**220**	0	100	-	-	0	0	0	5/8
10	**60**	0	100	-	-	0	0	0	5/13
Juniperus osteosperma									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**40**	100	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**0**	0	0	-	40	0	0	0	-/-
Pediocactus simpsonii									
82	**66**	0	100	-	-	0	0	0	1/2
88	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	-/-
00	**60**	67	33	-	-	0	0	0	-/-
05	**140**	0	100	-	-	0	0	0	1/2
10	**20**	0	100	-	-	0	0	0	3/4
Peraphyllum ramosissimum									
82	**133**	0	100	-	-	0	0	0	30/32
88	**66**	0	100	-	-	0	100	0	28/37
95	**0**	0	0	-	-	0	0	0	19/21
00	**0**	0	0	-	-	0	0	0	19/24
05	**0**	0	0	-	-	0	0	0	-/-
10	**20**	0	100	-	-	0	0	0	21/27

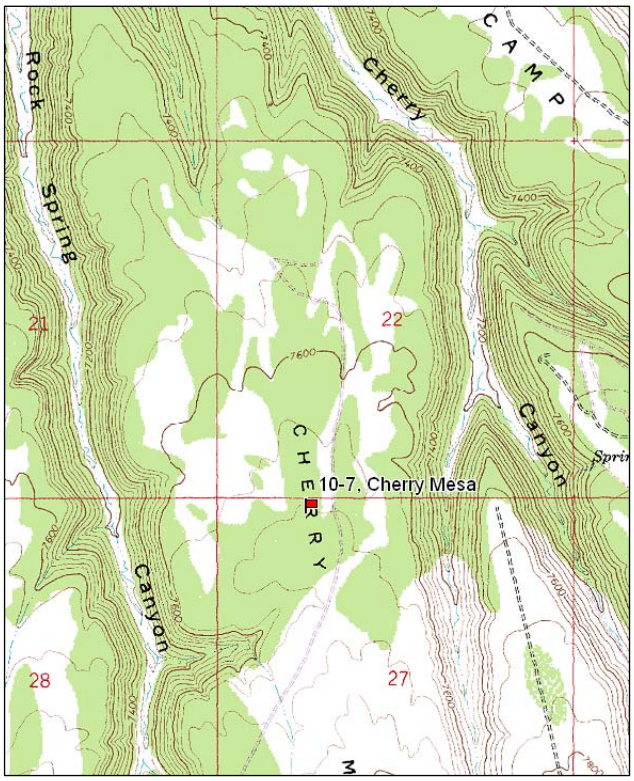
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pinus edulis									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**40**	100	0	-	-	0	0	0	-/-
05	**20**	100	0	-	40	0	0	0	-/-
10	**0**	0	0	-	20	0	0	0	-/-
Symphoricarpos oreophilus									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	14/35
00	**60**	0	100	-	-	0	0	0	-/-
05	**60**	0	100	-	-	0	0	0	12/23
10	**20**	0	100	-	-	0	0	0	4/17
Tetradymia canescens									
82	**0**	0	0	0	-	0	0	0	-/-
88	**66**	0	0	100	-	0	100	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-

CHERRY MESA - TREND STUDY NO. 10-7-10

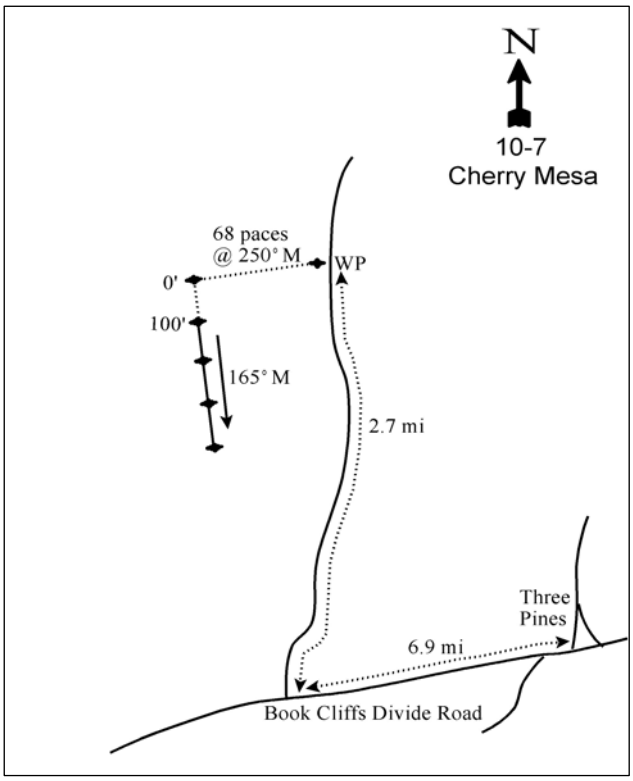
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Substantial Deer Summer, Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Upland Loam (Wyoming Big Sagebrush), R034XY306UT
Land Ownership: SITLA
Elevation: 7650 ft. (2332 m)
Aspect: North
Slope: 5%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the major intersection at Three Pines, continue southwest along the Book Cliff Divide for 6.9 miles. Turn right off the main road onto the Cherry Mesa road. Go down through the spraying 2.7 miles to a witness post on the left side of the road. Stop, then walk to the west up the ridge, 68 paces at 250°M to the 0-foot baseline stake, whic is marked by browse tag #9174.

Map Name: Cedar Camp Canyon



Diagrammatic Sketch:



Township: 16S Range: .22E Section: 22

GPS: NAD 83, UTM 12S 630664 E 4361531 N

CHERRY MESA - TREND STUDY NO. 10-7

Site Information

Site Description: The study samples an extensive pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) chaining on a large block of Utah State Institutional Trust Land (SITLA). The area was retreated by a bullhog as part of the Cherry Mesa Bullhog (WRI Project #1106) in the summer of 2009 to reduce pinyon and juniper that had reestablished following the initial treatment. Grazing in the area is managed as part of the Bureau of Land Management (BLM) McClelland allotment. Water is a limiting factor on this mesa. There was fresh deer sign and also evidence of winter use during the 1988 reading. Elk were also seen in the general area in 1988 and 30-40 elk were seen in June of 2005. Pellet group data has indicated fairly light use by deer, elk and cattle since 2000 (Table - Pellet Group Data).

Browse: Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the dominant species on the site and has provided the majority of browse cover since 1995 (Table - Browse Trends). Some of the sagebrush on the site appears to be a hybrid of mountain big sagebrush and basin big sagebrush (*A. tridentata* ssp. *tridentata*), but all sagebrush were classified as mountain big sagebrush in this study. The sagebrush population is mostly mature with low decadence except for 2005 when decadence was high. Recruitment of young sagebrush plants has been good over the course of the study, and utilization of sagebrush has been mostly light to moderate. Preferred species like antelope bitterbrush (*Purshia tridentata*) and true mountain mahogany (*Cercocarpus montanus*) are scattered throughout the site in low numbers. Use of both species is moderate to heavy (Table - Browse Characteristics), and bitterbrush has a "clubbed" appearance on the majority of the population. Prior to the treatment, pinyon and juniper trees were present at relatively moderate densities, but density (Table - Point-Quarter Tree Data) and cover (Table - Browse Trends) of both species decreased markedly in 2010.

Herbaceous Understory: Herbaceous vegetation has not been as abundant as would be desired for a higher elevation chaining in the mountain big sagebrush type. Grass composition is mainly from native perennial species. The most abundant species are thickspike wheatgrass (*Agropyron dasystachyum*), mutton bluegrass (*Poa fendleriana*), sedge (*Carex sp.*) and blue grama (*Bouteloua gracilis*). Forbs have been diverse, but are not very abundant. Perennial forb cover and sum of nested frequency have decreased since 1995.

Soil: The soil is a fine-textured loam with relatively high organic matter (5.2%) and neutral soil reactivity (pH 7.3). Bare ground cover is moderately low with a fair amount of litter associated with the plants and also debris and litter left from the chaining and bullhog (Table - Basic Cover). Many plants are slightly pedestalled and there has been obvious soil movement following high intensity rainstorms in the past. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **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 or vigor of sagebrush. Recruitment of young sagebrush plants has decreased, but remained good at 37%.
- **1995 to 2000 - stable (0):** The density of sagebrush changed little, but cover increased slightly from 10% to 12%. Decadence increased slightly to 10% and poor vigor increased to 17%. Recruitment of young sagebrush plants decreased to 16%, but is still considered good.
- **2000 to 2005 - down (-2):** Sagebrush density decreased by 16% from 4,240 plants/acre to 3,580 plants/acre, though cover remained similar. Decadence of sagebrush increased to high levels at 32% and recruitment of young sagebrush plants decreased to 8% of the population.
- **2005 to 2010 - slightly up (+1):** Density and cover of sagebrush decreased slightly, but decadence returned to 2000 levels of 10%. Recruitment of young plants also increased to 20%.

Grass:

- **1988 to 1995 - down (-2):** The sum of nested frequency of perennial grasses decreased by 33% with a significant decrease in nested frequency of many of the perennial species on the site.
- **1995 to 2000 - stable (0):** There was little change in nested frequency or cover of perennial grasses.
- **2000 to 2005 - stable (0):** The perennial grass sum of nested frequency decreased slightly, but cover increased from 7% to 8%.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 9% since 2005, but has decreased by 17% since 2000. Cover of perennial grass has decreased to 7%.

Forb:

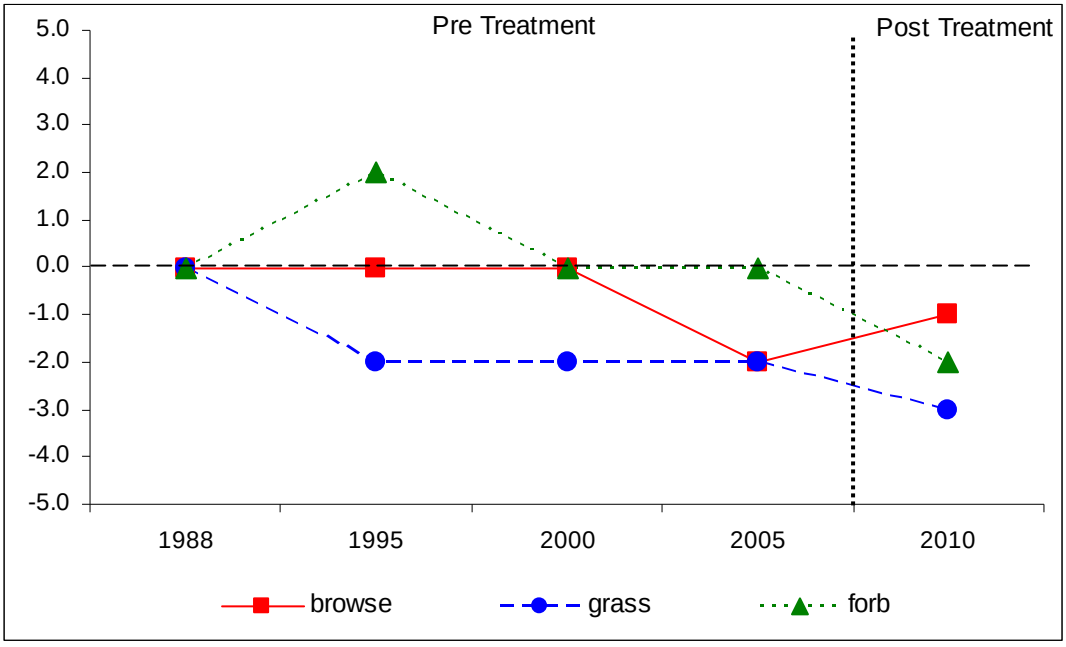
- **1988 to 1995 - up (+2):** Perennial forb sum of nested frequency increased 55%.
- **1995 to 2000 - down (-2):** The sum of nested frequency of perennial forbs decreased by 41% and cover decreased from 4% to 2%.
- **2000 to 2005 - stable (0):** There was little change in perennial forb sum of nested frequency or cover.
- **2005 to 2010 - down (-2):** The sum of nested frequency of perennial forbs decreased by 30% with a slight decrease in cover.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 10, study no: 7

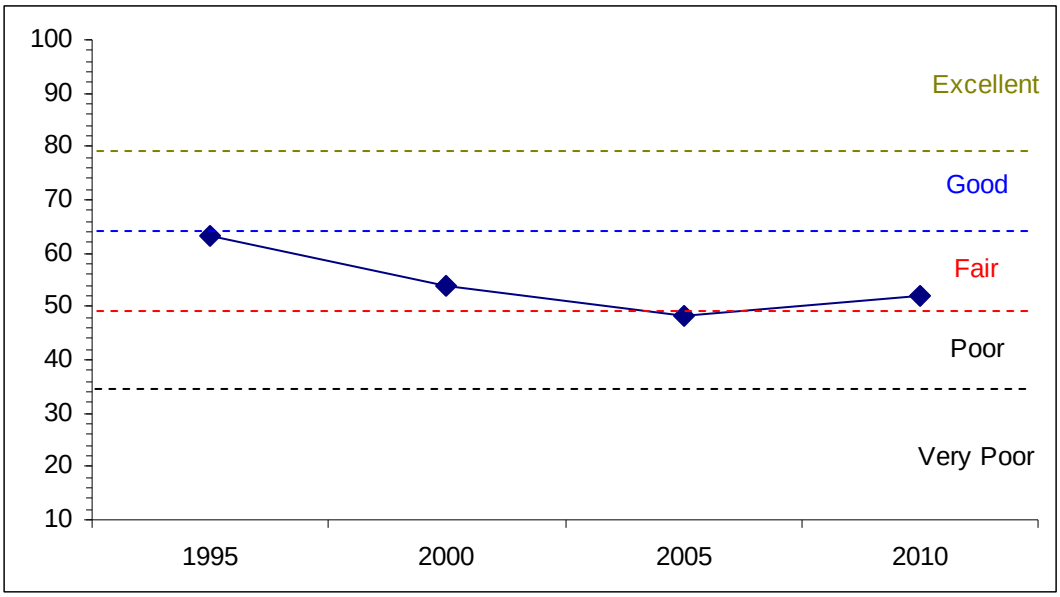
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	14.0	15.0	15.0	10.7	0.0	8.5	0.0	**63.2**	Fair-Good
00	16.5	12.1	7.7	13.4	0.0	4.4	0.0	**54.0**	Fair
05	16.4	6.2	4.1	16.9	0.0	4.8	0.0	**48.4**	Poor-Fair
10	14.1	11.8	9.5	13.2	0.0	3.6	0.0	**52.1**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 7



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 10, Study no: 7



HERBACEOUS TRENDS--
Management unit 10, Study no: 7

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	$_{b}$180	$_{b}$158	$_{a}$86	$_{a}$55	$_{a}$71	1.16	.52	.77	.72
G	Bouteloua gracilis	74	54	53	52	49	.83	.72	1.36	1.00
G	Bromus tectorum (a)	-	2	-	3	-	.00	-	.03	-
G	Carex sp.	$_{c}$139	$_{ab}$83	$_{c}$148	$_{bc}$133	$_{a}$67	.39	2.16	1.57	1.18
G	Koeleria cristata	$_{a}$-	$_{c}$80	$_{a}$3	$_{b}$42	$_{b}$39	1.11	.03	.58	.59
G	Oryzopsis hymenoides	$_{b}$33	$_{a}$11	$_{a}$-	$_{a}$-	$_{a}$3	.07	-	.00	.00
G	Poa fendleriana	$_{b}$116	$_{a}$67	$_{c}$177	$_{ab}$119	$_{bc}$150	1.71	3.17	3.55	2.67
G	Poa secunda	$_{a}$-	$_{a}$-	$_{a}$1	$_{b}$15	$_{a}$4	-	.00	.34	.18
G	Sitanion hystrix	$_{b}$82	$_{a}$16	$_{a}$1	$_{a}$7	$_{a}$11	.07	.03	.10	.22
G	Stipa comata	$_{b}$79	$_{a}$1	$_{a}$3	$_{a}$9	$_{a}$-	.00	.03	.13	-
Total for Annual Grasses		0	2	0	3	0	0.00	0	0.03	0
Total for Perennial Grasses		703	470	472	432	394	5.35	6.68	8.43	6.59
Total for Grasses		703	472	472	435	394	5.36	6.68	8.46	6.59
F	Androsace septentrionalis (a)	-	$_{a}$-	$_{a}$6	$_{c}$29	$_{ab}$17	-	.04	.14	.03
F	Antennaria rosea	$_{a}$11	$_{a}$23	$_{b}$40	$_{ab}$27	$_{ab}$29	.10	.39	.38	.58
F	Arabis sp.	$_{b}$29	$_{a}$1	$_{a}$-	$_{a}$4	$_{a}$1	.03	-	.01	.00
F	Arenaria kingii	-	-	-	-	1	-	-	-	.03
F	Aster sp.	12	3	5	-	-	.00	.04	-	-
F	Astragalus argophyllus	$_{a}$3	$_{b}$32	$_{a}$5	$_{a}$-	$_{a}$4	.70	.07	-	.18
F	Astragalus sp.	-	-	3	3	-	-	.00	.01	-
F	Calochortus flexuosus	-	-	-	-	-	-	-	-	-
F	Castilleja flava	9	12	4	4	5	.16	.03	.01	.01
F	Chaenactis douglasii	$_{b}$51	$_{a}$20	$_{a}$-	$_{a}$4	$_{a}$2	.04	-	.01	.00
F	Chenopodium fremontii (a)	-	-	-	-	4	-	-	-	.03

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	Chenopodium leptophyllum(a)	-	a-	a-	b10	a-	-	-	.02	-
F	Comandra pallida	ab36	b53	ab36	a20	a30	.38	.33	.11	.13
F	Crepis acuminata	a-	b53	b35	b30	b23	.30	.22	.18	.15
F	Cryptantha sp.	3	6	1	-	-	.04	.00	-	-
F	Delphinium nuttallianum	-	2	-	-	4	.01	-	-	.01
F	Erigeron eatonii	b47	b38	ab23	ab22	a6	.45	.12	.11	.05
F	Eriogonum alatum	-	-	2	7	6	-	.03	.04	.01
F	Eriogonum umbellatum	a19	a15	b34	ab20	a12	.22	.24	.25	.10
F	Gayophytum ramosissimum(a)	-	b54	a2	b70	b55	.42	.00	.34	.89
F	Gilia sp. (a)	-	b111	a3	a-	a-	.27	.01	-	-
F	Lappula occidentalis (a)	-	8	-	7	3	.02	-	.01	.01
F	Lesquerella sp.	bc50	b41	a18	b58	a15	.19	.10	.48	.12
F	Linum lewisii	2	-	5	-	-	-	.01	-	-
F	Machaeranthera grindelioides	ab15	b17	ab6	ab5	a1	.37	.04	.01	.00
F	Orthocarpus purpureo-albus (a)	3	-	-	-	-	-	-	-	-
F	Pedicularis centranthera	-	-	-	-	-	-	-	-	-
F	Penstemon caespitosus	a3	b26	a1	a4	a-	.59	.00	.04	-
F	Penstemon pachyphyllus	-	1	1	-	1	.00	.00	-	.00
F	Phlox austromontana	a-	b26	b23	b18	b24	.29	.41	.53	.34
F	Phlox longifolia	a12	c104	b37	ab32	ab20	.34	.11	.10	.04
F	Polygonum douglasii (a)	-	c91	a1	ab62	b33	.25	.00	.15	.08
F	Senecio integerrimus	-	-	-	6	-	-	-	.06	-
F	Senecio multilobatus	3	3	-	3	4	.01	-	.03	.01
F	Tragopogon dubius	2	-	-	-	-	-	-	-	-
Total for Annual Forbs		3	264	12	178	112	0.97	0.06	0.67	1.05
Total for Perennial Forbs		307	476	279	267	188	4.27	2.20	2.39	1.81
Total for Forbs		310	740	291	445	300	5.25	2.26	3.07	2.86

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

BROWSE TRENDS--
Management unit 10, Study no: 7

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata vaseyana	77	80	77	73	9.96	11.78	11.56	10.35
B	Cercocarpus montanus	1	3	3	2	.18	.38	.63	-
B	Chrysothamnus depressus	35	39	38	30	1.00	.80	.42	.38
B	Chrysothamnus viscidiflorus viscidiflorus	0	8	7	7	-	.00	.06	.03
B	Gutierrezia sarothrae	7	1	5	5	.18	.00	.00	.00
B	Juniperus osteosperma	0	6	7	1	.93	2.32	2.99	.15
B	Opuntia sp.	2	6	6	4	.00	-	.15	.00
B	Pinus edulis	0	4	3	0	3.03	4.15	5.84	-
B	Purshia tridentata	5	8	10	8	.03	.15	.33	.45
B	Symphoricarpos oreophilus	20	25	26	24	3.01	1.62	1.81	1.65
Total for Browse		147	180	182	154	18.37	21.22	23.81	13.03

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 7

Species	Percent Cover		
	'00	'05	'10
Artemisia tridentata vaseyana	-	17.54	15.11
Cercocarpus montanus	-	.08	-
Chrysothamnus depressus	-	.33	.45
Chrysothamnus viscidiflorus viscidiflorus	-	.25	.20
Gutierrezia sarothrae	-	.05	-
Juniperus osteosperma	-	3.38	.13
Opuntia sp.	-	.16	.03
Pinus edulis	5.59	9.10	-
Purshia tridentata	-	.36	.20
Symphoricarpos oreophilus	-	2.26	1.95

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 7

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	1.7	1.5
Cercocarpus montanus	2.0	2.6
Purshia tridentata	1.7	1.4

POINT-QUARTER TREE DATA--
Management unit 10, Study no: 7

Species	Trees per Acre				Average diameter (in)			
	'95	'00	'05	'10	'95	'00	'05	'10
Juniperus osteosperma	87	86	78	25	2.8	5.0	6.5	1.0
Pinus edulis	28	41	33	20	3.3	4.5	5.4	1.0
Pseudotsuga menziesii	-	-	-	20	-	-	-	5.1

BASIC COVER--
Management unit 10, Study no: 7

Cover Type	Average Cover %				
	'88	'95	'00	'05	'10
Vegetation	3.25	31.70	29.38	31.99	23.97
Rock	0	.88	.00	.04	0
Pavement	20.00	18.21	18.42	20.90	14.74
Litter	65.25	41.33	41.26	36.90	52.23
Cryptogams	.25	.20	.42	.30	.07
Bare Ground	11.25	9.14	25.53	27.02	19.30

SOIL ANALYSIS DATA --
Management unit 10, Study no: 7, Study Name: Cherry Mesa

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.2	6.8	48.0	30.0	22.0	4.1	9.4	89.6	0.8

PELLET GROUP DATA--
Management unit 10, Study no: 7

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	12	48	58	12
Elk	4	9	13	8
Deer	4	10	22	10
Cattle	1	2	-	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
15 (37)	19 (48)	14 (35)
21 (53)	22 (55)	9 (23)
6 (15)	4 (9)	2 (5)

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 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)
Artemisia tridentata vaseyana									
88	**6464**	68	29	3	799	18	1	1	21/19
95	**4180**	37	63	0	760	2	.95	0	26/31
00	**4240**	16	75	10	60	24	17	17	27/31
05	**3580**	8	60	32	9640	27	10	9	26/31
10	**3360**	20	70	10	400	18	0	7	29/36
Cercocarpus montanus									
88	**0**	0	0	0	-	0	0	0	-/-
95	**20**	100	0	0	-	0	0	0	35/27
00	**60**	67	33	0	-	0	33	0	33/38
05	**60**	67	33	0	-	0	67	0	39/45
10	**40**	0	50	50	-	50	50	50	25/24

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus									
88	**5265**	10	81	9	66	23	0	1	6/8
95	**1280**	0	95	5	20	2	0	0	6/13
00	**1740**	14	61	25	20	20	10	14	3/5
05	**1220**	7	75	12	-	43	20	11	4/7
10	**900**	13	82	4	20	0	0	0	4/9
Chrysothamnus viscidiflorus viscidiflorus									
88	**399**	33	33	33	-	0	0	0	7/8
95	**0**	0	0	0	-	0	0	0	17/25
00	**320**	13	81	6	-	56	0	6	11/8
05	**200**	30	50	20	80	30	0	0	10/10
10	**200**	0	100	0	-	0	0	0	8/10
Gutierrezia sarothrae									
88	**266**	0	100	-	-	0	0	0	6/7
95	**200**	0	100	-	-	0	0	0	7/12
00	**20**	100	0	-	-	0	0	0	-/-
05	**120**	0	100	-	-	17	0	0	5/6
10	**280**	43	57	-	40	0	0	0	5/7
Juniperus osteosperma									
88	**0**	0	0	0	66	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**120**	0	100	0	-	0	0	17	-/-
05	**200**	10	80	10	-	0	0	0	-/-
10	**20**	100	0	0	-	0	0	0	-/-
Opuntia sp.									
88	**0**	0	0	0	-	0	0	0	-/-
95	**40**	100	0	0	-	0	0	0	1/6
00	**140**	14	71	14	-	0	0	14	4/11
05	**160**	0	100	0	-	0	0	0	3/11
10	**100**	0	80	20	-	0	0	20	2/7
Pinus edulis									
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**100**	20	80	-	-	20	0	0	-/-
05	**60**	0	100	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Purshia tridentata									
88	**399**	0	100	0	-	50	50	0	9/26
95	**100**	0	100	0	-	0	0	0	13/34
00	**240**	0	100	0	-	33	25	0	12/33
05	**280**	7	86	7	-	29	21	0	9/21
10	**180**	33	67	0	-	22	44	0	12/26

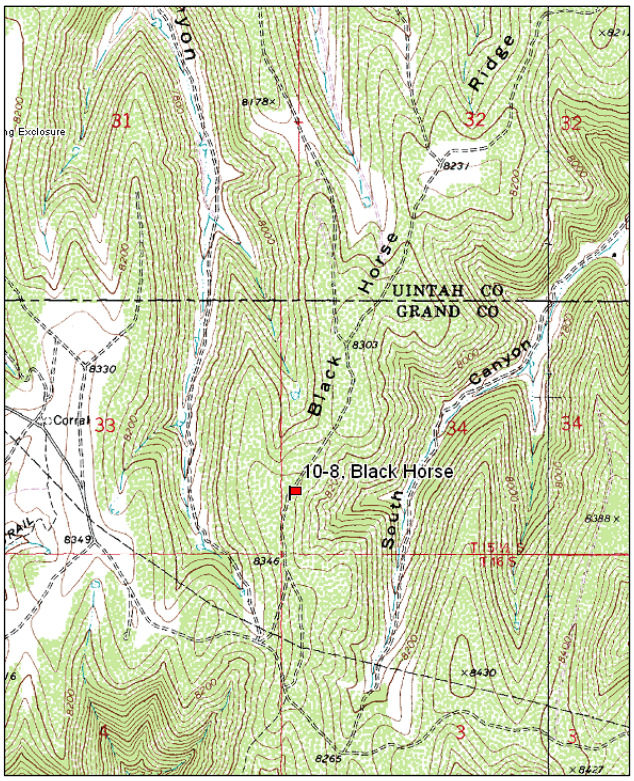
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus									
88	**0**	0	0	0	-	0	0	0	-/-
95	**500**	8	92	0	-	8	0	0	20/34
00	**1040**	40	56	4	-	12	2	0	17/27
05	**1260**	32	52	16	-	3	3	5	12/20
10	**1720**	48	52	0	40	0	0	0	10/15

BLACK HORSE - TREND STUDY NO. 10-8-10

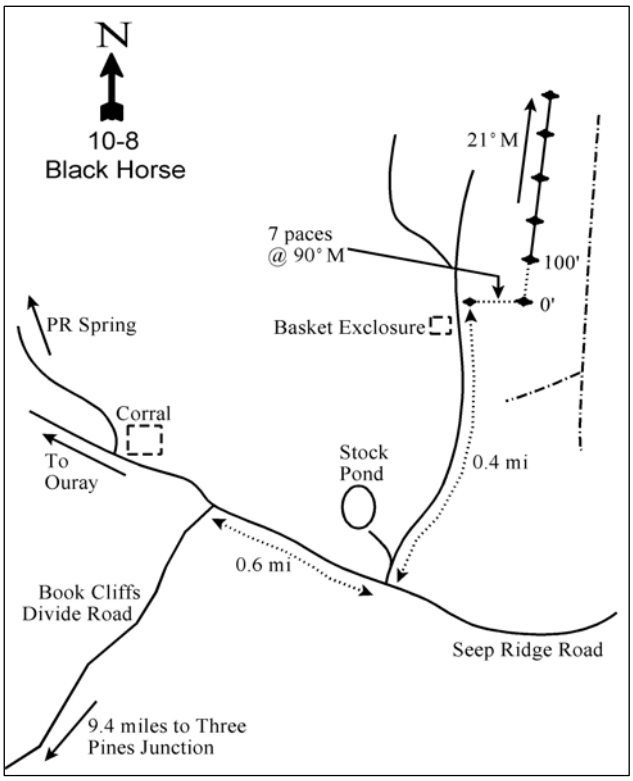
Vegetation Type: Mountain Brush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Mountain Stony Loam (Browse), R048AY451UT
Land Ownership: BLM
Elevation: 8341 ft. (2543 m)
Aspect: East
Slope: 10%
Transect bearing: 21° magnetic
Belt placement: line 1 (11ft*), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). **Belt 1 centered at 40 feet.

Directions:
At 0.6 miles southeast of the intersection of the Seep Ridge road and the Book Cliff Divide road, a road turns north off the divide road and heads up Black Horse Ridge. Go up this road 0.4 miles to a witness post on the right side of the road. The study site is on the east slope of the ridge. From the witness post, walk 7 paces bearing 90°M to the 0-foot baseline stake, which is marked by browse tag #9039 attached. The frequency baseline runs parallel to the road. Study markers are 18" green metal fenceposts.

Map Name: PR Sring



Diagrammatic Sketch:



Township: 15½S Range: 24E Section: 34

GPS: NAD 83, UTM 12S 649346 E 4368607 N

BLACK HORSE - TREND STUDY NO. 10-8

Site Information

Site Description: The study is located near the Book Cliffs summit in mountain brush vegetation which is used by deer and elk as summer range. This is the highest elevation trend study on the unit. There are small stands of aspen (*Populus tremuloides*) and conifers in the drainages, but the dominant vegetation is Gambel oak (*Quercus gambelii*) and associated mountain brush. Deer are commonly observed in the area. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Sweetwater allotment. Pellet group data estimated moderate deer use in 2000 and 2010, with heavy use in 2005. In 2005, a deer fawn carcass was found on the site. Estimated use of elk and cattle has been light since 2000 (Table - Pellet Group Data).

Browse: This mixed mountain brush community is composed of a variety of valuable shrubs. Large Utah serviceberry (*Amelanchier utahensis*) and clones of Gambel oak are the primary overstory species. Mature serviceberry average over 4 feet in height with some individuals being over 5 feet in height. Recruitment of young serviceberry plants has been excellent over the course of the study. The majority of the plants showed mostly light hedging in all sample years with heavier hedging in 2005 and 2010. Gambel oak is mostly a young population that has displayed light to moderate use since the outset of the study in 1988. Other preferred browse species include: mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*) and true mountain mahogany (*Cercocarpus montanus*). Mahogany and bitterbrush are more heavily utilized than sagebrush. Mahogany and sagebrush have had mixed populations of young and mature plants over the course of the study, while the bitterbrush population is mostly mature with little recruitment of young plants. Sagebrush is the most abundant of the three species, followed by mahogany. Bitterbrush is much less abundant on the site (Table - Browse Characteristics).

Herbaceous Understory: Since the area is primarily summer range, herbaceous forage is especially important on this site. Herbaceous vegetation is fairly abundant with grasses providing 14%-18% average cover since 1995. Most grasses were at least moderately utilized by cattle during the 1988 reading. The most numerous species are thickspike wheatgrass (*Agropyron dasystachyum*), sedge (*Carex sp.*), Kentucky bluegrass (*Poa pratensis*), mutton bluegrass (*P. fendleriana*) and Lettermen needlegrass (*Stipa comata*). The sedge is the most abundant species. Forbs are also moderately abundant and diverse. Weedy milkvetch (*Astragalus miser*), ballhead sandwort (*Arenaria congesta*), mat penstemon (*Penstemon caespitosus*) and Eaton fleabane (*Erigeron eatonii*) are the most abundant species. Several valuable forb species occur on the site including Pacific aster (*Aster chilensis*), arrowleaf balsamroot (*Balsamorhiza sagittata*), thickleaf penstemon (*Penstemon pachyphyllus*), yellow Indian paintbrush (*Castilleja flava*) and sulfur buckwheat (*Eriogonum umbellatum*) (Table - Herbaceous Trends).

Soil: The soil texture is clay and soils are in the Seeprid-Utso loam complex. These soils typically are moderately deep and well-drained. Organic matter is moderately high at 4.4% with soil reaction being neutral (pH 6.8) (Table - Soil Analysis Data). Bare ground cover is low with good vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as slight in 2005 due to surface movement of litter, rock and soil, and pedestaling of plants. The soil erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **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 in mountain big sagebrush and true mountain mahogany decreased substantially and vigor improved markedly in the Utah serviceberry population.
- **1995 to 2000 - stable (0):** The key browse species, serviceberry and true mountain mahogany, have remained similar in density, decadence remained low, and recruitment of young plants has remained good.

- **2000 to 2005 - stable (0):** Serviceberry density has remained similar, with slight increase in recruitment of young plants. There was an increase in the decadence of true mountain mahogany and mountain big sagebrush and a decrease in the recruitment of young plants in both species.
- **2005 to 2010 - slightly down (-1):** There was a 47% decrease in the density of serviceberry from 2,720 plants/acre to 1,440 plants/acre and cover decreased from 4% to 2%. Recruitment of young serviceberry plants remained high and decadence decreased to just 3%. Mountain big sagebrush density increased by 21% from 2,040 plants/acre to 2,460 plants/acre with a decrease in decadence and an increase in recruitment. True mountain mahogany and bitterbrush densities remained similar, but decadence decreased in mahogany and recruitment of young mahogany plants increased.

Grass:

- **1988 to 1995 - slightly up (+1):** The perennial grass sum of nested frequency increased by 11% with a significant increase in the nested frequency of bottlebrush squirreltail (*Sitanion hystrix*).
- **1995 to 2000 - slightly up (+1):** There was a 12% increase in the sum of nested frequency of perennial grasses with a slight increase in cover.
- **2000 to 2005 - stable (0):** The sum of nested frequency of perennial grasses changed little, though cover increased from 17% to 18%. There was a significantly increase in the nested frequency of the increaser species Kentucky bluegrass.
- **2005 to 2010 - slightly down (-1):** There was little change in the sum of nested frequency of perennial grasses since 2005, but frequency has decreased by 12% since 2000 returning to 1995 levels. Cover of perennial grasses also decreased to 14%. Kentucky bluegrass continues to be more abundant.

Forb:

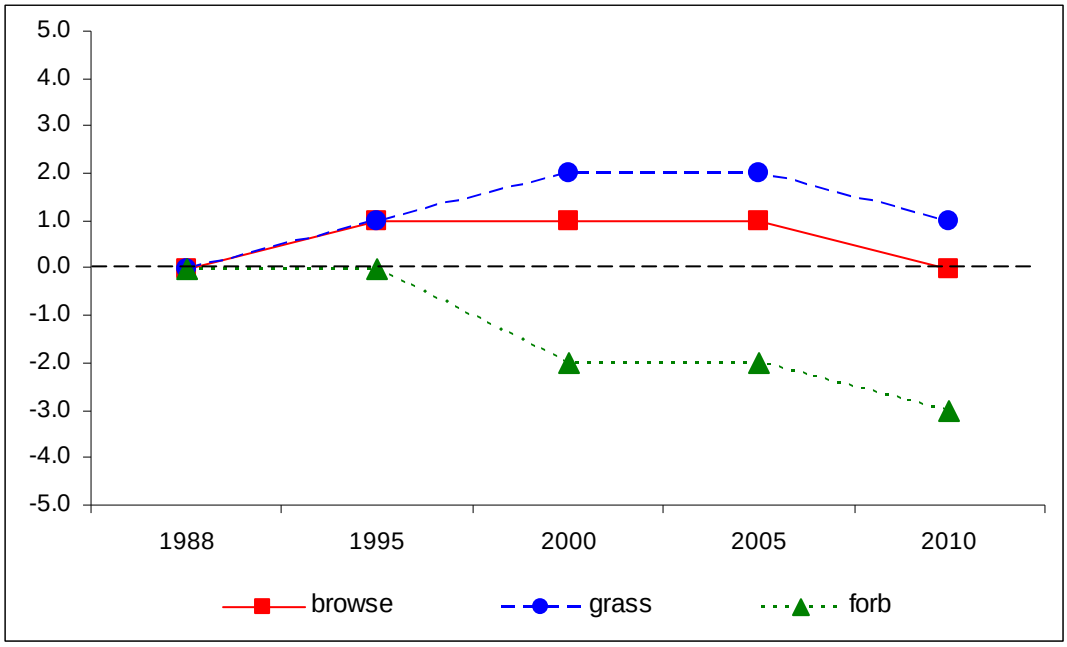
- **1988 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though composition has changed somewhat with significant decreases in the nested frequency of many species and significant increases in others.
- **1995 to 2000 - down (-2):** The sum of nested frequency of perennial forbs decreased by 24% and cover decreased from 10% to 9%.
- **2000 to 2005 - stable (0):** The perennial forb sum of nested frequency changed little, though cover increased to 12%.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 14% and cover decreased to 6%.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 10, study no: 8

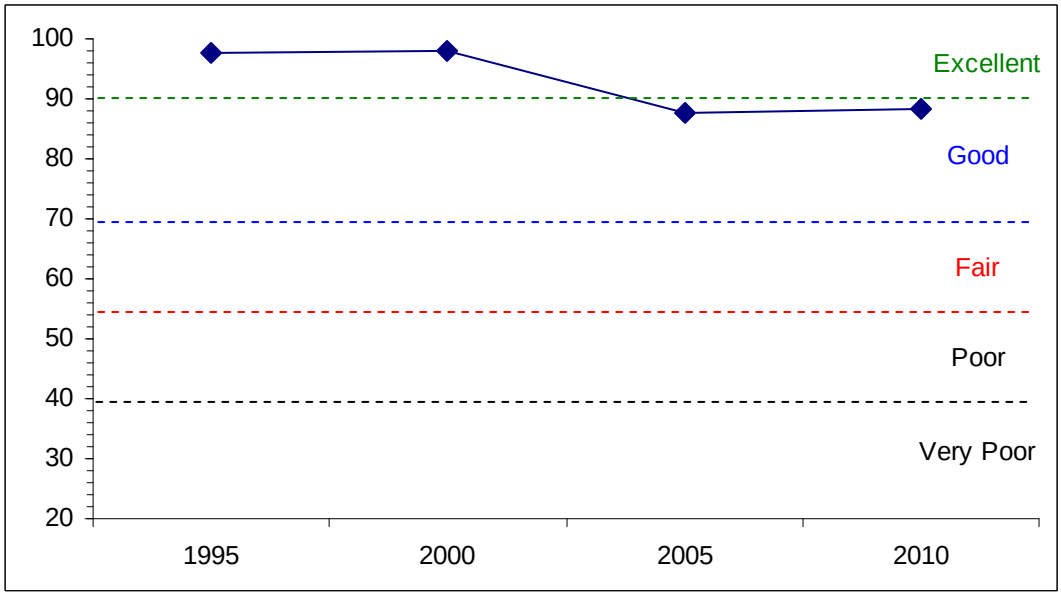
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	28.1	14.6	15.0	30.0	0.0	10.0	0.0	**97.7**	Excellent
00	30.0	13.0	15.0	30.0	0.0	10.0	0.0	**98.0**	Excellent
05	26.5	9.5	11.8	30.0	0.0	10.0	0.0	**87.8**	Good
10	20.7	14.0	15.0	28.5	0.0	10.0	0.0	**88.2**	Good-Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 8



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL--
Management unit 10, Study no: 8



HERBACEOUS TRENDS--
Management unit 10, Study no: 8

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	-	-	6	-	-	-	.03	-	-
G	Agropyron dasystachyum	108	103	128	135	121	1.58	1.92	2.40	1.22
G	Bromus anomalus	c71	c67	b27	a-	a-	.95	.23	-	-
G	Bromus tectorum (a)	-	3	-	-	-	.00	-	-	-
G	Carex sp.	b215	b234	b235	a146	a139	9.30	9.65	7.62	5.75
G	Koeleria cristata	a-	ab3	b15	b16	a-	.00	.27	.51	-
G	Phleum pratense	-	-	7	-	-	-	.30	-	-
G	Poa fendleriana	a35	a29	ab40	c85	bc86	1.18	.46	2.63	2.01
G	Poa pratensis	a39	a54	a63	b123	b155	1.74	2.42	3.65	5.10
G	Sitanion hystrix	a3	b13	ab6	a-	a-	.28	.03	-	-
G	Stipa columbiana	-	-	-	9	3	-	-	.19	.00
G	Stipa comata	-	-	-	5	5	-	-	.36	.06
G	Stipa lettermani	a4	a23	b62	a22	a10	.70	1.13	.48	.07
Total for Annual Grasses		0	3	0	0	0	0.00	0	0	0
Total for Perennial Grasses		475	526	589	541	519	15.76	16.47	17.85	14.23
Total for Grasses		475	529	589	541	519	15.76	16.47	17.85	14.23
F	Achillea millefolium	a15	b44	ab30	ab26	ab23	.60	.19	.45	.24
F	Agoseris glauca	a-	a3	b26	b32	b44	.00	.19	.72	.21
F	Androsace septentrionalis (a)	-	1	3	2	2	.00	.00	.00	.01
F	Arabis sp.	-	-	6	-	1	-	.21	-	.00
F	Arenaria congesta	b141	ab104	a74	ab108	a74	1.27	.65	1.93	1.02
F	Artemisia ludoviciana	4	-	-	-	-	-	-	-	-
F	Aster chilensis	b89	a51	a29	a23	a21	.45	.21	.36	.06
F	Aster sp.	-	-	-	-	12	-	-	-	.09
F	Astragalus miser	78	95	112	96	84	3.54	4.46	3.11	2.29
F	Balsamorhiza sagittata	b79	a18	a21	a14	a6	.73	.66	.86	.12
F	Calochortus nuttallii	a-	b7	ab3	a-	a-	.05	.00	-	-
F	Castilleja flava	b27	a6	ab17	a1	a3	.01	.09	.03	.00
F	Chenopodium sp. (a)	-	3	-	-	-	.00	-	-	-
F	Cirsium sp.	c28	ab23	abc11	a2	ab6	.41	.37	.18	.04
F	Collinsia parviflora (a)	-	4	-	-	4	.01	-	-	.01
F	Comandra pallida	b120	a37	a18	a39	a30	.17	.09	.20	.06
F	Crepis acuminata	a3	c48	bc29	ab9	ab8	.26	.26	.10	.02
F	Cymopterus sp.	-	-	8	3	3	-	.09	.00	.03
F	Delphinium nuttallianum	a-	ab8	a-	b16	b6	.03	-	.07	.03
F	Erigeron eatonii	a-	c101	b47	bc79	b53	.67	.28	.91	.39
F	Erigeron flagellaris	c53	a-	b25	a-	a-	-	.32	-	-
F	Eriogonum alatum	a-	a-	ab1	ab1	b14	-	.00	.03	.05
F	Eriogonum umbellatum	ab20	b36	a6	a15	a17	.24	.03	.47	.13
F	Gayophytum ramosissimum(a)	-	8	-	-	-	.04	-	-	-
F	Gilia sp. (a)	-	2	-	-	-	.00	-	-	-
F	Hymenoxys acaulis	-	8	1	-	5	.04	.03	-	.06
F	Ipomopsis aggregata	2	-	-	-	-	-	-	-	-

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	Lathyrus brachycalyx	$_{a}$-	$_{b}$14	$_{b}$21	$_{b}$17	$_{b}$17	.60	.34	.31	.29
F	Linum lewisii	-	3	7	7	6	.01	.04	.21	.01
F	Lithospermum sp.	-	-	-	1	-	-	-	.00	-
F	Lomatium sp.	-	7	4	2	3	.02	.06	.04	.00
F	Lupinus argenteus	$_{ab}$3	$_{b}$11	$_{a}$-	$_{ab}$6	$_{a}$-	.12	-	.04	-
F	Lychnis drummondii	-	-	-	-	6	-	-	-	.01
F	Oenothera sp.	2	-	-	-	-	-	-	-	-
F	Pedicularis centranthera	-	8	-	-	-	.10	-	-	-
F	Penstemon caespitosus	61	43	57	29	45	.21	.47	.57	.87
F	Penstemon pachyphyllus	3	6	2	-	3	.04	.00	-	.00
F	Phlox longifolia	$_{abc}$37	$_{bc}$41	$_{ab}$20	$_{c}$61	$_{a}$19	.15	.04	.36	.06
F	Polygonum douglasii (a)	-	$_{b}$28	$_{a}$-	$_{b}$38	$_{a}$9	.14	-	.11	.04
F	Senecio integerrimus	$_{a}$-	$_{ab}$3	$_{ab}$2	$_{b}$10	$_{ab}$10	.03	.00	.18	.09
F	Taraxacum officinale	1	36	12	21	16	.26	.09	.19	.03
F	Tragopogon dubius	3	-	-	-	-	-	-	-	-
F	Unknown forb-annual (a)	-	3	-	-	-	.00	-	-	-
F	Unknown forb-perennial	5	8	-	2	-	.04	-	.15	-
F	Viguiera multiflora	$_{ab}$3	$_{b}$15	$_{ab}$4	$_{a}$-	$_{a}$-	.13	.01	-	-
Total for Annual Forbs		0	49	3	40	15	0.21	0.00	0.11	0.06
Total for Perennial Forbs		777	784	593	620	535	10.28	9.26	11.51	6.28
Total for Forbs		777	833	596	660	550	10.49	9.27	11.63	6.35

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

BROWSE TRENDS--
Management unit 10, Study no: 8

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Amelanchier utahensis	43	55	58	39	3.55	4.26	3.67	1.70
B	Artemisia tridentata vaseyana	31	56	60	65	9.49	8.51	8.46	8.23
B	Cercocarpus montanus	27	30	30	36	4.30	4.50	3.99	2.87
B	Chrysothamnus depressus	5	4	3	5	.01	-	.18	.01
B	Chrysothamnus nauseosus	0	1	0	0	-	-	-	-
B	Chrysothamnus viscidiflorus lanceolatus	68	71	67	65	3.51	2.12	4.13	2.83
B	Gutierrezia sarothrae	4	8	11	1	.19	.10	1.01	.18
B	Juniperus osteosperma	0	0	0	1	-	-	-	-
B	Mahonia repens	25	43	36	47	1.05	2.43	1.97	.94
B	Opuntia sp.	2	2	2	2	-	-	-	-
B	Prunus virginiana	8	9	12	7	.51	.33	.62	.09
B	Purshia tridentata	3	8	5	6	.68	1.03	.24	.53
B	Quercus gambelii	10	44	33	30	2.83	6.07	3.07	2.66
B	Rosa woodsii	2	1	0	0	.18	.00	-	-
B	Symphoricarpos oreophilus	75	86	84	89	13.24	10.39	15.38	11.29
B	Tetradymia canescens	3	4	3	2	.00	.15	.03	-
Total for Browse		306	422	404	395	39.60	39.93	42.78	31.37

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 8

Species	Percent Cover		
	'00	'05	'10
Amelanchier utahensis	2.40	7.48	3.96
Artemisia tridentata vaseyana	-	9.46	11.39
Cercocarpus montanus	-	6.83	6.94
Chrysothamnus depressus	-	.06	-
Chrysothamnus viscidiflorus lanceolatus	-	4.48	6.75
Gutierrezia sarothrae	-	.20	.05
Juniperus osteosperma	-	.01	.18
Mahonia repens	-	1.06	1.20
Opuntia sp.	-	.06	.05
Prunus virginiana	-	.20	.10
Purshia tridentata	-	.15	.50
Quercus gambelii	2.40	4.55	1.81
Symphoricarpos oreophilus	-	17.43	17.71
Tetradymia canescens	-	.18	.55

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 8

Species	Average leader growth (in)	
	'05	'10
Amelanchier utahensis	2.4	1.9
Artemisia tridentata vaseyana	2.0	1.9

BASIC COVER--
Management unit 10, Study no: 8

Cover Type	Average Cover %				
	'88	'95	'00	'05	'10
Vegetation	11.75	55.30	61.88	57.64	58.84
Rock	4.25	6.09	4.62	4.90	2.88
Pavement	6.00	.51	1.54	3.79	1.81
Litter	55.50	53.79	56.37	39.45	51.31
Cryptogams	0	.07	.00	.07	0
Bare Ground	22.50	10.82	12.18	14.80	14.82

SOIL ANALYSIS DATA --
Management unit 10, Study no: 8, Study Name: Black Horse

Effective rooting depth (in)	pH	clay			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.2	6.8	26.0	33.4	40.6	4.4	10.8	252.8	0.8

PELLET GROUP DATA--
Management unit 10, Study no: 8

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	5	13	14	1
Elk	-	4	1	10
Deer	19	16	35	12
Cattle	6	-	4	3

Days use per acre (ha)		
'00	'05	'10
-	-	-
22 (54)	5 (13)	1 (3)
57 (141)	86 (212)	41 (101)
4 (10)	12 (29)	9 (23)

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 8

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
88	**3598**	94	2	4	466	9	9	22	54/55
95	**2400**	65	33	3	-	28	3	.83	44/34
00	**2660**	26	65	9	160	13	14	4	51/36
05	**2720**	42	46	12	40	18	30	1	47/30
10	**1440**	58	39	3	700	19	21	1	59/42
Artemisia tridentata vaseyana									
88	**1332**	10	35	55	133	0	0	0	34/31
95	**1160**	22	76	2	120	19	0	3	29/40
00	**1980**	16	73	11	240	22	8	1	29/36
05	**2040**	7	67	26	1180	16	4	12	21/28
10	**2460**	30	66	4	600	18	0	3	25/35
Cercocarpus montanus									
88	**66**	0	0	100	-	0	100	0	-/-
95	**1140**	37	63	0	-	54	11	0	44/49
00	**1160**	45	52	3	20	40	19	0	41/37
05	**1140**	7	74	19	20	2	98	4	54/46
10	**1200**	30	65	5	140	33	25	5	42/36
Chrysothamnus depressus									
88	**0**	0	0	-	-	0	0	0	-/-
95	**120**	17	83	-	-	17	0	0	4/7
00	**160**	38	63	-	-	0	0	0	14/5
05	**100**	0	100	-	-	0	0	0	4/10
10	**160**	0	100	-	-	0	0	0	4/6
Chrysothamnus nauseosus									
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	100	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus viscidiflorus lanceolatus									
88	**4132**	29	71	0	-	0	0	0	14/9
95	**4660**	28	72	0	40	0	0	0	12/14
00	**5000**	6	92	2	40	8	0	.40	15/16
05	**3700**	0	95	5	-	2	0	2	11/14
10	**4380**	15	85	0	100	4	0	0	14/18

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
88	**0**	0	0	-	-	0	0	0	-/-
95	**300**	33	67	-	-	0	0	0	6/7
00	**1020**	27	73	-	-	0	0	0	6/6
05	**880**	7	93	-	-	0	0	0	5/10
10	**40**	0	100	-	-	0	0	0	3/7
Juniperus osteosperma									
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	20	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**20**	100	0	-	-	0	0	0	-/-
Mahonia repens									
88	**2199**	76	24	0	-	0	0	0	10/6
95	**3220**	55	45	0	-	2	0	0	3/5
00	**6280**	6	94	0	-	0	0	8	3/6
05	**5080**	7	93	0	-	0	0	.39	4/5
10	**9560**	46	54	0	80	0	0	0	3/5
Opuntia sp.									
88	**0**	0	0	-	-	0	0	0	-/-
95	**60**	0	100	-	-	0	0	0	5/9
00	**40**	0	100	-	-	0	0	0	4/8
05	**60**	0	100	-	-	0	0	0	4/11
10	**40**	0	100	-	-	50	0	0	5/8
Prunus virginiana									
88	**799**	100	0	0	-	17	0	0	-/-
95	**720**	92	8	0	-	0	0	0	10/11
00	**760**	100	0	0	260	0	0	0	18/19
05	**420**	71	24	5	-	5	0	5	9/9
10	**500**	100	0	0	-	0	0	0	8/8
Purshia tridentata									
88	**199**	33	67	-	-	0	67	0	7/15
95	**80**	0	100	-	-	0	0	0	8/23
00	**240**	8	92	-	-	25	25	0	10/29
05	**120**	0	100	-	-	0	83	0	8/19
10	**160**	0	100	-	-	0	100	13	8/16
Quercus gambelii									
88	**5064**	87	12	1	266	17	0	1	70/56
95	**480**	42	58	0	-	38	4	0	57/64
00	**4580**	72	24	3	-	6	0	1	59/41
05	**3020**	63	27	10	180	17	1	11	55/34
10	**3460**	94	6	0	1300	0	0	0	29/27

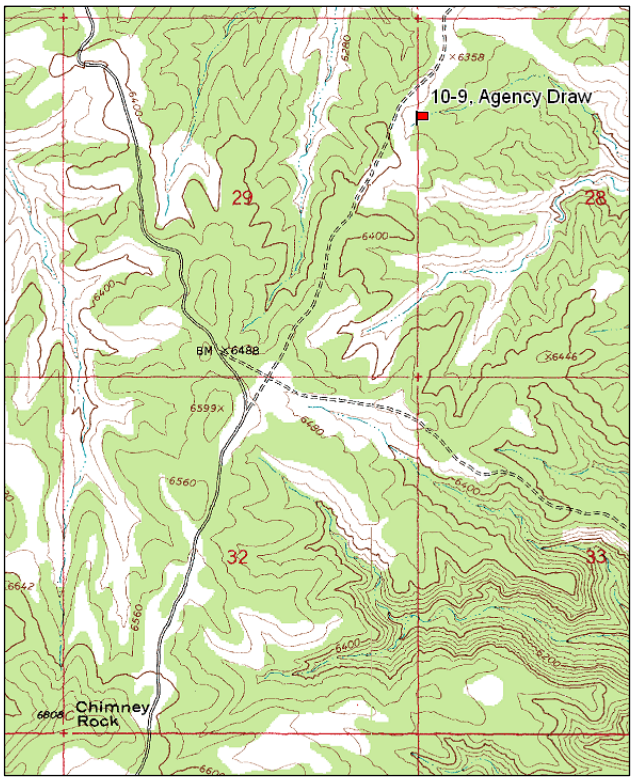
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Rosa woodsii									
88	**1332**	80	20	-	-	0	0	10	16/10
95	**40**	50	50	-	-	0	0	0	7/5
00	**20**	100	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	8/6
10	**0**	0	0	-	-	0	0	0	12/7
Symphoricarpos oreophilus									
88	**6265**	68	30	2	333	0	0	49	15/12
95	**5480**	27	73	0	160	11	.72	0	17/27
00	**5720**	5	95	0	200	15	0	0	14/23
05	**8020**	14	85	0	-	.74	0	0	14/19
10	**6860**	19	81	0	300	3	0	0	15/24
Tetradymia canescens									
88	**66**	100	0	0	-	0	0	0	-/-
95	**80**	0	100	0	-	25	0	0	14/12
00	**120**	17	83	0	-	0	0	0	15/9
05	**80**	0	75	25	-	50	25	0	19/13
10	**40**	0	100	0	-	50	0	0	7/11

AGENCY DRAW - TREND STUDY NO. 10-9-10

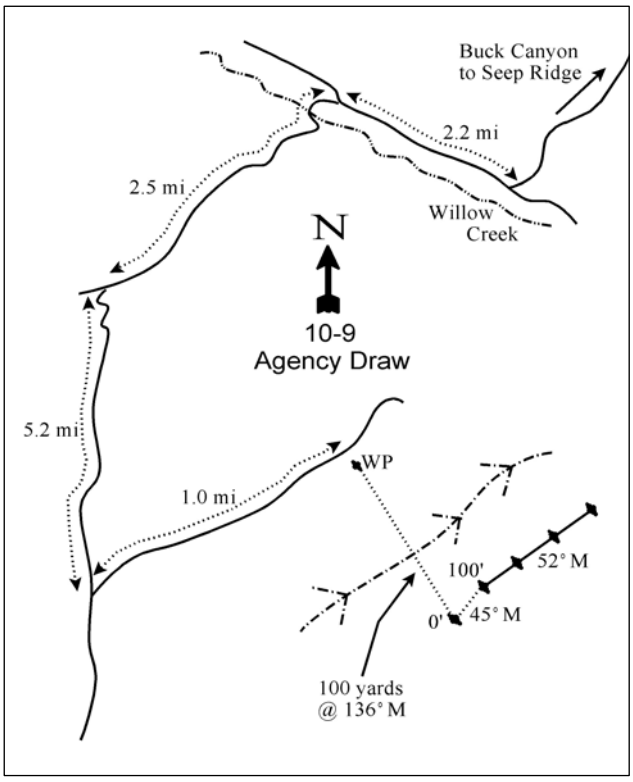
Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Desert Shaly Shallow Loam (Spiny Greasebush), R034XY131UT
Land Ownership: BLM
Elevation: 6319 ft. (1927 m)
Aspect: Northeast
Slope: 5-8%
Transect bearing: 45° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the Seep Ridge Road, go down Buck Canyon to Willow Creek. Travel north on Willow Creek 2.2 miles to a fork. Bear left, cross Willow Creek then drive up out of the canyon 2.5 miles to a fork. Bear left. Continue 5.2 miles to an intersection. Turn left off the main road. Go down 0.1 miles to a small flat. Continue going straight (Northeast) down the ridge 0.9 miles to a witness post on the right side of the road. From the witness post, walk 100 yards down into the draw at a bearing of 136°M. The 0-foot baseline stake is marked with a red browse tag, #9040. The frequency baseline is marked by green fenceposts, 12-18 inches in height.

Map Name: Agency Draw



Diagrammatic Sketch:



Township: 13S Range: 21E Section: 28

GPS: NAD 83, UTM 12S 6216734 E 4391037 N

AGENCY DRAW - TREND STUDY NO. 10-9

Site Information

Site Description: The study is actually located in the Willow Creek drainage and is representative of the Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and desert shrub communities found throughout the area. At 6,300 feet in elevation, Agency Draw is the lowest trend study on the northern end of the Book Cliffs management unit. The study site is located in the relatively flat bottom at the head of a draw. Drainage, via a three-foot deep gullied wash, is to the northeast with tall basin big sagebrush (*A. tridentata* ssp. *tridentata*) and black greasewood (*Sarcobatus vermiculatus*) plants grow along the wash. The surrounding low ridges are occupied by pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*) and black sagebrush (*Artemisia nova*). Grazing in the area is managed by the Bureau of Land Management as part of the Horse Point allotment. This is important winter range for deer judging by the abundance of pellet groups. There has been abundant sign of winter use by sage grouse in the past, with a few birds being observed on an adjacent ridge at the time of study establishment in 1988. A small herd of elk has also been observed in the area. Wild horses also frequent the area and were seen in 2000, 2005 and 2010. Pellet group data has estimated moderate use by deer and light use by elk since 2000. Estimated horse use has been mostly light since 2005 and estimated cattle use was only sampled in 2005 at light use (Table - Pellet Group Data).

Browse: The key browse species are Wyoming big sagebrush, black sagebrush, shadscale (*Atriplex confertifolia*) and winterfat (*Ceratoides lanata*). All the key species provide winter forage, although winterfat may be unavailable due to snow depth in some years. The Wyoming big sagebrush population is a mixture of mature, decadent and young plants that has had mostly moderate use, with some years of heavy use. The proportion of big sagebrush plants displaying poor vigor has increased since 1995 and is moderately high. Black sagebrush also has a mixed population of mature, decadent and young plants, but utilization has decreased since the outset of the study and is mostly light. Decadence of both sagebrush species increased markedly in 2000 and has been moderately high to high since. The shadscale population is mostly mature, but has had good recruitment of young plants over the course of the study. Decadence was moderately high from 1988 to 2005, but decreased substantially in 2010. Utilization of shadscale has been mostly light since 1988. The population of winterfat is mostly mature with good recruitment and low decadence. Utilization of winterfat has been mostly light with the exception of 2005, which had heavy use. The introduced species prostrate kochia (*Kochia prostrata*) was sampled for the first time in 2005 with heavy use. The density and size of kochia increased in 2010, but only light use was noted (Table - Browse Characteristics). It is unknown how or when kochia was seeded in this area.

Herbaceous Understory: Grasses on the site are fairly diverse for a desert shrub community, though perennial species are not overly abundant. Cheatgrass (*Bromus tectorum*) is a major component of the community and at times has dominated the grasses. Cheatgrass cover has fluctuated over the study years, but had a high of nearly 12% in 1995. Common perennial grasses include thickspike wheatgrass (*Agropyron dasystachyum*) and Sandberg bluegrass (*Poa secunda*). Thickspike wheatgrass and bluebunch wheatgrass (*Agropyron spicatum*) may have been lumped together prior to 2005. Other species include: Indian ricegrass (*Oryzopsis hymenoides*), bottlebrush squirreltail (*Sitanion hystrix*) and needle-and-thread (*Stipa comata*). Perennial forbs are fairly diverse, but none are abundant. Annual forb species dominate the forb component including weedy species such as halogeton (*Halogeton glomeratus*) (Table - Herbaceous Cover).

Soil: The site occurs between the deep saline soil along the wash and the shallow, very rocky soil on the ridges. The soil on the study site is a light brown, stony clay loam and is slightly alkaline (pH 7.7). Phosphorus has limited availability for plant growth and development at 4.1 ppm (Tiedemann and Lopez 2004) (Table - Soil Data Analysis). Bare ground cover has fluctuated over the course of the study, but has been moderately. Fluctuations in bare ground, vegetation and litter cover are due to the changes in cheatgrass cover (Table - Basic Cover). The shallow, rocky soils allow rapid runoff. Soil loss from the slopes and wash were evident with moderate pedestaling being noted around the base of shrubs in 2000. The soil erosion

condition was classified as stable in 2005, but was slight in 2010 due to surface litter and soil movement, and flow patterns.

Trend Assessments

Browse:

- **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 any of the preferred browse populations. There was a decrease in the recruitment of young Wyoming big sagebrush plants, but recruitment remained good.
- **1995 to 2000 - slightly down (-1):** There were decreases in the density of black sagebrush and shadscale, and decadence increased markedly in Wyoming big sagebrush, black sagebrush and shadscale.
- **2000 to 2005 - down (-2):** The density of Wyoming big sagebrush, black sagebrush and shadscale all decreased substantially, with an increase in decadence of both of the sagebrush species. The introduced species, forage kochia, was sampled for the first time.
- **2005 to 2010 - up (+2):** Density of Wyoming big sagebrush, black sagebrush, shadscale and winterfat increased substantially, many returning to 2000 levels. Decadence of the sagebrush species and shadscale decreased.

Grass:

- **1988 to 1995 - up (+2):** Perennial grass sum of nested frequency increased by 43% with a significant increase in the nested frequency of thickspike wheatgrass and Sandberg bluegrass.
- **1995 to 2000 - slightly down (-1):** There was a 10% decrease in the sum of nested frequency of perennial grasses, though cover remained similar. Much of the decrease came from a significant decrease in the nested frequency of Sandberg bluegrass.
- **2000 to 2005 - up (+2):** The sum of nested frequency of perennial grasses increased by 23% and cover increased from 6% to 9%.
- **2005 to 2010 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 13% and cover decreased to 6%. The cover of thickspike wheatgrass decreased from 4% to 2%.

Forb:

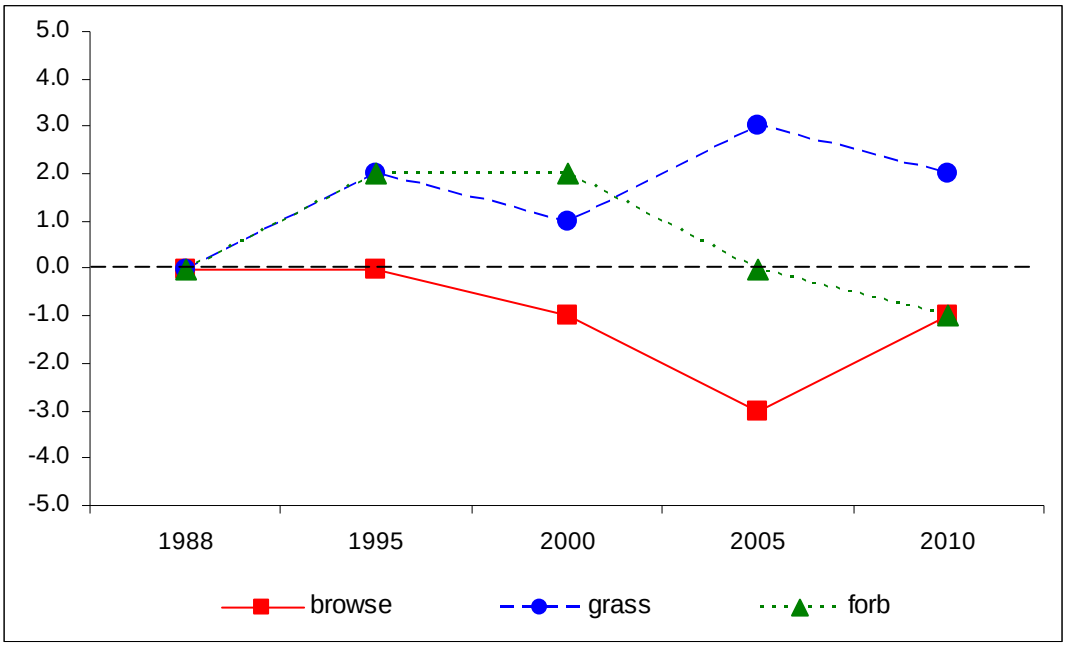
- **1988 to 1995 - up (+2):** The sum of nested frequency of perennial forbs increased seven-fold, but forbs remain rare on the site.
- **1995 to 2000 - stable (0):** There was little change in the sum of nested frequency and cover of perennial forbs.
- **2000 to 2005 - down (-2):** The perennial forb sum of nested frequency decreased by 50% and perennial forbs are very rare on the site. Annual forbs also increased in frequency and cover.
- **2005 to 2010 - slightly down (-1):** The trend is downward despite a 30% increase in the sum of nested frequency of perennial forbs and an increase in cover to over 1% for the first time in the study. Perennial forbs remain rare and weedy annual species have increased on the site, particularly annual stickseed (*Lappula occidentalis*) and halogeton which both increased significantly in nested frequency.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 9

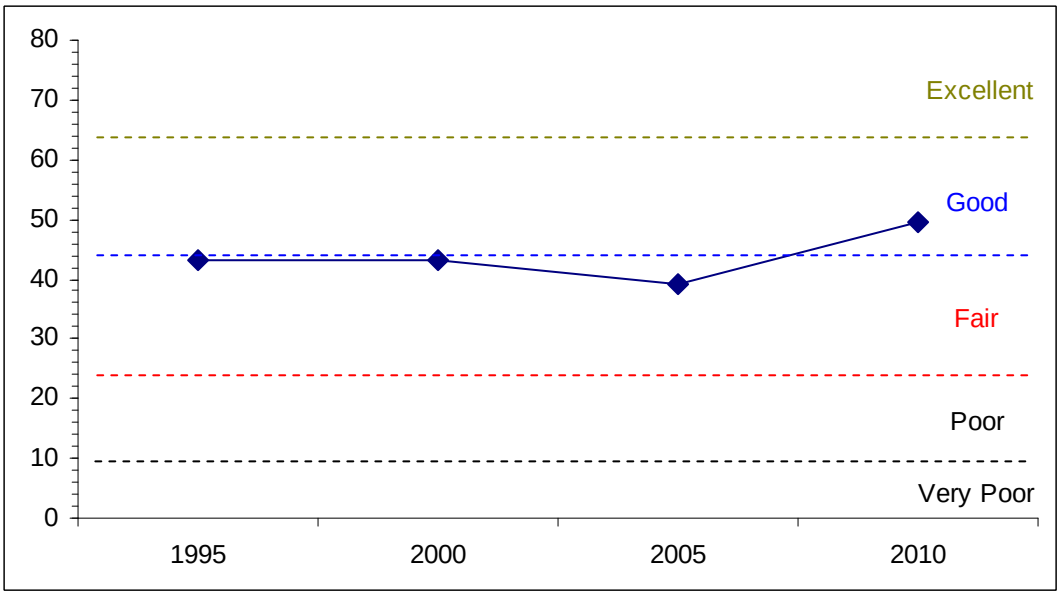
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	14.3	11.1	14.0	11.9	-8.8	0.8	0.0	**43.2**	Fair-Good
00	12.7	6.7	11.9	11.6	-0.6	1.0	0.0	**43.3**	Fair-Good
05	12.2	3.9	6.2	17.7	-1.3	0.5	0.0	**39.1**	Fair
10	12.6	10.3	15.0	11.2	-2.0	2.3	0.0	**49.4**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 9



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10, Study no: 9



HERBACEOUS TRENDS--
Management unit 10, Study no: 9

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	a7	bc110	c132	b96	b81	1.83	3.28	4.09	1.54
G	Agropyron spicatum	a-	a-	a-	b20	b30	-	-	.34	.22

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Bromus tectorum (a)	-	$_{b}$209	$_{a}$97	$_{a}$81	$_{a}$99	11.78	.77	1.77	2.69
G	Carex sp.	-	3	-	-	-	.01	-	-	-
G	Oryzopsis hymenoides	$_{b}$114	$_{a}$54	$_{a}$46	$_{a}$48	$_{a}$44	.84	.39	.36	.77
G	Poa secunda	$_{a}$31	$_{c}$125	$_{b}$88	$_{c}$157	$_{c}$145	1.75	.81	2.70	1.83
G	Sitanion hystrix	$_{a}$85	$_{ab}$56	$_{ab}$46	$_{bc}$55	$_{a}$28	1.13	.63	.71	.58
G	Stipa comata	22	23	22	33	26	.34	.66	.62	.65
Total for Annual Grasses		0	209	97	81	99	11.78	0.77	1.77	2.69
Total for Perennial Grasses		259	371	334	409	354	5.93	5.79	8.84	5.62
Total for Grasses		259	580	431	490	453	17.71	6.57	10.61	8.31
F	Allium sp.	-	-	-	2	1	-	-	.01	.03
F	Antennaria rosea	-	-	-	-	-	-	-	.00	-
F	Arenaria fendleri	-	-	3	5	5	.00	.00	.01	.06
F	Astragalus sp.	$_{a}$-	$_{b}$13	$_{a}$1	$_{a}$-	$_{a}$-	.06	.00	-	-
F	Astragalus utahensis	-	-	1	2	2	-	.00	.03	.03
F	Castilleja linariaefolia	-	-	-	-	4	-	-	-	.01
F	Chenopodium leptophyllum(a)	-	-	-	-	3	-	-	-	.01
F	Chorispora tenella (a)	-	$_{a}$-	$_{a}$-	$_{a}$4	$_{b}$32	-	-	.03	.16
F	Cordylanthus kingii (a)	-	5	-	-	-	.01	-	.00	-
F	Cryptantha sp.	2	5	-	-	3	.03	-	-	.15
F	Cymopterus sp.	-	-	-	1	-	-	-	.00	-
F	Descurainia pinnata (a)	-	$_{b}$48	$_{a}$18	$_{a}$14	$_{a}$14	.14	.15	.06	.10
F	Erigeron pumilus	-	4	4	-	-	.01	.01	-	-
F	Halogeton glomeratus (a)	-	$_{b}$13	$_{a}$-	$_{ab}$8	$_{c}$44	.71	-	.16	.75
F	Haplopappus acaulis	$_{a}$-	$_{ab}$2	$_{b}$9	$_{ab}$2	$_{ab}$4	.00	.05	.00	.33
F	Lappula occidentalis (a)	-	$_{b}$25	$_{a}$5	$_{c}$82	$_{d}$156	.12	.06	2.30	2.57
F	Lepidium sp. (a)	$_{c}$31	$_{b}$26	$_{a}$-	$_{a}$7	$_{b}$15	.11	-	.05	.41
F	Machaeranthera canescens	6	2	-	-	-	.01	-	-	-
F	Machaeranthera grindelioides	-	7	4	4	4	.04	.02	.01	.03
F	Penstemon sp.	-	-	4	-	-	-	.01	-	-
F	Petradoria pumila	-	1	-	-	-	.00	-	-	-
F	Phlox austromontana	-	8	6	3	1	.04	.16	.00	.15
F	Phlox longifolia	$_{a}$-	$_{c}$41	$_{c}$37	$_{ab}$8	$_{b}$14	.11	.10	.04	.10
F	Polygonum douglasii (a)	-	4	-	-	-	.00	-	-	-
F	Salsola iberica (a)	-	-	-	1	-	-	-	.00	-
F	Schoencrambe linifolia	-	-	-	3	6	-	-	.01	.09
F	Sphaeralcea coccinea	6	4	11	12	7	.03	.09	.08	.09
F	Streptanthus cordatus	-	1	-	-	1	.00	-	-	.00
F	Townsendia incana	$_{a}$-	$_{b}$12	$_{b}$14	$_{ab}$5	$_{ab}$9	.05	.04	.01	.04
Total for Annual Forbs		31	121	23	116	264	1.11	0.21	2.62	4.01
Total for Perennial Forbs		14	100	94	47	61	0.41	0.50	0.24	1.14
Total for Forbs		45	221	117	163	325	1.52	0.71	2.87	5.15

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

BROWSE TRENDS--
Management unit 10, Study no: 9

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia frigida	33	22	12	3	.15	.17	.01	-
B	Artemisia nova	24	20	19	32	2.13	1.35	1.00	2.38
B	Artemisia tridentata wyomingensis	44	50	42	34	5.95	5.68	5.13	4.49
B	Atriplex confertifolia	54	49	36	44	3.15	3.50	2.54	2.35
B	Ceratoides lanata	40	36	36	39	.69	.22	.90	1.14
B	Gutierrezia sarothrae	11	12	5	20	.02	.01	.03	.40
B	Juniperus osteosperma	0	1	2	2	-	-	.15	.85
B	Kochia prostrata	0	0	8	8	-	-	.56	.18
B	Opuntia sp.	2	2	2	1	-	.03	-	-
B	Pediocactus simpsonii	0	0	1	0	-	-	-	-
B	Pinus edulis	0	1	2	0	-	.03	.03	-
B	Sarcobatus vermiculatus	19	20	20	21	6.06	6.24	4.31	4.85
Total for Browse		227	213	185	205	18.17	17.24	14.68	16.68

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 9

Species	Percent Cover		
	'00	'05	'10
Artemisia frigida	-	.10	.11
Artemisia nova	-	1.04	2.28
Artemisia tridentata wyomingensis	-	4.31	3.53
Atriplex confertifolia	-	1.45	1.51
Ceratoides lanata	-	.75	.51
Gutierrezia sarothrae	-	-	.06
Juniperus osteosperma	.20	-	.33
Kochia prostrata	-	.13	.81
Opuntia sp.	-	.03	-
Sarcobatus vermiculatus	-	4.33	7.26

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 9

Species	Average leader growth (in)	
	'05	'10
Artemisia nova	1.1	1.1
Artemisia tridentata wyomingensis	2.2	2.5
Ceratoides lanata	2.4	6.3

BASIC COVER--
Management unit 10, Study no: 9

Cover Type	Average Cover %				
	'88	'95	'00	'05	'10
Vegetation	2.50	36.44	26.27	25.42	32.75
Rock	.50	3.76	1.76	2.25	2.48
Pavement	2.50	8.98	11.08	14.17	9.68
Litter	60.00	33.42	39.20	25.56	33.84
Cryptogams	1.50	2.37	5.07	2.11	.97
Bare Ground	33.00	25.00	32.34	40.70	31.66

SOIL ANALYSIS DATA --
Management unit 10, Study no: 9, Study Name: Agency Draw

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.2	7.7	29.0	40.4	30.6	1.4	4.1	329.6	0.9

PELLET GROUP DATA--
Management unit 10, Study no: 9

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	4	10	28	12
Horse	5	8	10	4
Elk	1	3	3	2
Deer	19	29	45	15
Cattle	1	-	1	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	23 (57)	17 (43)
11 (29)	13 (31)	1 (2)
49 (121)	23 (58)	27 (66)
-	12 (29)	-

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 9

		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									
88	**5198**	27	73	0	866	0	0	0	8/3
95	**1060**	11	89	0	180	0	0	0	11/7
00	**660**	24	73	3	60	9	3	0	5/7
05	**360**	11	89	0	-	6	0	0	7/6
10	**60**	0	100	0	-	0	0	0	13/7
Artemisia nova									
88	**665**	60	40	0	66	10	40	0	11/21
95	**1280**	14	77	9	200	64	6	6	15/18
00	**1120**	16	52	32	20	38	2	11	13/20
05	**980**	0	55	45	100	27	27	10	8/13
10	**1380**	23	49	28	420	9	19	13	12/20

		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 wyomingensis									
88	**3865**	36	45	19	66	31	16	5	21/25
95	**2620**	44	47	10	980	34	2	2	21/29
00	**2760**	35	40	25	180	41	17	12	23/30
05	**1600**	13	35	53	140	34	53	38	20/26
10	**2040**	49	31	20	120	24	14	23	24/28
Atriplex confertifolia									
88	**2197**	9	73	18	-	6	0	0	16/18
95	**1840**	10	65	25	40	11	0	11	14/21
00	**1600**	8	60	33	-	9	10	13	15/20
05	**1180**	19	59	22	380	8	2	10	16/22
10	**1500**	25	71	4	20	0	0	0	16/20
Ceratoides lanata									
88	**1265**	74	16	11	66	5	0	5	6/6
95	**1780**	19	80	1	100	4	0	0	10/9
00	**1740**	30	64	6	-	13	17	3	11/9
05	**2040**	12	86	2	80	7	79	2	9/10
10	**2500**	19	81	0	20	7	4	2	12/9
Chrysothamnus nauseosus									
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	16/20
Gutierrezia sarothrae									
88	**799**	0	100	0	66	0	0	0	7/5
95	**340**	53	47	0	240	0	0	0	9/11
00	**560**	14	57	29	-	0	0	25	5/8
05	**180**	22	78	0	20	0	0	0	8/9
10	**1320**	39	61	0	-	0	0	0	9/8
Juniperus osteosperma									
88	**0**	0	0	0	-	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**20**	100	0	0	20	0	0	0	-/-
05	**40**	50	0	50	-	0	0	0	-/-
10	**40**	50	50	0	-	0	0	0	-/-
Kochia prostrata									
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**700**	0	100	-	-	0	63	0	11/13
10	**780**	28	72	-	-	0	0	0	18/21

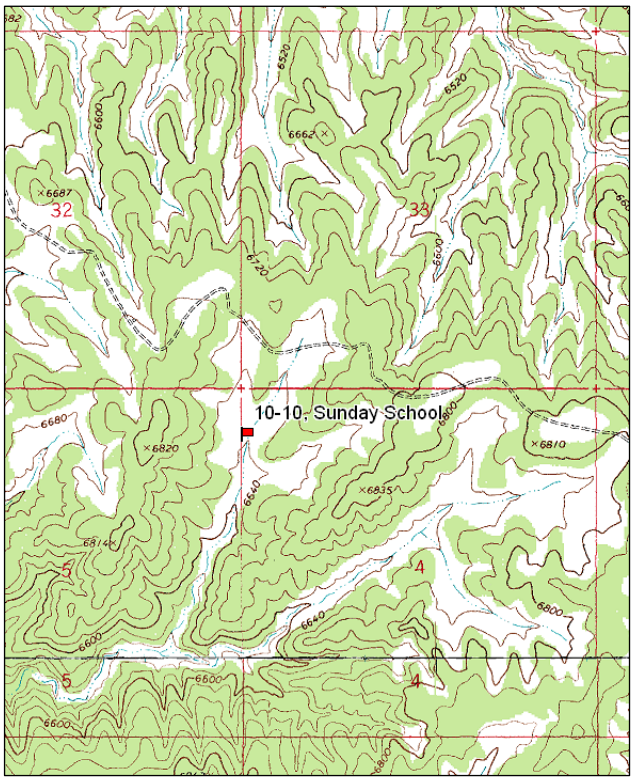
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
88	**66**	0	100	0	-	0	0	0	2/3
95	**40**	0	50	50	-	0	0	0	5/14
00	**40**	0	50	50	20	0	0	50	2/9
05	**40**	0	100	0	-	0	0	0	5/16
10	**20**	0	100	0	-	0	0	0	4/13
Pediocactus simpsonii									
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	3/5
10	**0**	0	0	-	-	0	0	0	-/-
Pinus edulis									
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	-/-
05	**40**	100	0	-	-	0	50	0	-/-
10	**0**	0	0	-	20	0	0	0	-/-
Sarcobatus vermiculatus									
88	**66**	0	100	0	-	0	0	0	54/63
95	**680**	18	76	6	-	0	0	0	34/49
00	**1680**	64	33	2	-	0	0	1	37/54
05	**660**	3	85	12	40	15	3	3	29/44
10	**660**	12	85	3	-	0	0	0	33/50
Sclerocactus sp.									
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	3/3
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Tetradymia spinosa									
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	23/31
10	**0**	0	0	-	-	0	0	0	-/-

SUNDAY SCHOOL - TREND STUDY NO. 10-10-10

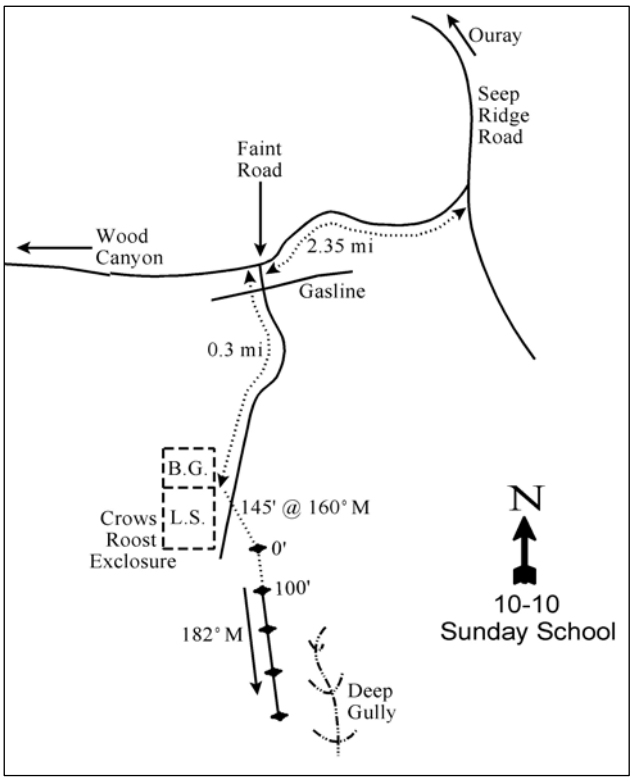
Vegetation Type: Fourwing Saltbush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Silt Loam (Fourwing Saltbush-Winterfat), R034XY329UT
Land Ownership: BLM
Elevation: 6650 ft. (2027 m)
Aspect: South
Slope: 2%
Transect bearing: 182° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the Seep Ridge Road, turn onto the Wood Canyon/Willow Creek road and proceed west 2.35 miles. Turn left onto a jeep trail and go 0.3 miles to the Crows Roost Exclosure. The study site is on the east side of the exclosure. The 0-foot baseline stake is 29 paces from the Southeast corner of the big game exclosure, at a bearing of 160°M. The frequency baseline runs south from there, parallel to the livestock exclosure fence. The study is marked by 2-foot tall green metal fenceposts.

Map Name: Bates Knolls



Diagrammatic Sketch:



Township: 14S Range: 22E Section: 5

GPS: NAD 83, UTM 12S 631373 E 4388223 N

Site Information

Site Description: The study is located in a draw adjacent to the Crows Roost Exclosure on BLM land. The wide draw drains to the south, although the bottom of the draw is relatively flat. The dominant vegetation is fourwing saltbush (*Atriplex canescens*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). The Sunday School Canyon allotment is used by cattle each winter with a rotational deferred system of grazing from November 1 through April 30. Few deer and elk pellet groups were encountered in 1988 and no pellet groups were sampled in 1995. Pellet group transect data has estimated light use by deer, elk and cattle since 2000. Rabbit sign was very high in 2005 with an 86% quadrat frequency, but has been low to moderate in all other sample years (Table - Pellet Group Data).

Browse: Fourwing saltbush, Wyoming big sagebrush, basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), fringed sagebrush (*A. frigida*) and winterfat (*Ceratoides lanata*) are all abundant browse species on this site. The majority of the big sagebrush on the site is Wyoming big sagebrush. Basin big sagebrush is found near the bottom of the draw where soil is deeper. Decadence of the big sagebrush species has been low except for 2005, when decadence was very high in both species. There was a large increase in the density of both big sagebrush species in 2010 due to a large surge in recruitment of young plants. Utilization of the two big sagebrush species has been mostly moderate with heavier use in 2005. Fourwing saltbush is a mostly mature population with moderately high decadence and moderate to heavy use. The density of fourwing saltbush has decreased steadily since 2000 with little knew recruitment of young plants in 2000 or 2005. However, recruitment increased in 2010. Winterfat and fringed sagebrush are very abundant on this site with mostly light to moderate use on winterfat and mostly light use on fringed sage. Utilization of both species was higher in 2005 (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory was dominated by annual species in 1995 as cheatgrass (*Bromus tectorum*) and tansy mustard (*Descurainia pinnata*) made up 88% of the herbaceous cover and 64% of the total vegetation cover. Due to the unusually wet spring of 1995, tansy mustard was 2 to 3 feet tall and cheatgrass cover was nearly 11%. Since that time, both species have decreased significantly and are not prevalent on the site. Thickspike wheatgrass (*Agropyron dasystachyum*) and blue grama (*Bouteloua gracilis*) are the most abundant perennial grasses. Scarlet globemallow (*Sphaeralcea coccinea*) is the only common perennial forb with annual forb species being more prevalent on the site (Table - Herbaceous Trends).

Soil: The soil is a well-drained clay loam with a slightly alkaline soil reaction (pH 7.7) (Table - Soil Analysis Data). Bare ground cover increased in 2000 and has remained relatively high since then due to the decrease in vegetation cover provided by annual species (Table - Basic Cover). There is an active gully in the draw that was reported to be 10 feet deep with steep banks in 2005. In 1995, it was only about 4 feet deep with vegetation growing in the bottom. In 2000 and 2005 the gully appeared to be actively head cutting the erodible soil and had steep bank 15-20 feet deep, and in 2010 it was 6-8 feet deep. The soil erosion condition was classified as critical in 2005 due to the gully, pedestaling, and soil movement, and slight in 2010 for the same reasons.

Trend Assessments

Browse:

- **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 most of the preferred browse. Fourwing saltbush increased substantially in decadence from 0% to 80% and poor vigor from 0% to 47%. In the nearby Crow's Roost Exclosure, decadent fourwing plants were also noted in both the total and livestock exclosure.
- **1995 to 2000 - stable (0):** Density of both big sagebrush species decreased, but increased slightly for fourwing saltbush. Cover of all three of these species increased. Decadence of fourwing saltbush

decreased to 27% and poor vigor returned to 0%. Recruitment of young plants decreased in both big sagebrush species and remained low for fourwing saltbush.

- **2000 to 2005 - slightly down (-1):** Decadence of the big sagebrush species and fourwing saltbush increased markedly and recruitment of young plants has remained low.
- **2005 to 2010 - slightly up (+1):** The density of the two big sagebrush species increased substantially, primarily due to a large increase in the recruitment of young plants with only a slight increase in total big sagebrush cover. Decadence and poor vigor of big sagebrush also decreased substantially. The density of fourwing saltbush decreased by 28% and decadence remained moderately high.

Grass:

- **1988 to 1995 - down (-2):** The sum of nested frequency of perennial grasses decreased by 59% with a significant decrease in thickspike wheatgrass and blue grama. Annual species were not included in the sample in 1988, but cheatgrass was prevalent in 1995 providing nearly 11% cover.
- **1995 to 2000 - up (+2):** Perennial grass sum of nested frequency increased over two-fold and cover increased from 2% to 13%. There was a significant increase in the nested frequency of thickspike wheatgrass and blue grama. Cheatgrass decreased significantly in nested frequency and cover decreased to less than 1%.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover decreased slightly to 10%. Cheatgrass had a significant decrease in nested frequency.
- **2005 to 2010 - stable (0):** The perennial grass sum of nested frequency remained similar and cover increased to 13%. Cheatgrass nested frequency increased significantly though cover remained less than 1%

Forb:

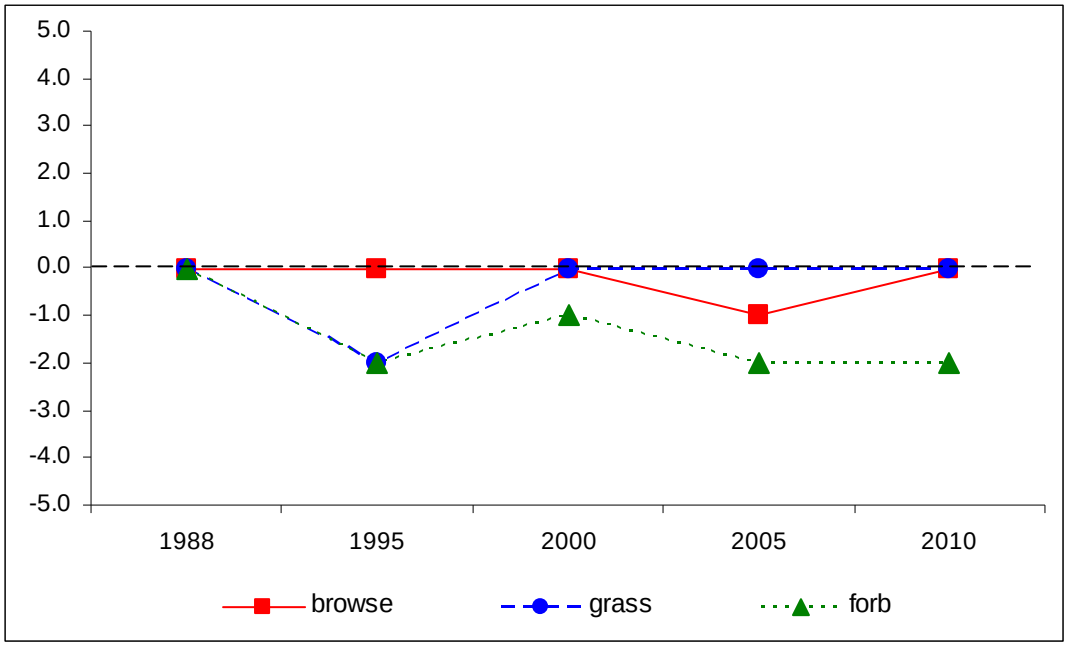
- **1988 to 1995 - down (-2):** The sum of nested frequency of perennial forbs decreased by 42%. Annual species were not included in the sample in 1988, but tansy mustard was prevalent at 19%.
- **1995 to 2000 - slightly up (+1):** There was an 18% increase in the sum of nested frequency of perennial forbs and cover increased from 1% to 3%. Tansy mustard was not sampled.
- **2000 to 2005 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased to 1995 levels and cover decreased to 2%.
- **2005 to 2010 - stable (0):** There was no change in the sum of nested frequency of perennial forbs and cover decreased to 1%.

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

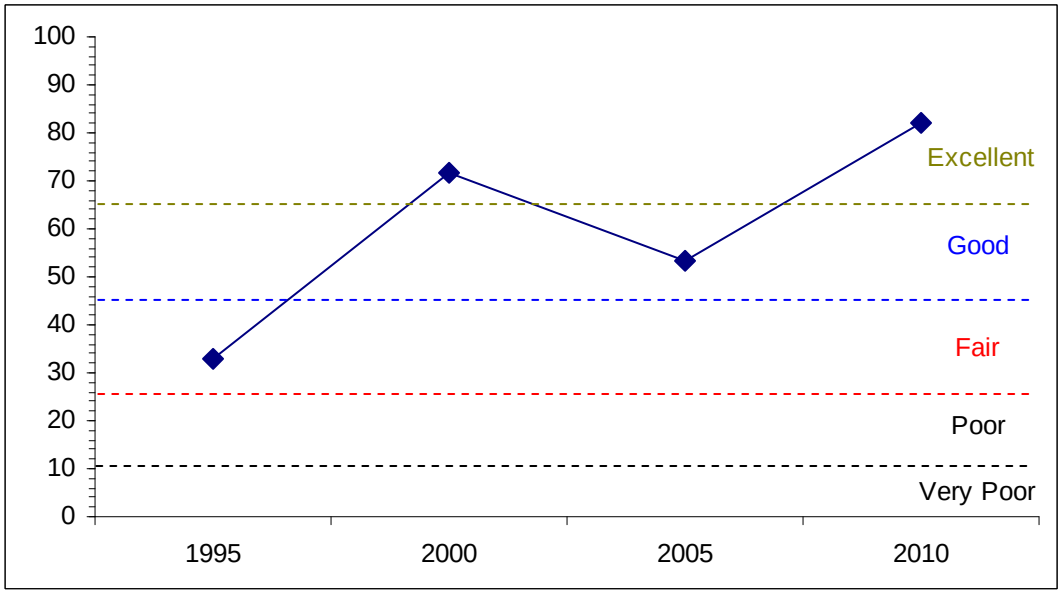
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	15.0	8.6	11.2	3.6	-8.1	2.6	0.0	**33.0**	Fair
00	23.7	12.4	4.3	25.1	-0.4	6.4	0.0	**71.5**	Excellent
05	19.3	7.6	4.0	19.1	-0.1	3.6	0.0	**53.4**	Good
10	24.8	14.1	15.0	26.6	-0.5	2.0	0.0	**82.0**	Excellent

Trend Summary

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



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



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

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	$_{b}$208	$_{a}$119	$_{b}$247	$_{b}$245	$_{b}$229	1.43	10.67	5.08	7.58
G	Agropyron spicatum	-	9	-	2	6	.09	-	.00	.18
G	Bouteloua gracilis	$_{d}$177	$_{a}$22	$_{b}$97	$_{bc}$129	$_{c}$130	.18	1.68	3.79	5.11
G	Bromus tectorum (a)	-	$_{c}$252	$_{b}$82	$_{a}$43	$_{b}$84	10.79	.53	.19	.73
G	Oryzopsis hymenoides	-	-	-	1	-	-	-	.00	-
G	Poa secunda	20	16	26	24	22	.10	.21	.64	.42
G	Sitanion hystrix	-	-	-	3	-	-	-	.00	-
Total for Annual Grasses		0	252	82	43	84	10.79	0.53	0.19	0.73
Total for Perennial Grasses		405	166	370	404	387	1.81	12.57	9.53	13.30
Total for Grasses		405	418	452	447	471	12.61	13.10	9.73	14.04
F	Chenopodium fremontii (a)	-	-	-	5	10	-	-	.01	.02
F	Delphinium sp.	-	1	-	-	-	.00	-	-	-
F	Descurainia pinnata (a)	-	$_{c}$302	$_{a}$-	$_{ab}$6	$_{b}$15	19.10	-	.04	.05
F	Erigeron eatonii	$_{a}$1	$_{b}$18	$_{a}$-	$_{a}$-	$_{a}$4	.54	-	-	.00
F	Lappula occidentalis (a)	-	$_{b}$88	$_{a}$44	$_{c}$245	$_{c}$221	.39	.16	7.76	1.58
F	Machaeranthera canescens	$_{b}$9	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	.03
F	Phlox longifolia	$_{a}$15	$_{ab}$28	$_{a}$13	$_{a}$16	$_{b}$48	.11	.10	.04	.40
F	Ranunculus testiculatus (a)	-	$_{b}$84	$_{a}$21	$_{a}$23	$_{c}$181	.70	.10	.08	2.50
F	Schoencrambe linifolia	-	-	-	-	2	-	-	.00	.00
F	Sphaeralcea coccinea	$_{d}$202	$_{ab}$84	$_{c}$142	$_{bc}$107	$_{a}$69	.63	3.08	1.75	.56
Total for Annual Forbs		0	474	65	279	427	20.20	0.27	7.90	4.17
Total for Perennial Forbs		227	131	155	123	123	1.28	3.18	1.80	1.00
Total for Forbs		227	605	220	402	550	21.48	3.45	9.71	5.17

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

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

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia frigida	44	79	79	91	1.78	3.60	3.02	8.17
B	Artemisia tridentata tridentata	11	15	11	20	.71	2.84	3.12	2.28
B	Artemisia tridentata wyomingensis	36	27	27	27	3.84	5.17	4.18	6.39
B	Atriplex canescens	55	53	49	42	2.83	5.23	2.46	1.13
B	Ceratoides lanata	55	61	68	72	3.23	2.85	3.28	3.53
B	Gutierrezia sarothrae	0	0	0	1	-	-	-	-
Total for Browse		201	235	234	253	12.39	19.71	16.09	21.53

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

Species	Percent Cover	
	'05	'10
Artemisia frigida	1.38	8.31
Artemisia tridentata tridentata	2.73	4.11
Artemisia tridentata wyomingensis	3.36	4.50
Atriplex canescens	1.86	2.16
Ceratoides lanata	3.16	3.08

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

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	1.9	2.2
Ceratoides lanata	4.2	2.8

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

Cover Type	Average Cover %				
	'88	'95	'00	'05	'10
Vegetation	7.00	49.70	36.77	29.32	38.70
Rock	.25	.27	.06	.62	.05
Pavement	9.50	2.63	3.00	7.91	5.70
Litter	55.00	40.40	42.09	22.85	40.18
Cryptogams	.50	.03	.36	.06	.03
Bare Ground	27.75	21.33	35.75	49.85	36.77

SOIL ANALYSIS DATA --
Management unit 10, Study no: 10, Study Name: Sunday School #1

Effective rooting depth (in)	pH	caly loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.8	7.7	28.0	39.4	32.6	2.4	10.1	409.6	0.6

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

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	3	38	86	16
Horse	-	-	-	6
Elk	-	11	22	3
Deer	-	6	10	8
Cattle	3	6	10	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	6 (16)
20 (50)	15 (38)	7 (17)
3 (9)	10 (25)	9 (23)
19 (47)	14 (34)	-

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

		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									
88	**94599**	66	34	0	132333	0	0	0	7/5
95	**2040**	33	66	1	8880	0	0	.98	7/5
00	**9660**	14	86	0	340	0	0	.20	5/8
05	**7860**	13	87	0	160	32	7	0	5/7
10	**18960**	37	63	0	2480	7	1	.42	6/9
Artemisia tridentata tridentata									
88	**0**	0	0	0	-	0	0	0	-/-
95	**760**	53	47	0	160	11	0	0	24/33
00	**660**	18	79	3	-	3	0	27	72/65
05	**740**	0	59	41	-	32	24	22	34/41
10	**3260**	75	23	2	160	1	6	0	38/50
Artemisia tridentata wyomingensis									
88	**199**	100	0	0	1733	0	0	0	-/-
95	**1940**	39	58	3	260	11	5	1	19/24
00	**1120**	4	93	4	60	7	0	9	24/30
05	**980**	10	45	45	-	39	31	31	21/29
10	**3720**	74	23	3	700	24	0	11	22/27
Atriplex canescens									
88	**1332**	10	90	0	-	0	0	0	31/28
95	**1860**	3	17	80	-	5	8	47	18/26
00	**2200**	6	66	27	-	43	5	0	18/24
05	**1740**	7	61	32	-	20	60	18	11/16
10	**1260**	22	43	35	20	37	21	16	13/20
Ceratoides lanata									
88	**9399**	30	70	0	66	0	0	0	9/3
95	**8320**	7	86	7	40	3	4	0	10/10
00	**7380**	6	94	1	120	18	1	0	7/8
05	**10280**	9	90	1	20	13	79	.58	7/7
10	**9440**	9	91	0	140	20	17	0	7/9
Gutierrezia sarothrae									
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	6/8
10	**20**	0	100	-	-	0	0	0	5/6

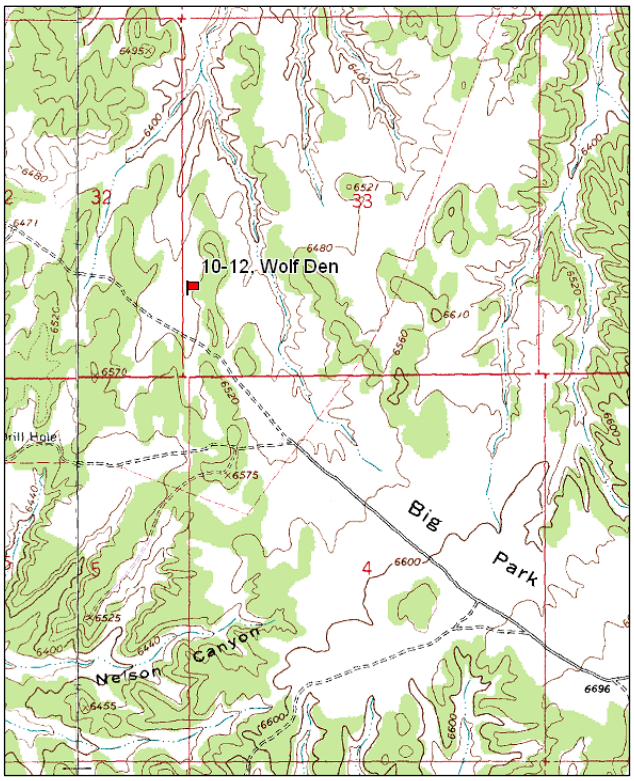
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	1/3
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-

WOLF DEN - TREND STUDY NO. 10-12-10

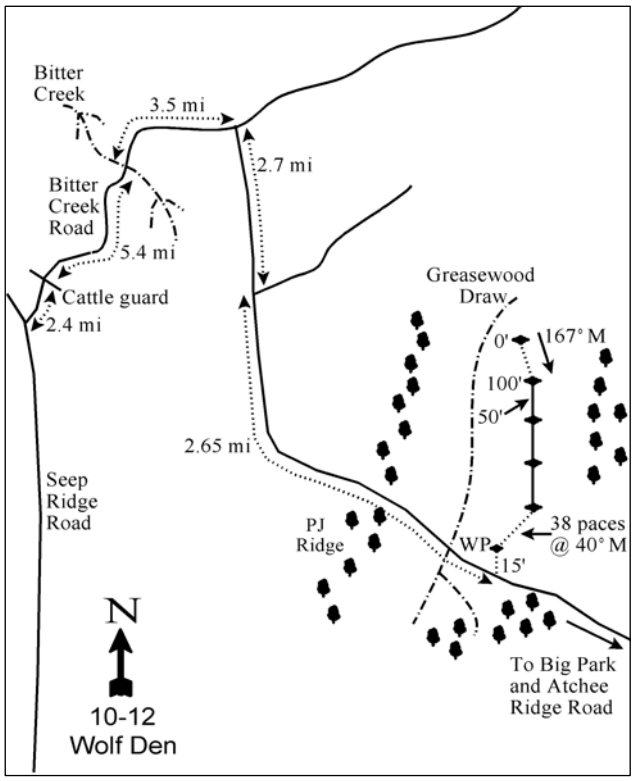
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R034XY334UT
Land Ownership: BLM
Elevation: 6437 ft. (1963 m)
Aspect: North
Slope: 3-5%
Transect bearing: 167° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the Seep Ridge Road, about 10 miles north of Pine Spring, turn onto the Bitter Creek Road near McCoy Reservoir. Drive easterly on this road for 2.4 miles to a cattle guard. Continue 5.4 miles to a corral in the bottom of Bitter Creek. Drive up out of the Bitter Creek canyon 3.5 miles. Where the road tops out, turn right off the main road. Go 2.7 miles to a minor fork. Continue straight on the main road for 2.65 miles to the east edge of a sagebrush/greasewood draw. There is a witness post 15 feet off the north side of the road. From the witness post walk 38 paces bearing 40°M to the 400 ft. baseline stake. The 0-foot baseline stake, tagged #9098, is 400 feet north.
Alternate route: From the intersection of Atchee Ridge Road and Big Park Road travel north toward Big Park 3.45 miles to a fork. Stay left and continue 0.15 to another fork. Go straight to Big Park for 5.7 miles to a cattle guard and a fork. Proceed right for 0.4 miles to the witness post.

Map Name: Burnt Timber Canyon



Diagrammatic Sketch:



Township: 12S Range: 24E Section: 33

GPS: NAD 83, UTM 12S 650422 E 4398983 N

Site Information

Site Description: The study is located in a very dense stand of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) along a wide swale between low ridges of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). This area, near Big Park, is considered crucial deer winter range. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Asphalt Draw allotment. Pellet group transect data has estimated very high use by deer since 2000 with some very light use by elk (Table - Pellet Group Data). No cattle pats have been sampled on the study, although cows were in the general area when the site was read in 2000.

Browse: The cover on the study site is dominated by Wyoming big sagebrush, though black greasewood (*Sarcobatus vermiculatus*) provides moderate amounts of cover along the lower reaches of the depression (Table - Browse Trends). Shadscale (*Atriplex confertifolia*) was common on the site at the outset of the study in 1988, but has decreased since 2000 and is now rare on the site. The sagebrush on the site is so dense that it is difficult to walk through it. The Wyoming big sagebrush population is mostly mature and has had moderate to high decadence over the sample years. Recruitment of young sagebrush plants has been low over most sample years, but increased to a large portion of the population in 2010. Utilization of sagebrush has been mostly moderate with some years of heavier use (Table - Browse Characteristics).

Herbaceous Understory: The high sagebrush density and cover severely limits understory plants. Grasses and forbs are very rare on the site (Table - Herbaceous Trends).

Soil: The soil is a loam with a moderately alkaline soil reaction (pH 8). Phosphorus has a low availability for plant growth and development at 3.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately low as the dense sagebrush provides excellent cover, but the understory is very limited and the low amounts of litter are easily displaced. Cryptogam cover is high, but exists almost entirely underneath the sagebrush crowns. The soil erosion condition was classified as slight in 2005 due to pedestaling of plants and flow patterns. The soil erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **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. Decadence of sagebrush remained moderate and recruitment of young plants remained low.
- **1995 to 2000 - stable (0):** There was little change in the density or cover of sagebrush, but decadence increased from 19% to 42%. There was a 37% increase in the density of shadscale from 380 plants/acre to 520 plants/acre, though cover decreased slightly.
- **2000 to 2005 - slightly down (-1):** The density of sagebrush increased slightly, but cover decreased from 33% to 27%. Decadence of sagebrush remained high at 45% and recruitment of young plants decreased to just 1% of the population. Shadscale decreased by 69% to 160 plants/acre and cover decreased to near 0%. Decadence in shadscale increased from 19% to 50%.
- **2005 to 2010 - slightly up (+1):** There was a 20% increase in the density of sagebrush to 9,280 plants/acre due to a large increase in the recruitment of young plants. Cover of sagebrush decreased slightly to 24%. Shadscale density decreased to just 20 plants/acre and no cover was sampled.

Grass:

- **1988 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1995 to 2000 - up (+2):** The sum of nested frequency of perennial grasses increased by 45% due to a significant increase in the nested frequency of mutton bluegrass (*Poa fendleriana*). Bottlebrush squirreltail (*Sitanion hystrix*) increased substantially in cover increasing the cover of perennial grasses.

- **2000 to 2005 - down (-2):** The perennial grass sum of nested frequency decreased by 70% and cover decreased beneath 1%. There was a significant decrease in the nested frequency of mutton bluegrass and bottlebrush squirreltail. Grasses are very rare on the site.
- **2005 to 2010 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial grasses, but grasses were already so rare that it makes little impact on the community.

Forb:

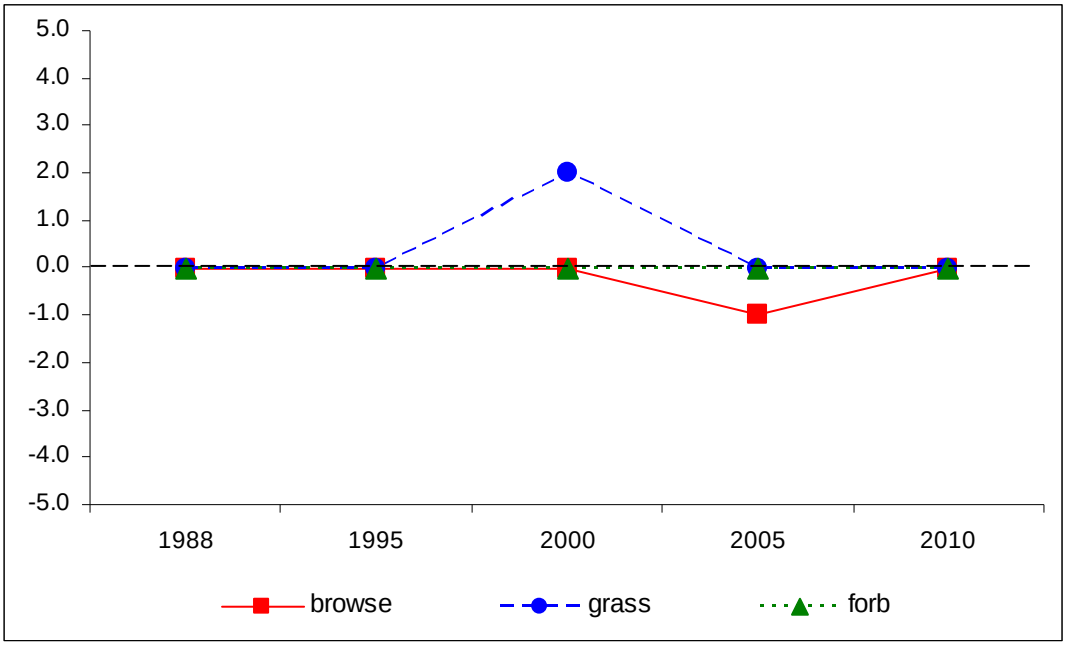
- **1988 to 1995 - stable (0):** Forbs are very rare.
- **1995 to 2000 - stable (0):** Forbs are very rare.
- **2000 to 2005 - stable (0):** Forbs are very rare.
- **2005 to 2010 - stable (0):** Forbs are very rare.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 12

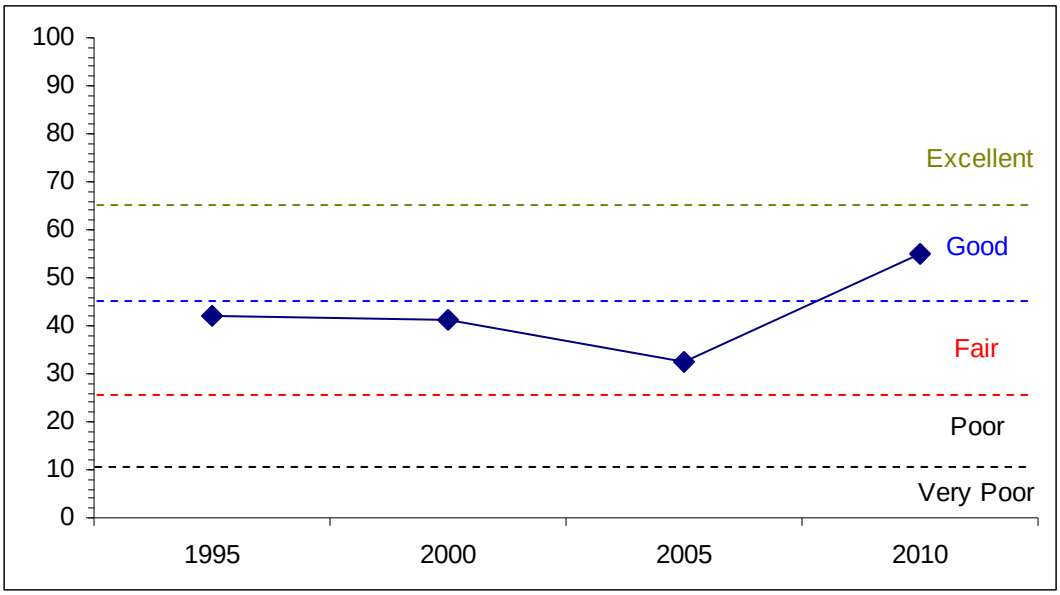
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	30.0	9.6	1.7	0.9	0.0	0.0	0.0	**42.2**	Fair
00	30.0	3.6	3.5	4.2	0.0	0.0	0.0	**41.3**	Fair
05	30.0	1.6	0.6	0.4	0.0	0.1	0.0	**32.7**	Fair
10	30.0	9.0	15.0	0.3	0.0	0.5	0.0	**54.8**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 12



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10, Study no: 12



HERBACEOUS TRENDS--
Management unit 10, Study no: 12

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	$_{c}$59	$_{b}$35	$_{a}$1	$_{a}$-	$_{a}$-	.22	.00	-	-
G	Agropyron spicatum	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$26	$_{b}$10	-	-	.08	.03
G	Bromus tectorum (a)	-	3	-	-	-	.01	-	-	-
G	Oryzopsis hymenoides	3	2	5	6	-	.03	.06	.02	-
G	Poa fendleriana	$_{a}$1	$_{a}$3	$_{b}$51	$_{a}$4	$_{a}$2	.00	.66	.01	.06
G	Sitanion hystrix	$_{ab}$24	$_{bc}$52	$_{c}$76	$_{ab}$30	$_{a}$8	.18	1.35	.08	.05
Total for Annual Grasses		0	3	0	0	0	0.00	0	0	0
Total for Perennial Grasses		87	92	133	66	20	0.43	2.08	0.19	0.14
Total for Grasses		87	95	133	66	20	0.44	2.08	0.19	0.14
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{a}$-	$_{b}$20	$_{a}$-	-	-	.36	-
F	Chenopodium leptophyllum(a)	-	$_{b}$84	$_{a}$-	$_{b}$76	$_{a}$-	.34	-	.22	-
F	Cryptantha sp.	1	2	-	-	-	.00	-	-	-
F	Descurainia pinnata (a)	-	$_{c}$148	$_{a}$3	$_{b}$56	$_{a}$3	1.46	.00	.77	.00
F	Lappula occidentalis (a)	-	$_{ab}$11	$_{a}$-	$_{b}$14	$_{ab}$9	.07	-	.06	.01
F	Schoencrambe linifolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$8	$_{b}$22	-	-	.06	.27
F	Unknown forb-annual (a)	-	4	-	-	-	.01	-	-	-
Total for Annual Forbs		0	247	3	166	12	1.88	0.00	1.42	0.01
Total for Perennial Forbs		1	2	0	8	22	0.00	0	0.06	0.27
Total for Forbs		1	249	3	174	34	1.89	0.00	1.49	0.29

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

BROWSE TRENDS--
Management unit 10, Study no: 12

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia frigida	36	46	33	42	1.85	3.03	.22	1.29
B	Artemisia tridentata wyomingensis	97	98	97	98	32.26	32.55	26.90	24.24
B	Atriplex canescens	1	0	2	0	-	-	-	-
B	Atriplex confertifolia	16	18	8	1	1.69	.97	.03	-
B	Gutierrezia sarothrae	2	14	3	3	.01	.07	-	.00
B	Juniperus osteosperma	0	7	8	4	.15	.18	.38	-
B	Opuntia sp.	4	3	1	0	-	.03	-	-
B	Pinus edulis	0	0	1	0	-	-	-	-
B	Sarcobatus vermiculatus	17	19	17	17	2.62	5.28	3.64	3.32
Total for Browse		173	205	170	165	38.59	42.13	31.18	28.87

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 12

Species	Percent Cover	
	'05	'10
Artemisia frigida	.11	.90
Artemisia tridentata wyomingensis	32.84	25.88
Atriplex confertifolia	.03	-
Gutierrezia sarothrae	-	.10
Juniperus osteosperma	.75	-
Sarcobatus vermiculatus	3.43	3.75

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 12

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	2.0	1.2

BASIC COVER--
Management unit 10, Study no: 12

Cover Type	Average Cover %				
	'88	'95	'00	'05	'10
Vegetation	5.75	43.86	41.80	31.92	28.45
Rock	.75	.74	.02	.02	.00
Pavement	32.25	19.73	15.25	18.66	9.26
Litter	49.50	43.14	45.29	40.06	43.25
Cryptogams	5.00	6.84	9.23	9.01	3.48
Bare Ground	6.75	8.53	19.11	16.12	33.35

SOIL ANALYSIS DATA --

Management unit 10, Study no: 12, Study Name: Wolf Den

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
26.1	8.0	46.0	33.4	20.6	1.8	3.5	115.2	0.6

PELLET GROUP DATA--

Management unit 10, Study no: 12

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	7	6	70	5
Elk	3	4	8	1
Deer	52	47	77	39

Days use per acre (ha)		
'00	'05	'10
-	-	-
3 (9)	-	2 (5)
116 (287)	261 (645)	212 (524)

BROWSE CHARACTERISTICS--

Management unit 10, Study no: 12

		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									
88	**4532**	15	82	3	866	4	10	0	7/5
95	**2040**	20	80	0	600	0	0	0	11/11
00	**3700**	15	85	0	40	1	0	0	5/9
05	**1300**	31	57	12	840	8	0	11	5/5
10	**3120**	21	79	0	20	13	3	0	6/7
Artemisia tridentata wyomingensis									
88	**18131**	8	65	26	1066	25	6	10	21/16
95	**7580**	3	78	19	240	65	20	3	27/32
00	**7260**	6	53	42	60	38	18	13	26/33
05	**7740**	1	54	45	4100	54	22	9	29/34
10	**9280**	36	43	21	3080	41	9	17	25/29
Atriplex canescens									
88	**0**	0	0	0	-	0	0	0	-/-
95	**20**	0	0	100	-	100	0	0	43/22
00	**0**	0	0	0	-	0	0	0	-/-
05	**40**	0	0	100	-	50	0	50	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Atriplex confertifolia									
88	**465**	29	57	14	-	0	0	0	22/18
95	**380**	11	74	16	160	0	0	0	20/23
00	**520**	19	62	19	-	12	8	15	19/26
05	**160**	13	38	50	20	25	38	50	26/20
10	**20**	100	0	0	-	0	0	0	13/12

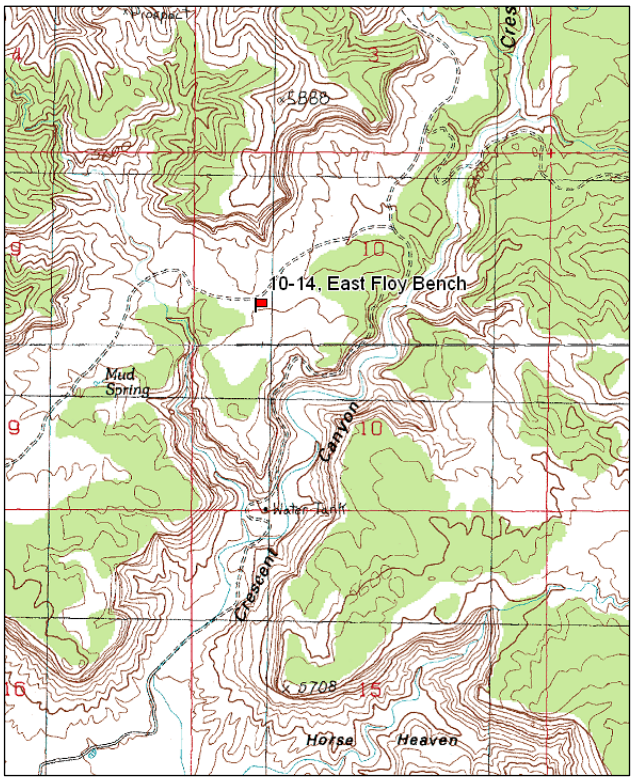
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
88	**865**	31	69	-	133	0	0	0	7/6
95	**60**	0	100	-	180	0	0	0	12/8
00	**900**	20	80	-	-	0	0	0	5/6
05	**60**	33	67	-	140	0	33	0	3/2
10	**200**	10	90	-	-	0	0	0	5/5
Juniperus osteosperma									
88	**0**	0	0	0	-	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**140**	43	57	0	20	0	0	0	-/-
05	**160**	50	0	50	-	13	0	50	-/-
10	**80**	75	25	0	-	25	0	25	-/-
Opuntia sp.									
88	**66**	100	0	-	-	0	0	0	-/-
95	**80**	0	100	-	-	0	0	0	3/4
00	**60**	0	100	-	-	0	0	0	5/9
05	**20**	0	100	-	-	0	0	0	2/4
10	**0**	0	0	-	-	0	0	0	-/-
Pinus edulis									
88	**0**	0	0	-	66	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Sarcobatus vermiculatus									
88	**266**	0	100	0	-	0	0	0	33/26
95	**3860**	0	89	11	-	0	0	0	37/50
00	**800**	8	63	30	-	15	10	13	40/54
05	**940**	2	64	34	20	72	28	9	35/49
10	**780**	44	46	10	-	10	0	10	35/43

EAST FLOY BENCH - TREND STUDY NO. 10-14-10

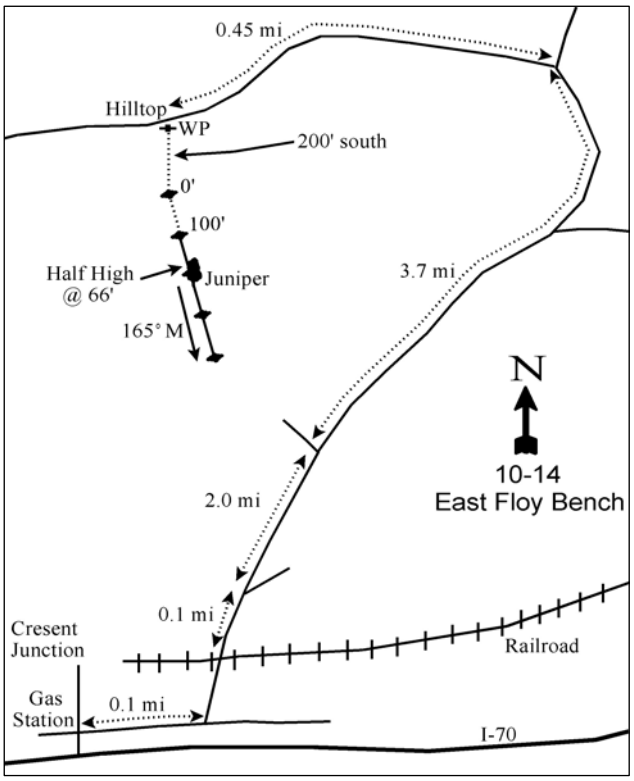
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 5600 ft. (1707 m)
Aspect: West
Slope: 5%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 3 rebar at 15ft

Directions:
Go to Crescent Junction, off of I-70 east of Green River. From the paved road 0.1 miles east of the gas station and SR 163 junction, cross the east-west running tracks. After the tracks go 0.1 miles and turn left onto a dirt road. Go north 2 miles on the main dirt road to a fork. Bear right and go 3.7 miles to a fork on top of a hill, stay left and climb out of the wash and up the west side of the canyon. Turn left. Continue 0.45 miles to the crest of a small hill. There is a rebar witness post 10 feet to the left. The 0-foot baseline stake, marked with a browse tag, is 200 feet south of the witness post.

Map Name: Cresent Junction



Diagrammatic Sketch:



Township: 21S Range: 19E Section: 9/16

GPS: NAD 83, UTM 12S 602868 E 4317594 N

EAST FLOY BENCH - TREND STUDY NO. 10-14

Site Information

Site Description: The study is located on a low lying bench running along the south end of the Book Cliffs. This Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) flat drops off abruptly at the southern edge to the salt desert below. The study is located on Bureau of Land Management (BLM) administered land in the Crescent Canyon allotment. Pellet group transect data estimated moderate deer use in 2000 and 2005, with heavier use in 2010. Estimated elk use has been light since 2000. Estimated cattle use was lightly moderate in 2000 and 2005, but was heavy in 2010. Rabbit use was very high in 2005, but was moderate in other sample years (Table - Pellet Group Data).

Browse: Wyoming big sagebrush is the key browse species. The sagebrush population is mostly mature with moderate decadence and good vigor. Recruitment of young sagebrush plants was good at the outset of the study, but has been somewhat low since 2000. Sagebrush utilization has been mostly moderate with heavy use in 1986 and 2010. Due to the larger sample size and better sample distribution used in 1995, considerably more browse species were sampled. These species include: fourwing saltbush (*Atriplex canescens*), shadscale (*A. confertifolia*), winterfat (*Ceratoides lanata*), spiny hopsage (*Grayia spinosa*), green ephedra (*Ephedra viridis*), rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *consimilis*), stickyleaf low rabbitbrush (*C. viscidiflorus* ssp. *stenophyllus*), slenderbush eriogonum (*Eriogonum microthecum*) and broom snakeweed (*Gutierrezia sarothrae*). Many of these species are preferred by wildlife and livestock, but most occur in low densities and shadscale has not been sampled since 2005. Broom snakeweed density has varied and has been reflective of drought conditions (Table - Browse Characteristics). Juniper density (Table - Point-Quarter Tree Data) and cover (Table - Browse Trends) have been increasing since 1995, but remain moderately low.

Herbaceous Understory: Perennial grasses are diverse, but are not overly abundant on this site. Common perennial species include: galleta (*Hilaria jamesii*), bottlebrush squirreltail (*Sitanion hystrix*), sand dropseed (*Sporobolus cryptandrus*), Indian ricegrass (*Oryzopsis hymenoides*) and needle-and-thread (*Stipa comata*). Cheatgrass (*Bromus tectorum*) is common on the site, but has fluctuated in frequency and cover with precipitation patterns. Forbs are sparse and mostly comprised of annuals (Table - Herbaceous Trends).

Soil: The soil is a sandy loam with neutral soil reactivity (pH 7.0) and large areas of exposed or shallow covered sandstone bedrock. Phosphorus may be limiting to plant growth and development at 4.3 ppm (Tiedemann and Lopez 2004) and organic matter is low at less than 1% (Table - Soil Analysis Data). Bare ground is abundant on this site with low amounts of vegetation and litter cover, though cryptogam cover is quite high (Table - Basic Cover). Some soil movement is evident in plant interspaces, but due to the gentle slope, erosion is minimal. The soil erosion condition was classified as slight in 2005 and 2010.

Trend Assessments

Browse:

- **1986 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 a slight increase in poor vigor of sagebrush, but decadence decreased slightly.
- **1995 to 2000 - slightly down (-1):** Density of sagebrush decreased 11% from 1,060 plants/acre to 940 plants/acre with a large decrease in the recruitment of young plants. Sagebrush decadence increased from 2% to 28% and poor vigor increased from 13% to 19%. Cover of sagebrush decreased slightly from 4% to 3%.
- **2000 to 2005 - stable (0):** Sagebrush density increased 17% to 1,100 plants/acre, but decadence increased to 38% and cover remained similar at 3%. Recruitment of young sagebrush plants remained low at 4%. Shadscale was not sampled on the site. Winterfat density and cover increased slightly.

- **2005 to 2010 - stable (0):** There was a 24% decrease in the density of sagebrush to 840 plants/acre, but decadence decreased to 19% and cover increased to 6%. Recruitment of young sagebrush plants increased slightly, but is still relatively low.

Grass:

- **1986 to 1995 - down (-2):** The sum of nested frequency of perennial grasses decreased by 46% with a significant decrease in the nested frequency of galleta, bottlebrush squirreltail and needle-and-thread. Annual species were not included in the sample in 1986, but cheatgrass was the dominant grass species in 1995.
- **1995 to 2000 - up (+2):** The perennial grass sum of nested frequency increased by 28%, though there was little change in cover. Cheatgrass decreased significantly in nested frequency and cover decreased from 7% to 1%.
- **2000 to 2005 - down (-2):** There was a 14% decrease in the sum of nested frequency and cover decreased from 5% to 3%. Cheatgrass increased significantly in nested frequency and cover increased to 8%.
- **2005 to 2010 - down (-2):** The sum of nested frequency of perennial grasses decreased by 39% with little change in cover. Cheatgrass cover decreased to 3%, but there was little change in nested frequency.

Forb:

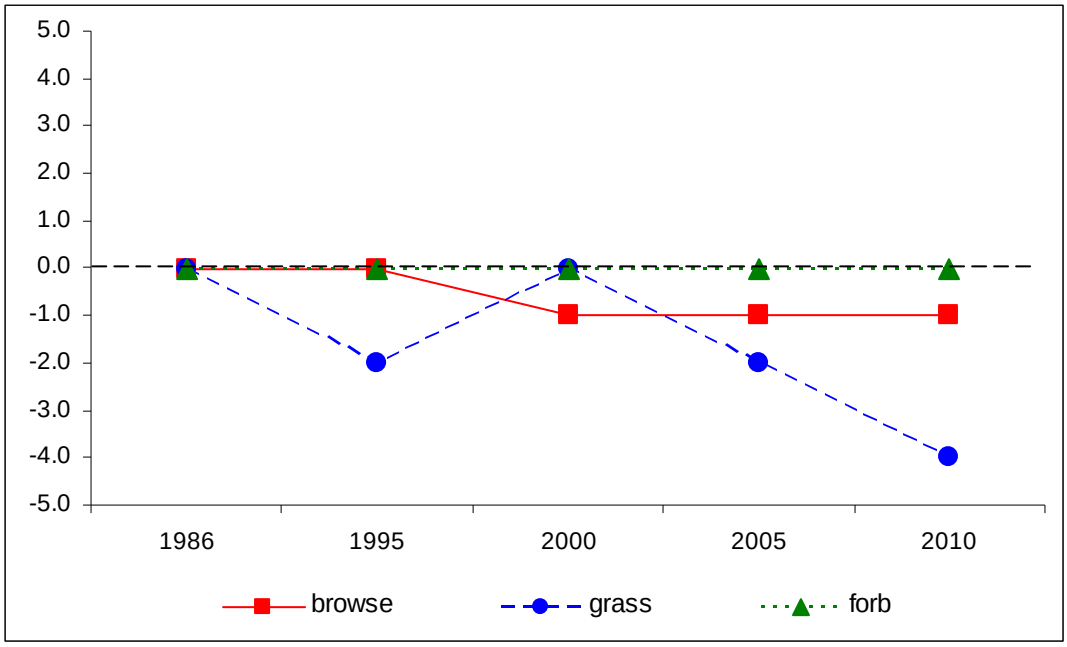
- **1986 to 1995 - stable (0):** Perennial forbs are very rare.
- **1995 to 2000 - stable (0):** Perennial forbs are very rare.
- **2000 to 2005 - stable (0):** Perennial forbs are very rare.
- **2005 to 2010 - stable (0):** Perennial forbs are very rare.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 14

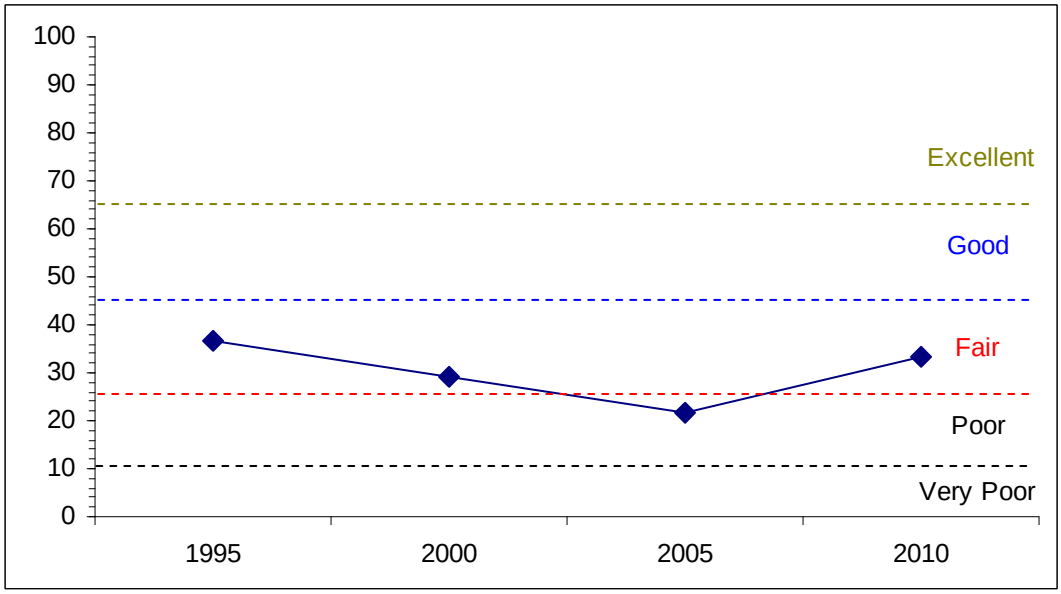
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	6.5	14.5	10.3	10.4	-5.2	0.0	0.0	**36.6**	Fair
00	7.2	5.6	7.1	10.2	-0.8	0.0	0.0	**29.3**	Fair
05	7.5	8.3	5.8	6.5	-6.8	0.4	0.0	**21.7**	Poor
10	9.7	10.9	7.6	6.3	-2.1	0.9	0.0	**33.2**	Fair

Trend Summary

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



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



HERBACEOUS TRENDS--
Management unit 10, Study no: 14

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Aristida purpurea	-	1	7	4	-	.03	.07	.30	-
G	Bromus tectorum (a)	-	$_{c}$318	$_{a}$56	$_{b}$161	$_{b}$167	6.72	1.10	8.11	2.75
G	Elymus salina	$_{a}$-	$_{b}$15	$_{b}$13	$_{a}$-	$_{a}$-	1.10	.18	-	-
G	Hilaria jamesii	$_{b}$156	$_{a}$65	$_{a}$76	$_{a}$80	$_{a}$50	1.10	2.01	1.71	1.87
G	Oryzopsis hymenoides	$_{ab}$36	$_{ab}$37	$_{a}$17	$_{b}$57	$_{b}$41	1.91	.30	.50	.66
G	Poa secunda	-	-	-	6	1	-	-	.04	.00
G	Sitanion hystrix	$_{b}$40	$_{a}$7	$_{a}$2	$_{a}$10	$_{a}$14	.07	.03	.19	.39
G	Sporobolus cryptandrus	$_{a}$-	$_{ab}$5	$_{c}$63	$_{b}$9	$_{ab}$2	.03	1.58	.05	.03
G	Stipa comata	$_{c}$92	$_{b}$40	$_{b}$39	$_{ab}$20	$_{a}$6	.92	.93	.47	.15
G	Vulpia octoflora (a)	-	$_{c}$75	$_{a}$4	$_{d}$114	$_{b}$40	.21	.01	.92	.10
Total for Annual Grasses		0	393	60	275	207	6.93	1.11	9.03	2.86
Total for Perennial Grasses		324	170	217	186	114	5.18	5.12	3.27	3.13
Total for Grasses		324	563	277	461	321	12.11	6.23	12.31	5.99
F	Arabis sp.	-	-	-	-	-	-	-	.03	-
F	Chaenactis stevioides	-	-	-	1	-	-	-	.00	-
F	Chenopodium fremontii (a)	-	-	-	3	3	-	-	.00	.00
F	Chenopodium leptophyllum(a)	-	$_{a}$2	$_{a}$-	$_{b}$14	$_{a}$-	.00	-	.06	-
F	Cryptantha sp.	-	-	-	3	18	-	-	.00	.06
F	Descurainia pinnata (a)	-	$_{a}$3	$_{a}$-	$_{b}$13	$_{a}$-	.00	-	.31	-
F	Draba sp. (a)	-	$_{b}$17	$_{a}$-	$_{c}$50	$_{a}$-	.02	-	.22	-
F	Erigeron pumilus	-	5	-	2	3	.01	-	.00	.03
F	Eriogonum cernuum (a)	-	10	-	1	-	.02	-	.01	-
F	Euphorbia sp.	-	-	-	-	1	-	-	-	.03
F	Gilia sp. (a)	-	$_{a}$-	$_{a}$-	$_{c}$73	$_{b}$31	-	-	.38	.06
F	Halogeton glomeratus (a)	-	-	-	-	3	-	-	-	.01
F	Lappula occidentalis (a)	-	$_{b}$67	$_{a}$-	$_{c}$118	$_{b}$64	.12	-	1.68	.13
F	Lepidium sp. (a)	-	-	-	3	7	-	-	.03	.04
F	Machaeranthera grindelioides	-	-	-	1	-	-	-	.03	-
F	Malcolmia africana	-	-	-	-	1	-	-	-	.00
F	Mentzelia sp.	-	-	-	5	3	-	-	.04	.00
F	Navarretia intertexta (a)	-	-$_{a}$	$_{a}$-	$_{b}$35	$_{a}$-	-	-	1.08	-
F	Oenothera sp.	-	-	-	3	-	-	-	.00	-
F	Plantago patagonica (a)	-	$_{bc}$42	$_{a}$-	$_{c}$58	$_{b}$34	.09	-	.21	.07
F	Ranunculus testiculatus (a)	-	$_{a}$-	$_{a}$1	$_{b}$20	$_{a}$1	-	.00	.06	.00
F	Salsola iberica (a)	-	$_{a}$-	$_{ab}$2	$_{b}$11	$_{b}$12	-	.00	.03	.07
F	Sphaeralcea coccinea	-	-	-	5	8	-	-	.09	.31
F	Tragopogon dubius	3	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	141	3	399	155	0.26	0.00	4.09	0.40
Total for Perennial Forbs		3	5	0	20	34	0.01	0	0.22	0.43
Total for Forbs		3	146	3	419	189	0.28	0.00	4.31	0.84

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

BROWSE TRENDS--
Management unit 10, Study no: 14

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata wyomingensis	24	21	21	21	4.20	3.29	3.37	5.60
B	Atriplex canescens	7	7	10	8	.56	.15	.82	1.18
B	Atriplex confertifolia	4	5	0	0	.03	.88	-	-
B	Ceratoides lanata	6	2	7	6	.45	.15	.48	.18
B	Chrysothamnus nauseosus consimilis	1	0	0	1	-	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	9	7	4	3	.15	.44	.33	.18
B	Ephedra viridis	1	4	4	4	-	1.50	1.32	.79
B	Eriogonum microthecum	2	0	3	1	.00	-	-	-
B	Grayia spinosa	5	2	5	4	.33	.15	.63	.78
B	Gutierrezia sarothrae	80	27	51	60	3.82	.32	1.93	1.00
B	Juniperus osteosperma	0	0	1	1	2.25	3.11	4.48	4.91
B	Opuntia sp.	1	4	4	3	-	.03	.00	-
Total for Browse		140	79	110	112	11.82	10.05	13.39	14.65

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 14

Species	Percent Cover		
	'00	'05	'10
Artemisia tridentata wyomingensis	-	3.88	5.11
Atriplex canescens	-	1.39	1.28
Ceratoides lanata	-	.30	.35
Chrysothamnus viscidiflorus stenophyllus	-	-	.10
Ephedra viridis	-	1.95	1.00
Grayia spinosa	-	.88	.66
Gutierrezia sarothrae	-	2.58	1.58
Juniperus osteosperma	4.40	6.59	7.93
Opuntia sp.	-	.01	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 14

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	2.9	2.6
Atriplex canescens	4.5	2.6
Ceratoides lanata	6.2	6.3
Grayia spinosa	-	4.4

POINT-QUARTER TREE DATA--
Management unit 10, Study no: 14

Species	Trees per Acre			
	'95	'00	'05	'10
Juniperus osteosperma	16	16	32	30

Average diameter (in)			
'95	'00	'05	'10
6.18	4.9	10.0	7.2

BASIC COVER--
Management unit 10, Study no: 14

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	2.25	23.38	17.85	25.43	21.59
Rock	0	1.45	1.17	.84	.66
Pavement	0	.44	.42	.41	.30
Litter	35.75	31.51	24.85	18.26	25.18
Cryptogams	2.50	10.39	10.03	11.91	7.36
Bare Ground	59.50	39.23	57.54	54.95	54.77

SOIL ANALYSIS DATA --
Management unit 10, Study no: 14, Study Name: East Floy Bench

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.8	7.0	60.0	23.4	16.6	0.6	4.3	185.6	0.5

PELLET GROUP DATA--
Management unit 10, Study no: 14

Type	Quadrat Frequency			
	'95	'00	'05	'10
Sheep	7	4	-	-
Rabbit	58	42	83	24
Elk	5	3	1	-
Deer	20	15	10	10
Cattle	-	2	12	15

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	-
7 (17)	5 (12)	4 (10)
27 (67)	27 (66)	59 (146)
18 (44)	23 (57)	70 (174)

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 14

		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 wyomingensis									
86	**2697**	37	44	19	66	31	41	6	15/14
95	**1060**	23	75	2	140	58	4	13	23/39
00	**940**	4	68	28	-	68	11	19	24/41
05	**1100**	4	58	38	-	49	45	7	26/39
10	**840**	10	71	19	-	86	7	17	20/38
Atriplex canescens									
86	**333**	0	0	100	-	20	50	40	-/-
95	**140**	14	86	0	-	0	0	0	27/37
00	**300**	0	7	93	20	33	0	73	23/28
05	**260**	15	77	8	-	31	38	0	25/33
10	**200**	10	90	0	-	50	30	0	27/42
Atriplex confertifolia									
86	**0**	0	0	0	-	0	0	0	-/-
95	**100**	0	100	0	-	60	20	0	22/32
00	**160**	13	13	75	80	63	0	0	21/44
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Ceratoides lanata									
86	**0**	0	0	-	-	0	0	0	-/-
95	**260**	8	92	-	-	77	0	0	15/17
00	**180**	0	100	-	-	33	0	0	13/22
05	**360**	33	67	-	300	6	67	0	13/12
10	**380**	11	89	-	220	0	11	0	16/20
Chrysothamnus nauseosus consimilis									
86	**0**	0	0	0	-	0	0	0	-/-
95	**20**	0	0	100	-	0	0	0	21/20
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	19/20
10	**20**	0	100	0	-	0	100	0	17/32
Chrysothamnus viscidiflorus stenophyllus									
86	**0**	0	0	0	-	0	0	0	-/-
95	**200**	30	50	20	-	0	0	10	16/34
00	**200**	10	80	10	20	0	10	10	13/28
05	**100**	0	100	0	-	0	0	0	13/19
10	**60**	67	33	0	-	0	0	0	10/23

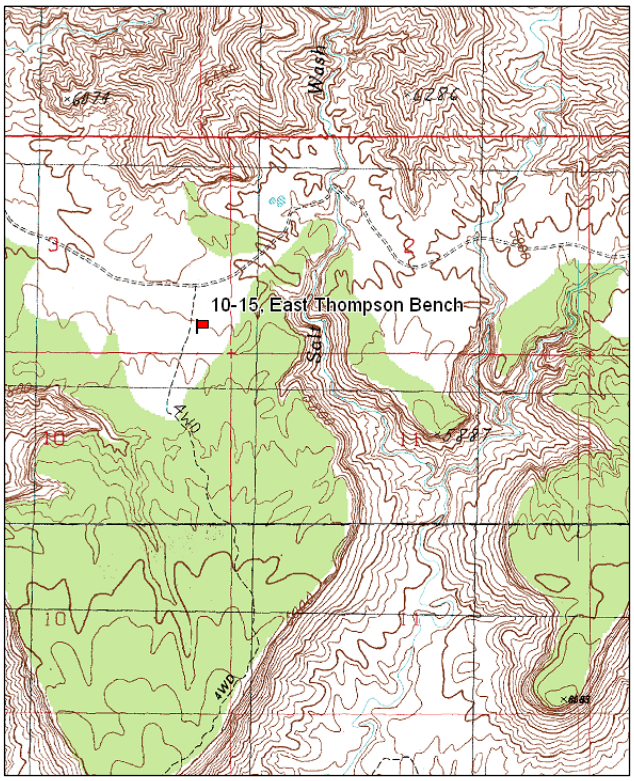
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Ephedra viridis									
86	**0**	0	0	0	-	0	0	0	-/-
95	**20**	100	0	0	-	0	0	0	63/97
00	**200**	40	50	10	-	60	20	0	25/25
05	**380**	21	79	0	-	79	0	0	31/46
10	**360**	61	39	0	-	11	0	0	22/31
Eriogonum microthecum									
86	**0**	0	0	-	-	0	0	0	-/-
95	**140**	14	86	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**80**	0	100	-	-	50	50	0	6/8
10	**20**	0	100	-	-	100	0	0	5/12
Grayia spinosa									
86	**0**	0	0	0	-	0	0	0	-/-
95	**120**	0	50	50	-	0	0	0	25/44
00	**40**	0	0	100	-	100	0	100	23/44
05	**120**	0	67	33	-	0	83	33	25/45
10	**80**	0	100	0	-	50	50	0	19/39
Gutierrezia sarothrae									
86	**8198**	46	52	2	333	0	0	0	8/7
95	**6140**	2	98	0	40	0	0	0	9/11
00	**960**	0	69	31	-	2	0	17	6/8
05	**3280**	7	93	0	240	2	0	0	10/12
10	**8060**	51	48	2	80	0	0	1	7/8
Juniperus osteosperma									
86	**66**	50	50	-	-	0	0	0	71/71
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	-/-
10	**20**	0	100	-	-	0	0	0	-/-
Opuntia sp.									
86	**33**	0	100	0	-	0	0	0	7/1
95	**20**	0	100	0	-	0	0	0	5/21
00	**80**	0	75	25	-	0	0	0	6/21
05	**80**	0	100	0	-	0	0	25	7/20
10	**100**	0	100	0	-	0	0	0	4/14

EAST THOMPSON BENCH - TREND STUDY NO. 10-15-10

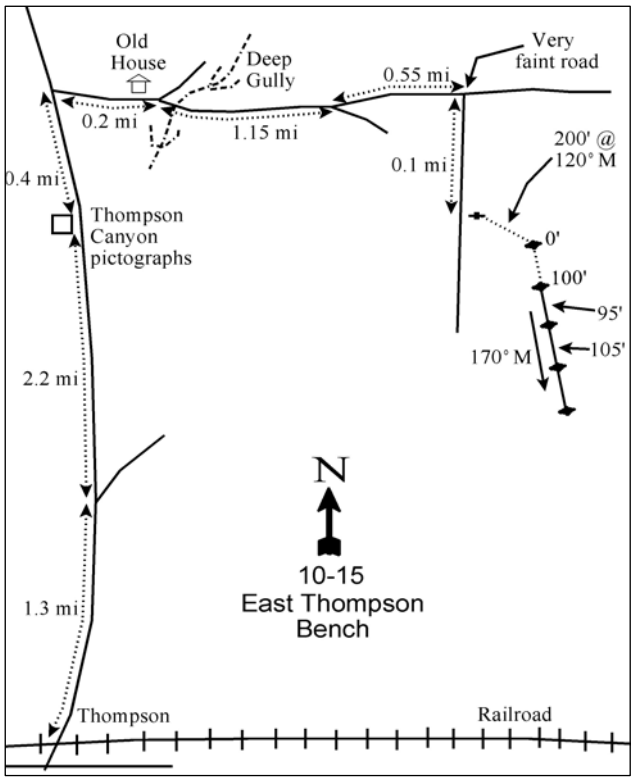
Vegetation Type: Pinyon-Juniper
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 5790 ft. (1764 m)
Aspect: Northwest
Slope: 8%
Transect bearing: 170° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). No rebar marking belt placement on belts 1 and 4.

Directions:
From the railroad crossing in the town of Thompson, travel 1.3 miles north up the main road to a fork. Stay left and go 2.2 miles to the Thompson Canyon pictographs. Continue 0.4 miles. Make a sharp right turn and go 0.2 miles past an old house and a railroad cut to a fork. Turn right across a deep gully and go 1.15 miles to a fork. Stay left and continue 0.55 miles to a very faint road on the right. Turn on this road and go 0.1 mile to a witness post (a steel rebar) on the left side of the road. The first baseline post is 200 feet away at a bearing of 120°M from the witness post.

Map Name: Sego Canyon



Diagrammatic Sketch:



Township: 21S Range: 20E Section: 3

GPS: NAD 83, UTM 12S 613672 E 4318449 N

EAST THOMPSON BENCH - TREND STUDY NO. 10-15

Site Information

Site Description: The study is located on a low lying bench east of Thompson Canyon. This broad flat bench is dominated by Utah juniper (*Juniperus osteosperma*) and intermixed with small openings of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Water is limited in the area, but spring runoff flows through most of the intermittent washes in late winter or early spring. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the large Cisco allotment. In the past, the area was thought to be used heavily by deer, but pellet group data has indicated moderate deer use since 2000. Estimated elk use has been light since 2000 (Table - Pellet Group Data). Most of the deer pellet groups were sampled on the first 200 feet of the transect where the area is in a sagebrush opening. Pellet groups tend to decrease in frequency as you move into the pinyon pine (*Pinus edulis*) and juniper further down the transect baseline.

Browse: Utah juniper is the predominant browse species in cover and has increased in cover (Table - Browse Trends) and density since 1995. Most of the juniper trees are mature with over half of the sampled trees being over 8 feet tall since 2005 (Table - Point-Quarter Tree Data). Pinyon pine trees are present, but are much less abundant than juniper. The preferred key browse species is Wyoming big sagebrush which provides most of the remaining browse cover on the site, though cover has decreased steadily since 2000 (Table - Browse Trends). The sagebrush on the site consists of a decreasing population of mostly mature plants with high decadence and mostly poor vigor over the sample years. Recruitment of young sagebrush plants has also decreased markedly since 2000. Utilization of sagebrush has been a mixture of moderate to heavy use over the course of the study. Other browse species on this site include green ephedra (*Ephedra viridis*) and broom snakeweed (*Gutierrezia sarothrae*).

Herbaceous Understory: The herbaceous understory is meager on the site. Perennial grasses occur sporadically throughout the site and are in low abundance. Galleta (*Hilaria jamesii*) and bottlebrush squirreltail (*Sitanion hystrix*) are the most abundant perennial grass species. The sum of nested frequency for perennial grasses has slowly declined with each reading. Cheatgrass (*Bromus tectorum*) and sixweeks fescue (*Vulpia octoflora*) were common in 1995, but have decreased since then. Forbs are sparse and not significant on this site. The most abundant perennial forb is timber poisonvetch (*Astragalus convallarius*). Although considered palatable by all classes of livestock, this plant is in some instances toxic, and in others, a highly nutritious plant (high protein content). Other perennial forbs encountered include: longleaf phlox (*Phlox longifolia*), low fleabane (*Erigeron pumilus*) and sego lily (*Calochortus nuttallii*). Annual species dominated the scant forb understory in 1995 and 2005 due to the wet spring weather. Common pepperweed (*Lepidium densiflorum*) was very abundant in 2005 (Table - Herbaceous Trends).

Soil: The soil texture is a reddish, sandy clay loam with slightly alkaline soil reactivity (pH 7.5). Phosphorus and potassium may have limited availability for plant growth and development at 1.7 ppm and 48 ppm, respectively (Tiedemann and Lopez 2004). Organic matter is very low at less than 1% (Table - Soil Analysis Data). There is little soil protection from vegetation and litter in the shrub interspaces and bare ground cover is high. Cryptogam cover is relatively high (Table - Basic Cover). Most of the litter and cryptogams are located directly beneath the canopy of the Wyoming big sagebrush. Several small active gullies are present, but due to the gentle terrain, erosion is not severe. Soil movement is most evident on trails or where the soil has been disturbed. The soil erosion condition was classified as slight in 2005 and moderate in 2010.

Trend Assessments

Browse:

- **1986 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 a slight decrease in decadence of sagebrush, but decadence remained high. Recruitment of young sagebrush plants decreased from 15% to 7% of the population.

- **1995 to 2000 - slightly down (-1):** The density of sagebrush increased 17% from 1,680 plants/acre to 1,960 plants/acre due to a large increase in the recruitment of young plants. However, the density of mature plants decreased by 51% and decadence increased slightly.
- **2000 to 2005 - down (-2):** There was a 53% decrease in the density of sagebrush to 920 plants/acre and cover decreased from 6% to 2%. Nearly all of the population was decadent at 96% and poor vigor increased to 89%. There was almost no new recruitment of young sagebrush at just 2%.
- **2005 to 2010 - stable (0):** Sagebrush density decreased by 13%, but decadence also decreased to 35% and poor vigor decreased to 3% of the population. Recruitment of young sagebrush plants remained low.

Grass:

- **1986 to 1995 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 15% with a significant decrease in the nested frequency of galleta.
- **1995 to 2000 - slightly up (+1):** There was little change in the sum of nested frequency of perennial grasses, but cover increased slightly and there was a significant decrease in the nested frequency of cheatgrass and sixweeks fescue. Cover of the two annual species also decreased substantially.
- **2000 to 2005 - slightly down (-1):** There was a 15% decrease in the sum of nested frequency of perennial grasses, though cover increased from 3% to 5%.
- **2005 to 2010 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 14% and cover decreased to 3%.

Forb:

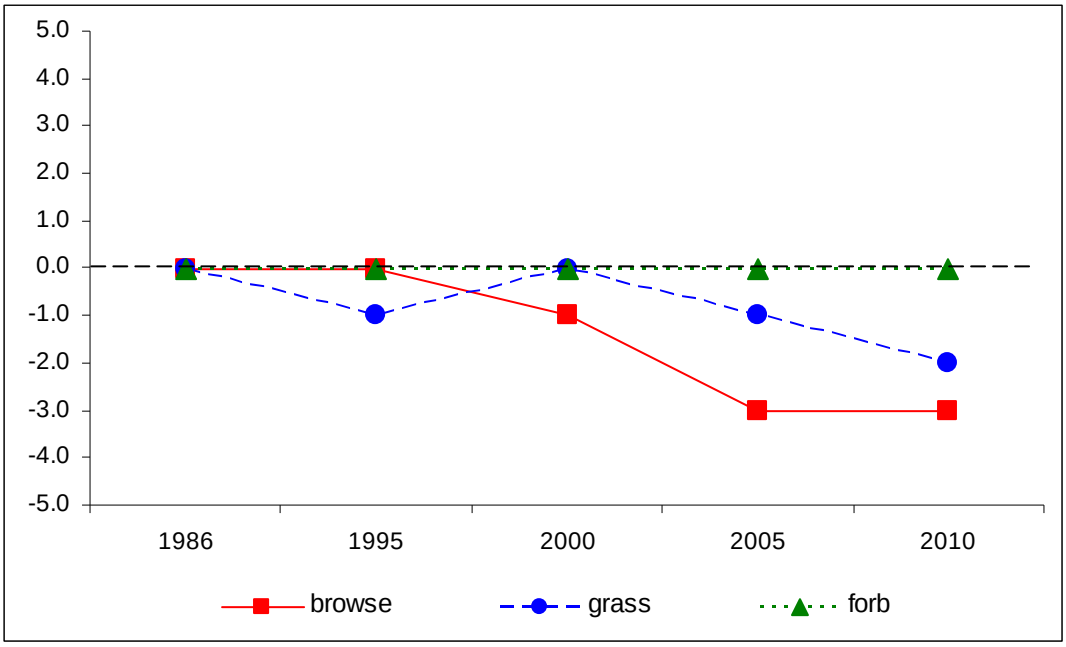
- **1986 to 1995 - stable (0):** Perennial forbs are very rare.
- **1995 to 2000 - stable (0):** Perennial forbs are very rare.
- **2000 to 2005 - stable (0):** Perennial forbs are very rare.
- **2005 to 2010 - stable (0):** Perennial forbs are very rare.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 15

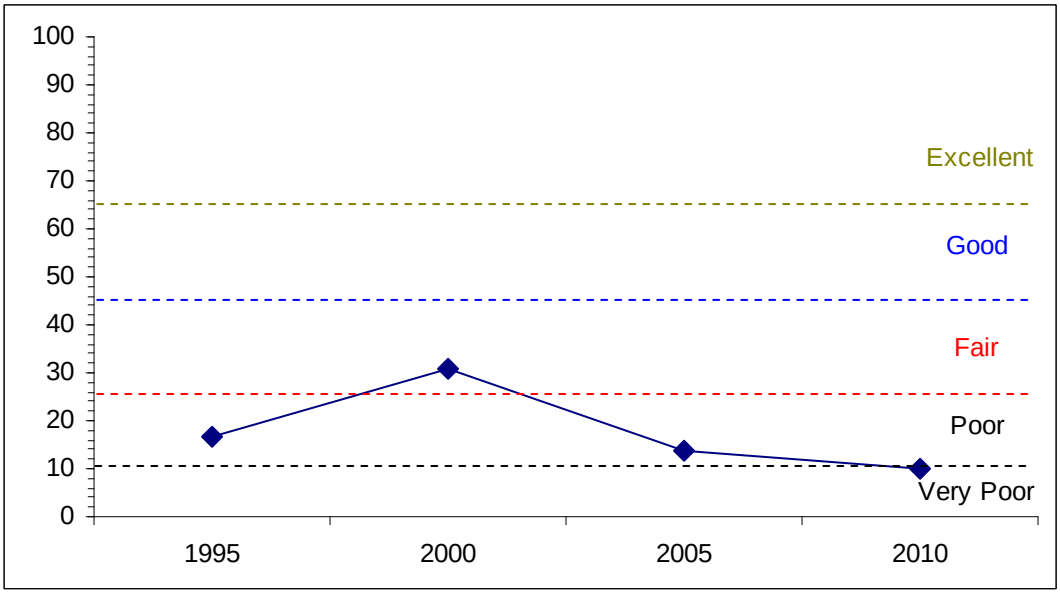
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	6.5	2.4	3.5	4.5	-1.4	0.9	0.0	**16.5**	Poor
00	7.6	1.5	15.0	6.1	-0.1	0.6	0.0	**30.7**	Fair
05	2.6	0.0	0.0	9.3	-0.6	2.3	0.0	**13.6**	Poor
10	2.1	0.0	0.0	6.4	-0.1	1.6	0.0	**9.9**	Very Poor-Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 15



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10, Study no: 15



HERBACEOUS TRENDS--
Management unit 10, Study no: 15

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Bromus tectorum (a)	-	$_{c}$190	$_{a}$33	$_{b}$69	$_{a}$40	1.41	.07	.33	.12
G	Elymus salina	$_{a}$-	$_{b}$29	$_{b}$15	$_{b}$16	$_{b}$11	.63	.52	1.16	.24
G	Hilaria jamesii	$_{c}$129	$_{ab}$65	$_{b}$83	$_{ab}$60	$_{a}$43	.74	1.97	2.26	.95
G	Oryzopsis hymenoides	14	1	4	9	6	.03	.17	.25	.67
G	Poa secunda	$_{a}$-	$_{b}$16	$_{ab}$5	$_{b}$16	$_{b}$18	.03	.02	.19	.10
G	Sitanion hystrix	49	52	49	31	35	.83	.36	.76	1.24
G	Vulpia octoflora (a)	-	$_{c}$186	$_{a}$-	$_{b}$75	$_{a}$7	.44	-	.52	.04
Total for Annual Grasses		0	376	33	144	47	1.85	0.07	0.85	0.16
Total for Perennial Grasses		192	163	156	132	113	2.27	3.05	4.63	3.21
Total for Grasses		192	539	189	276	160	4.12	3.12	5.49	3.38
F	Astragalus convallarius	13	16	20	17	11	.27	.26	.99	.40
F	Astragalus sp.	-	5	5	4	-	.01	.01	.01	-
F	Calochortus nuttallii	$_{a}$-	$_{ab}$17	$_{a}$1	$_{b}$22	$_{ab}$17	.04	.00	.06	.09
F	Castilleja linariaefolia	9	8	-	-	-	.04	-	-	-
F	Chenopodium fremontii (a)	-	1	-	4	-	.00	-	.03	-
F	Cryptantha sp.	$_{a}$-	$_{b}$14	$_{a}$-	$_{a}$2	$_{a}$1	.03	-	.03	.03
F	Descurainia pinnata (a)	-	$_{b}$26	$_{a}$-	$_{c}$34	$_{a}$-	.05	-	.21	-
F	Draba sp. (a)	-	-	-	1	-	-	-	.00	-
F	Erigeron pumilus	2	6	5	-	5	.04	.01	.00	.18
F	Eriogonum cernuum (a)	-	3	-	-	-	.01	-	-	-
F	Euphorbia sp.	-	1	1	4	5	.00	.00	.01	.06
F	Gilia hutchinifolia (a)	-	$_{c}$72	$_{ab}$3	$_{d}$125	$_{b}$10	.20	.01	1.12	.02
F	Lappula occidentalis (a)	-	$_{ab}$6	$_{a}$-	$_{c}$35	$_{b}$13	.01	-	.22	.02
F	Lepidium densiflorum (a)	-	$_{c}$139	$_{a}$18	$_{d}$178	$_{b}$74	.51	.04	8.69	.17
F	Oenothera sp.	-	-	-	2	-	-	-	.00	-
F	Phlox longifolia	13	10	8	10	7	.01	.01	.04	.02
F	Ranunculus testiculatus (a)	-	-	1	-	-	-	.00	-	-
F	Schoencrambe linifolia	-	2	-	-	-	.00	-	-	-
F	Sisymbrium altissimum (a)	-	5	-	6	-	.01	-	.01	-
F	Townsendia sp.	-	-	-	2	-	-	-	.00	-
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	252	22	383	97	0.81	0.05	10.31	0.22
Total for Perennial Forbs		38	79	40	63	46	0.47	0.31	1.17	0.78
Total for Forbs		38	331	62	446	143	1.28	0.36	11.48	1.01

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

BROWSE TRENDS--
Management unit 10, Study no: 15

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata wyomingensis	39	38	30	22	5.23	6.04	2.01	1.50
B	Chrysothamnus viscidiflorus stenophyllus	0	1	0	0	-	-	-	-
B	Ephedra viridis	3	2	3	1	.00	.00	.06	.15
B	Gutierrezia sarothrae	22	20	6	15	.43	.43	.51	.27
B	Juniperus osteosperma	0	12	17	12	11.85	13.11	12.87	18.75
B	Leptodactylon pungens	0	0	2	0	-	-	-	-
B	Opuntia sp.	2	2	1	2	.15	.00	-	-
Total for Browse		66	75	59	52	17.68	19.60	15.45	20.68

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 15

Species	Percent Cover		
	'00	'05	'10
Artemisia tridentata wyomingensis	-	7.30	1.39
Gutierrezia sarothrae	-	-	.15
Juniperus osteosperma	14.19	15.89	29.36
Leptodactylon pungens	-	.06	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 15

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	1.7	1.6

POINT-QUARTER TREE DATA--
Management unit 10, Study no: 15

Species	Trees per Acre			
	'95	'00	'05	'10
Juniperus osteosperma	108	84	136	183

Average diameter (in)			
'95	'00	'05	'10
4.17	3.0	3.9	8.8

BASIC COVER--
Management unit 10, Study no: 15

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	8.25	26.71	25.85	26.68	27.75
Rock	0	.68	.15	.06	0
Pavement	0	.10	.75	.78	.51
Litter	40.25	34.96	34.76	27.98	39.61
Cryptogams	4.25	9.87	13.65	5.19	4.87
Bare Ground	47.25	30.85	47.48	53.02	45.65

SOIL ANALYSIS DATA --

Management unit 10, Study no: 15, Study Name: East Thompson Bench

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.2	7.5	50.0	28.0	22.0	0.7	1.7	48.0	0.6

PELLET GROUP DATA--

Management unit 10, Study no: 15

Type	Quadrat Frequency			
	'95	'00	'05	'10
Sheep	22	-	-	-
Rabbit	43	36	58	15
Elk	-	8	6	-
Deer	19	19	31	17
Cattle	-	-	-	2

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	-
1 (2)	5 (12)	5 (13)
35 (88)	46 (112)	35 (86)
-	-	-

BROWSE CHARACTERISTICS--

Management unit 10, Study no: 15

		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 wyomingensis									
86	**898**	15	33	52	33	26	74	19	18/20
95	**1680**	7	51	42	540	43	24	19	20/31
00	**1960**	34	21	45	40	48	7	29	21/29
05	**920**	2	2	96	-	22	70	89	13/19
10	**800**	5	60	35	-	35	18	3	13/23
Chrysothamnus viscidiflorus stenophyllus									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	7/13
10	**0**	0	0	-	-	0	0	0	6/7
Ephedra viridis									
86	**0**	0	0	0	-	0	0	0	-/-
95	**80**	25	75	0	-	0	0	0	16/16
00	**40**	0	50	50	-	0	50	50	9/9
05	**60**	0	67	33	-	0	33	33	21/19
10	**20**	0	100	0	-	0	0	0	8/12
Gutierrezia sarothrae									
86	**3465**	11	89	0	33	0	0	0	8/7
95	**1160**	26	74	0	20	0	0	0	8/8
00	**860**	14	58	28	-	0	0	7	6/8
05	**200**	0	100	0	20	0	0	0	9/10
10	**940**	4	96	0	-	0	0	0	5/6

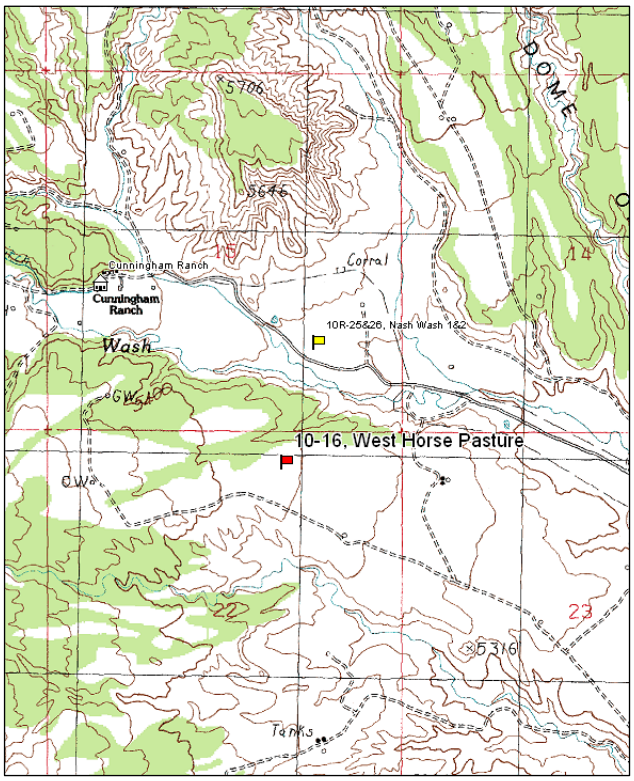
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Juniperus osteosperma									
86	**198**	50	50	-	33	0	0	0	94/104
95	**0**	0	0	-	-	0	0	0	-/-
00	**260**	8	92	-	20	0	0	0	-/-
05	**340**	41	59	-	-	0	0	0	-/-
10	**240**	25	75	-	20	0	0	0	-/-
Leptodactylon pungens									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**140**	0	100	-	60	0	0	0	4/6
10	**0**	0	0	-	-	0	0	0	5/6
Opuntia sp.									
86	**33**	0	100	-	-	0	0	0	7/7
95	**40**	0	100	-	-	0	0	0	6/12
00	**40**	50	50	-	20	0	0	0	5/14
05	**20**	0	100	-	-	0	0	0	7/31
10	**40**	0	100	-	-	0	0	50	5/15

WEST HORSE PASTURE - TREND STUDY NO. 10-16-10

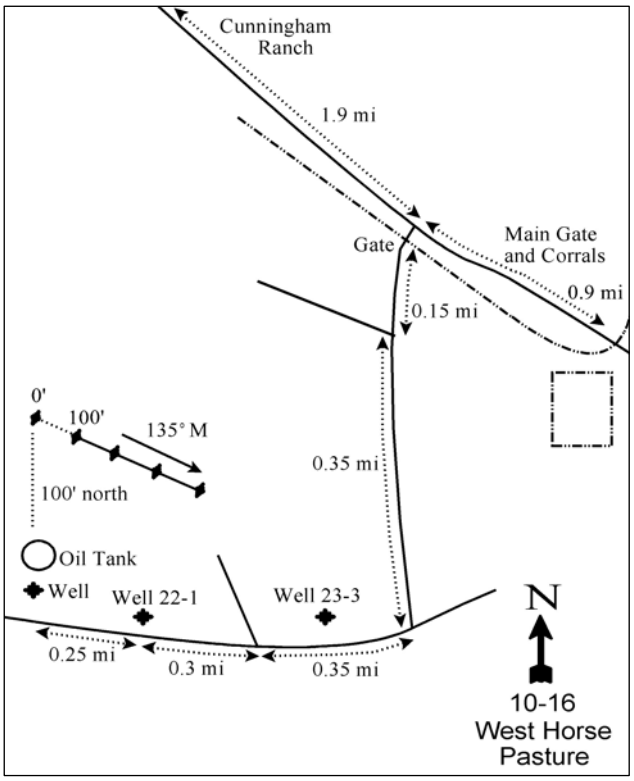
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 5300 ft. (1615 m)
Aspect: Southeast
Slope: 0-3%
Transect bearing: 135° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (28ft).

Directions:
From the main gate at Cunningham Ranch travel south 1.9 miles to a fork and turn right. Go through a gate (100 yards) and proceed 0.15 miles to a fork at the top of a hill. Stay left and go 0.35 miles to a "T" intersection. Turn right and go 0.35 miles past a well [NP Energy #23-3] to a fork. Stay left and travel northwest 0.3 miles to another well [NP Energy #22-1]. Continue northwest for 0.25 miles to another well and oil-tank. The 0-foot stake is 100 feet north from oil-tank marked by a rebar tagged with browse tag #7807.

Map Name: Sego Canyon



Diagrammatic Sketch:



Township: 20S Range: 21E Section: 22

GPS: NAD 83, UTM 12S 622851 E 4324139 N

WEST HORSE PASTURE - TREND STUDY NO. 10-16

Site Information

Site Description: The study is located south of Nash Wash in a large, open, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat surrounded by Utah juniper (*Juniperus osteosperma*) trees and eroded steep cliffs to the north and west. Not only is the area a crucial deer winter concentration area, it also supports many other uses including cattle and sheep grazing, oil and gas exploration, and production, mining and associated human activity. The study transect had to be moved slightly in 2010 due to an oil pad that was placed directly over the old transect. A fire also burned the upper section of the transect some time between 2005 and 2010. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the large Cisco allotment. Other pellet group transects located in the Horse Pasture area showed an average use of 58 deer days use/acre (143 ddu/ha) between 1981 and 1986 (Jense et al. 1986). From 1986 through 1990, use averaged 39 deer days use/acre (95 ddu/ha) (Jense et al. 1991). Pellet group data estimated moderate deer use in 2000 and 2005, increasing to very heavy use in 2010. In 1986, four antler sheds were found. Cover for deer is provided by a nearby dense stand of mature Utah Juniper. Antler rubs on trees were noted in 2005. Estimated elk use has been light since 2000, and estimated cattle use was only sampled in 2005 at light levels (Table - Pellet Group Data).

Browse: The key browse species on the site is Wyoming big sagebrush, but the species has been decreasing in cover since 2000 (Table - Browse Trends) and density since 1995. The fire between 2005 and 2010 caused a large decline in sagebrush. The sagebrush population is a mixture of mature and decadent plants with little recruitment of young plants. Utilization of sagebrush has been a mixture of moderate to heavy hedging over the sample years. The high amounts of cheatgrass on this site may be preventing the establishment of seedling and young plants. Broom snakeweed (*Gutierrezia sarothrae*) is the only other common browse species, but it has fluctuated in density with fluctuation in precipitation (Table - Browse Characteristics). There are also some scattered spiny hopsage (*Grayia spinosa*), and young pinyon pine (*Pinus edulis*) and juniper trees throughout the flat.

Herbaceous Understory: As reported in 1986, the grass composition has been dominated by cheatgrass (*Bromus tectorum*), with perennial grasses being relatively scarce. This puts this site at risk for fire, which would destroy the sagebrush population. Perennial grasses have not been very abundant. Galleta (*Hilaria jamesii*) and bottlebrush squirreltail (*Sitanion hystrix*) have been the most abundant perennial grasses. Perennial forbs are also not very abundant on the site. Scarlet globemallow (*Sphaeralcea coccinea*) and timber poisonvetch (*Astragalus convallarius*) are the most abundant perennial forbs.

Soil: The soil texture is a sandy clay loam with a slightly alkaline soil reaction (pH 7.4). Both phosphorus and potassium may have limited availability for plant growth and development at 3.8 ppm and 57.6 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Vegetation and litter cover is primarily provided by the annual species cheatgrass and has been variable over the sample years. Because of this, bare ground cover has been high at times. Cryptogams are mossy-like and are present under almost the entire area under the shrub crowns, but have been decreasing since 2000 (Table - Basic Cover). Soil loss in the past is evident by a high degree of soil movement from interspaces and subsequent pedestaling around the base of the shrubs. Litter build-up is also evident on mounds beneath shrub crowns. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 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 a substantial decrease in decadence of sagebrush from 55% to 27%, but is still considered moderately high. Recruitment of young sagebrush plants remained low.

- **1995 to 2000 - slightly down (-1):** Density of sagebrush decreased by 19% from 4,300 plants/acre to 3,500 plants/acre, though cover increased from 12% to 15%. Decadence, vigor and recruitment of sagebrush remained similar.
- **2000 to 2005 - down (-2):** The density of sagebrush decreased 10% to 3,140 plants/acre, but cover decreased to 8%. Decadence increased to 71% and poor vigor increased from 19% to 51%. Recruitment of young plants remained very low.
- **2005 to 2010 - down (-2):** Due to the relocation of the transect, direct comparison between the study years is not possible. There was a large decrease in the density of sagebrush following the fire on the site and cover was low at 4%. Decadence and poor vigor decreased, but recruitment of young plants remained very low.

Grass:

- **1986 to 1995 - up (+2):** There was a five-fold increase in the sum of nested frequency of perennial grasses, but perennial grasses remain relatively rare.
- **1995 to 2000 - up (+2):** The sum of nested frequency of perennial grasses increased by 27% and cover increased from 2% to 6%. Cheatgrass decreased significantly in nested frequency and cover decreased from 12% to 1%.
- **2000 to 2005 - down (-2):** The perennial grass sum of nested frequency decreased 47% and cover decreased to 2%. Perennial grasses are rare on the site. The nested frequency of cheatgrass increased significantly and cover increased to 51%.
- **2005 to 2010 - slightly down (-1):** Due to the relocation of the transect, direct comparison between the study years is not possible. The sum of nested frequency of perennial grasses decreased with a significant decrease in the nested frequency of galleta. Cheatgrass decreased in nested frequency, but remained the dominant species on the site providing 20% cover.

Forb:

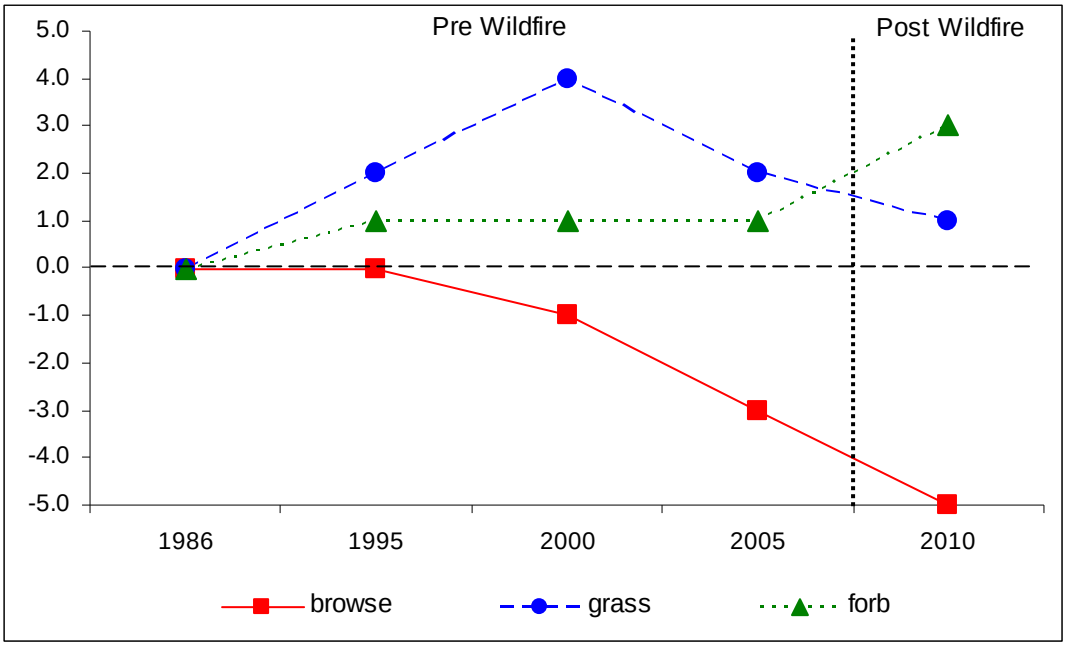
- **1986 to 1995 - slightly up (+1):** There was a three-fold increase in the sum of nested frequency of perennial forbs, but they remained rare on the site.
- **1995 to 2000 - stable (0):** The sum of nested frequency of perennial forbs decreased by 15%, but cover increased from less than 1% to 2% due to a large increase in the cover of scarlet globemallow.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs.
- **2005 to 2010 - up (+2):** Due to the relocation of the transect, direct comparison between the study years is not possible. The perennial forb sum of nested frequency and cover increased were substantially higher on the site due to a large increase in the nested frequency of scarlet globemallow.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 16

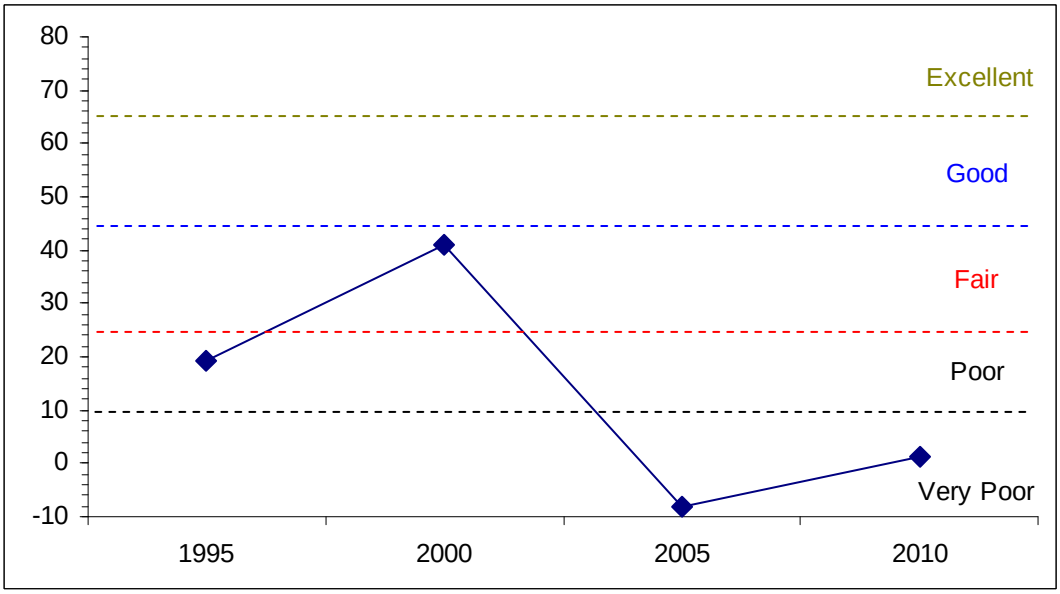
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	15.4	6.9	1.0	3.7	-9.1	1.2	0.0	**19.1**	Poor
00	18.9	7.2	0.5	11.6	-1.1	3.8	0.0	**41.0**	Fair
05	10.0	-6.3	0.5	4.3	-20.0	3.5	0.0	**-8.0**	Very Poor
10	4.4	0.0	0.0	3.9	-14.9	7.9	0.0	**1.4**	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 16



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10, Study no: 16



HERBACEOUS TRENDS--
Management unit 10, Study no: 16

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Bromus tectorum (a)	-	$_{c}$374	$_{a}$196	$_{c}$379	$_{b}$336	12.08	1.44	51.08	19.82
G	Hilaria jamesii	$_{a}$2	$_{b}$50	$_{b}$51	$_{b}$44	$_{a}$16	1.25	3.73	.91	.87
G	Oryzopsis hymenoides	1	3	5	6	3	.15	.44	.82	.19
G	Sitanion hystrix	$_{a}$3	$_{b}$42	$_{b}$63	$_{a}$14	$_{a}$9	.44	1.58	.40	.48
G	Sporobolus cryptandrus	$_{b}$12	$_{a}$-	$_{ab}$2	$_{a}$-	$_{ab}$6	-	.03	-	.25
G	Stipa comata	-	-	-	-	1	-	-	-	.15
G	Vulpia octoflora (a)	-	$_{a}$10	$_{a}$-	$_{b}$67	$_{a}$6	.01	-	.75	.01
Total for Annual Grasses		0	384	196	446	342	12.10	1.44	51.83	19.83
Total for Perennial Grasses		18	95	121	64	35	1.83	5.78	2.14	1.96
Total for Grasses		18	479	317	510	377	13.94	7.22	53.97	21.79
F	Astragalus convallarius	5	12	7	9	12	.17	.21	.48	.09
F	Astragalus moencopensis	1	-	-	-	-	-	-	-	-
F	Astragalus sp.	$_{a}$3	$_{b}$28	$_{a}$3	$_{a}$5	$_{a}$-	.05	.00	.01	.01
F	Calochortus nuttallii	$_{a}$-	$_{a}$3	$_{a}$1	$_{b}$20	$_{a}$2	.00	.00	.08	.01
F	Castilleja linariaefolia	-	6	3	-	3	.16	.00	-	.15
F	Delphinium nuttallianum	-	-	-	2	-	-	-	.00	-
F	Descurainia pinnata (a)	-	$_{ab}$11	$_{a}$-	$_{b}$16	$_{a}$4	.02	-	.13	.06
F	Draba sp. (a)	-	1	-	1	-	.00	-	.00	-
F	Erigeron pumilus	1	-	5	-	-	-	.04	-	-
F	Erodium cicutarium (a)	-	-	-	-	2	-	-	-	.00
F	Gilia hutchinifolia (a)	-	$_{a}$8	$_{a}$-	$_{b}$34	$_{ab}$25	.02	-	.20	.26
F	Holosteum umbellatum (a)	-	$_{b}$21	$_{a}$-	$_{a}$-	$_{a}$-	.06	-	-	-
F	Lactuca serriola	-	-	-	-	8	-	-	-	.01
F	Lappula occidentalis (a)	-	$_{b}$31	$_{a}$-	$_{b}$61	$_{c}$99	.05	-	.34	.42
F	Lepidium sp. (a)	-	$_{c}$51	$_{a}$-	$_{b}$27	$_{b}$12	.11	-	.59	.57
F	Leucelene ericoides	-	1	3	3	5	.00	.03	.03	.45
F	Oenothera sp.	-	5	-	-	9	.01	-	-	.06
F	Phlox longifolia	$_{a}$-	$_{b}$19	$_{b}$21	$_{a}$-	$_{a}$1	.04	.04	-	.00
F	Plantago patagonica (a)	-	$_{c}$129	$_{a}$2	$_{d}$183	$_{b}$11	.30	.00	3.93	.05
F	Salsola iberica (a)	-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$20	-	-	-	.55
F	Schoencrambe linifolia	-	-	1	-	-	-	.00	-	-
F	Sphaeralcea coccinea	$_{a}$20	$_{a}$28	$_{a}$43	$_{a}$38	$_{b}$101	.16	1.57	1.12	3.14
F	Townsendia sp.	-	-	-	3	-	-	-	.00	-
F	Unknown forb-perennial	3	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	252	2	322	173	0.58	0.00	5.20	1.92
Total for Perennial Forbs		33	102	87	80	141	0.61	1.92	1.74	3.94
Total for Forbs		33	354	89	402	314	1.19	1.93	6.94	5.86

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

BROWSE TRENDS--
Management unit 10, Study no: 16

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata wyomingensis	84	80	77	34	12.32	15.15	8.03	3.55
B	Atriplex canescens	0	1	0	0	-	-	-	-
B	Chrysothamnus nauseosus	0	0	0	0	-	-	-	.01
B	Echinocactus sp.	0	0	0	1	-	-	-	-
B	Grayia spinosa	0	0	0	1	-	-	-	.15
B	Gutierrezia sarothrae	97	34	71	41	7.67	.23	3.80	2.74
B	Juniperus osteosperma	0	0	0	1	-	-	-	-
B	Opuntia sp.	9	10	11	7	.00	.09	.58	.21
Total for Browse		190	125	159	85	20.01	15.48	12.43	6.67

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 16

Species	Percent Cover	
	'05	'10
Artemisia tridentata wyomingensis	7.71	4.44
Gutierrezia sarothrae	4.00	3.04
Opuntia sp.	.45	.18

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 16

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	1.2	2.3

BASIC COVER--
Management unit 10, Study no: 16

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	24.50	36.40	27.21	68.36	28.62
Rock	0	.07	.01	.04	.03
Pavement	0	0	.12	.01	.00
Litter	48.00	45.56	33.00	18.70	32.25
Cryptogams	0	1.89	2.98	.63	.18
Bare Ground	27.50	29.78	51.00	20.34	32.46

SOIL ANALYSIS DATA --
Management unit 10, Study no: 16, Study Name: West Horse Pasture

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.4	7.4	50.0	24.0	26.0	0.7	3.8	57.6	0.5

PELLET GROUP DATA--
Management unit 10, Study no: 16

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	49	30	16	6
Elk	-	3	1	4
Deer	44	66	24	28
Cattle	-	-	-	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
5 (12)	9 (22)	3 (7)
58 (143)	38 (94)	141 (349)
-	2 (4)	-

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 16

		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 wyomingensis									
86	**2798**	2	43	55	-	5	93	21	12/14
95	**4300**	2	71	27	-	43	50	16	17/30
00	**3500**	1	74	26	-	58	23	19	16/26
05	**3140**	1	27	71	180	25	67	51	19/28
10	**1380**	7	52	41	300	59	9	22	14/25
Atriplex canescens									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	100	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus nauseosus									
86	**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	-	40	0	0	0	-/-
Echinocactus sp.									
86	**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	**20**	0	100	-	-	0	0	0	7/17
Grayia spinosa									
86	**265**	0	25	75	-	0	100	25	13/17
95	**0**	0	0	0	-	0	0	0	10/20
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	20/27
10	**20**	0	100	0	-	0	100	0	17/29

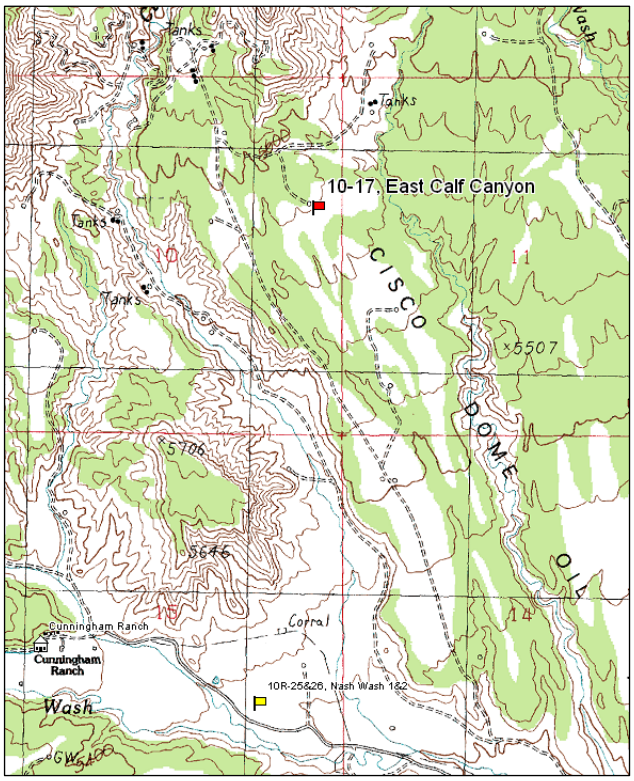
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
86	**7531**	53	42	5	733	0	0	0	10/7
95	**15140**	35	65	0	580	0	0	.13	12/13
00	**1020**	2	80	18	40	0	0	12	10/11
05	**4460**	1	97	2	180	0	0	0	13/13
10	**1740**	3	86	10	-	0	0	1	10/15
Juniperus osteosperma									
86	**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	**20**	100	0	-	-	0	0	0	-/-
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
95	**200**	0	100	0	-	0	0	0	6/18
00	**240**	0	75	25	20	8	0	17	5/17
05	**360**	0	100	0	-	0	0	0	6/23
10	**160**	0	75	25	-	0	0	13	5/17

EAST CALF CANYON - TREND STUDY NO. 10-17-10

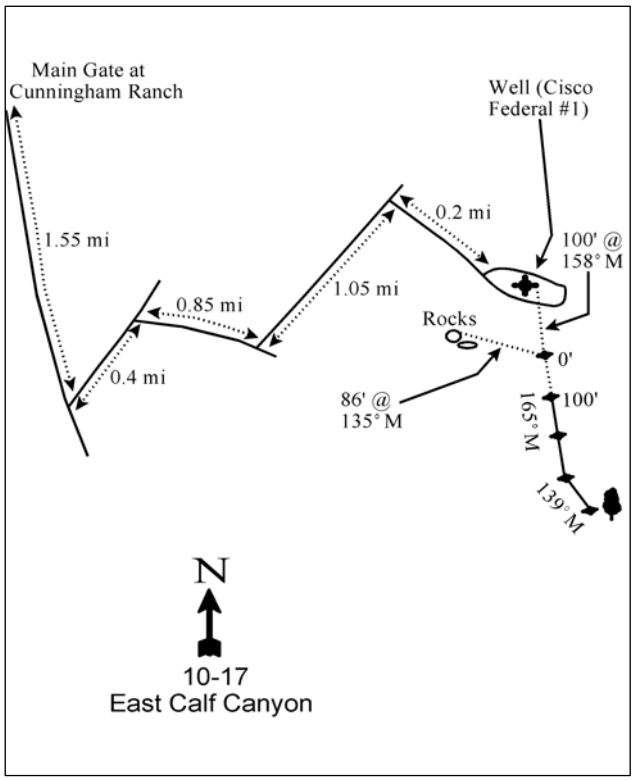
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 5500 ft. (1676 m)
Aspect: Southeast
Slope: 3%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the main gate at Cunningham Ranch go southeast on the main road for 1.55 miles to a fork and turn left (northeast). Proceed 0.4 miles to a fork. Turn right and proceed 0.85 to a fork. Stay left and go 1.05 miles to another fork. Turn right and go 0.2 miles to a well numbered Cisco Federal #1. The first baseline stake is approximately 100 feet southeast of the road in the sagebrush opening.

Map Name: Sego Canyon



Diagrammatic Sketch:



Township: 20S Range: 21E Section: 10

GPS: NAD 83, UTM 12S 623214 E 4326909 N

EAST CALF CANYON - TREND STUDY NO. 10-17

Site Information

Site Description: The study is located in a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) clearing on a mixed pinyon pine (*Pinus edulis*) Utah juniper (*Juniperus osteosperma*) and sagebrush bench at the base of the Book Cliffs, but north of Horse Pasture and Nash Wash. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the large Cisco allotment. A 330-acre chaining project was completed in the fall of 1987 on the area just east and northeast of the study site, but the study transect was not treated. The chaining and seeding was an interagency project coordinated through State Institutional Trust Lands (SITLA), BLM and Utah Division of Wildlife Resources (UDWR). The chaining was done with a light smooth chain to help protect an understory population of decadent cliffrose (*Cowania mexicana* ssp. *stansburiana*). Besides its importance as big game and livestock winter range, there is active oil and gas exploration with associated developments and network of roads in the area. At the north end of the clearing is an oil pump and storage tanks. Pellet group transect data has estimated fluctuating deer use with moderate use in 2000, light use in 2005 and heavy use in 2010. Estimated elk use has been light since 2000 (Table - Pellet Group Data).

Browse: The overall area supports mostly juniper-pinyon woodland with scattered sagebrush openings. These sagebrush-grass openings provide important forage for deer, sheep and cattle. Wyoming big sagebrush is the key browse species and provides nearly all of the browse cover on the site (Table - Browse Trends). According to earlier BLM studies on the allotment in 1986, sagebrush utilization was heavy to severe. Since the outset of the study in 1986, the sagebrush population has been a mixture of young, mature and decadent plants. The utilization of sagebrush has also been a mixture of light, moderate and heavy use over the course of the study, with the heaviest use occurring in 1986. The two other browse species found on the transect are broom snakeweed (*Gutierrezia sarothrae*) and pricklypear cactus (*Opuntia sp.*) (Table - Browse Characteristics). Utah Juniper surrounds the sagebrush opening, but does not appear to be invading (Table - Point-Quarter Tree Data). Mature trees, especially on the edges and in the opening, have been highlined.

Herbaceous Understory: Both grasses and forbs are limited on the site. The only common perennial grass is bottlebrush squirreltail (*Sitanion hystrix*). Cheatgrass was prevalent in 1995, but decreased significantly in nested frequency in 2000 and has had low frequency and cover since then. There are only a few scattered forbs on the site. The most abundant forbs are longleaf phlox (*Phlox longifolia*) and several milkvetch species (*Astragalus spp.*) that occur in low frequencies (Table - Herbaceous Trends). The disturbed areas along the road and drill pad are a refuge for exotic annual weeds such as Russian thistle (*Salsola iberica*), but they have not yet invaded into the flat.

Soil: Soil on the site is well-drained, loam to clay loam with a neutral soil reactivity (pH 7.2) (Table - Soil Analysis Data). Bare ground cover on the site is high (Table - Basic Cover) with shrub interspaces mostly bare, and small gullies and compacted animal trails showing the effects of some surface erosion. The soil erosion condition was classified as stable in 2005, but was slight in 2010 due to pedestaling, flow patterns and rills.

Trend Assessments

Browse:

- **1986 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 sagebrush decreased from 55% to 18% of the population and recruitment of young plants remained good.
- **1995 to 2000 - stable (0):** There was little change in the density of sagebrush, though cover increased slightly from 18% to 19%. Sagebrush decadence, vigor and recruitment of young plants remained similar.

- **2000 to 2005 - slightly down (-1):** The density of sagebrush decreased by 13% from 5,880 plants/acre to 5,140 plants/acre, and cover decreased to 17%. Decadence of sagebrush increased to 31% and poor vigor increased to 20%, though the recruitment of young plants increased to 32%.
- **2005 to 2010 - up (+2):** Sagebrush density increased by 53% to 7,880 plants/acre, and cover increased to 20%. Much of the increase in density was due to an increase in the recruitment of young sagebrush plants to 44% of the population. Decadence of sagebrush decreased to 17% and poor vigor decreased to 8% of the population.

Grass:

- **1986 to 1995 - slightly up (+1):** There was nearly a two-fold increase in the sum of nested frequency of perennial grasses due to a significant increase in the nested frequency of bottlebrush squirreltail, but perennial grasses remain rare. Annual species were not included in the sample in 1986, but cheatgrass was the dominant species providing 17% cover in 1995.
- **1995 to 2000 - stable (0):** The sum of nested frequency of perennial grasses decreased by 40%, but perennial grasses were already rare. Cheatgrass decreased significantly in nested frequency on the site and provide only 1% cover.
- **2000 to 2005 - stable (0):** Perennial grass sum of nested frequency decreased, but perennial grasses were already rare on the site.
- **2005 to 2010 - stable (0):** There was an increase in the sum of nested frequency of perennial grasses, but they remain rare on the site. Bottlebrush squirreltail cover increased to near 2%, the highest since the outset of the study.

Forb:

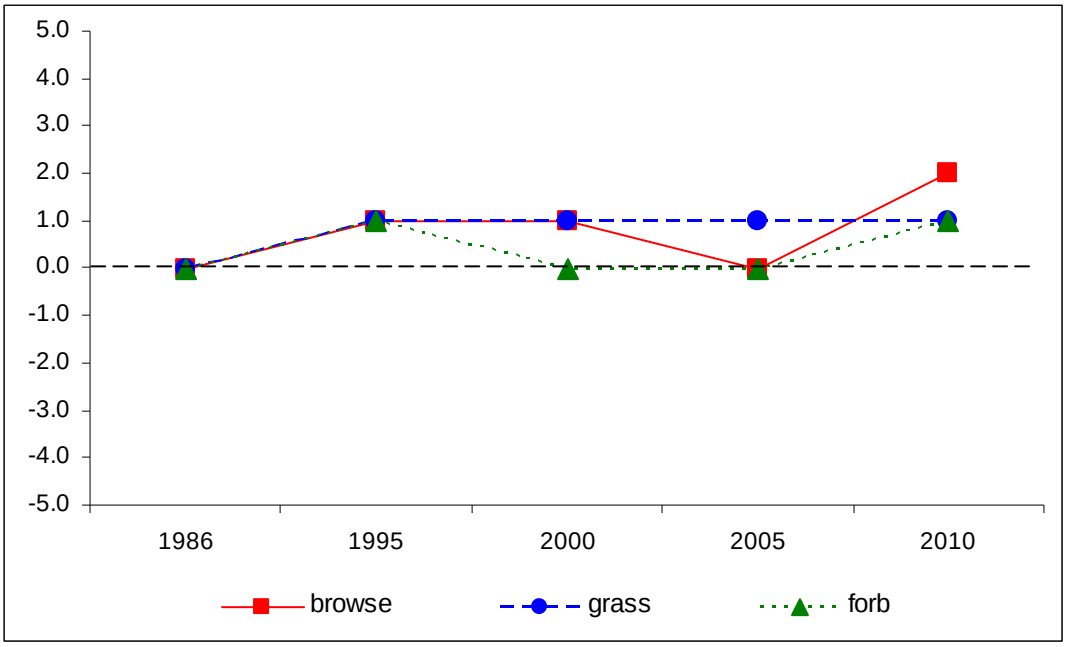
- **1986 to 1995 - slightly up (+1):** The sum of nested frequency of perennial forbs increased two-fold, but perennial forbs remain rare on the site.
- **1995 to 2000 - slightly down (-1):** The perennial forb sum of nested frequency decreased to near 1986 levels.
- **2000 to 2005 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial forbs, but cover increased to nearly 2% due to a large increase in the cover of milkvetch.
- **2005 to 2010 - slightly up (+1):** The sum of nested frequency of perennial forbs increased 74%, though cover decreased slightly.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 17

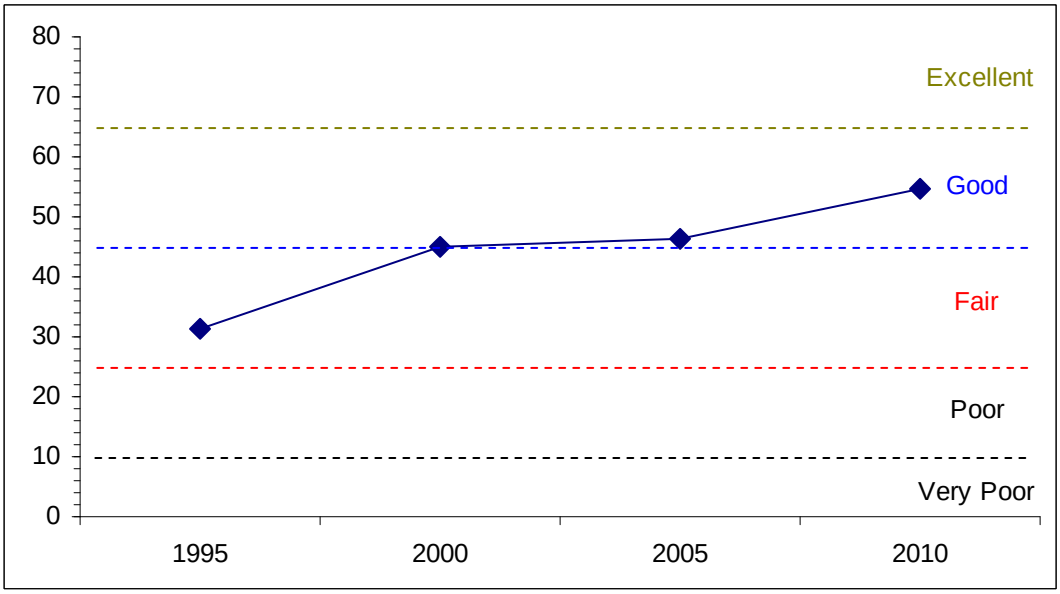
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	22.0	9.6	10.0	1.3	-12.7	1.3	0.0	**31.5**	Fair
00	24.9	7.7	11.7	0.8	-0.8	0.8	0.0	**45.1**	Fair-Good
05	21.7	5.7	15.0	1.8	-1.3	3.6	0.0	**46.4**	Fair-Good
10	24.5	9.9	15.0	3.4	-0.5	2.3	0.0	**54.6**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 17



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10, Study no: 17



HERBACEOUS TRENDS--
Management unit 10, Study no: 17

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Bromus tectorum (a)	-	$_{b}$359	$_{a}$95	$_{a}$116	$_{a}$126	16.90	1.02	.95	.68
G	Hilaria jamesii	3	-	-	-	-	-	-	-	-
G	Poa fendleriana	-	3	1	-	-	.00	.00	-	-
G	Sitanion hystrix	$_{a}$31	$_{b}$95	$_{ab}$58	$_{a}$38	$_{ab}$57	.66	.41	.90	1.72
G	Vulpia octoflora (a)	-	$_{b}$37	$_{a}$1	$_{c}$87	$_{a}$4	.07	.00	.84	.01
Total for Annual Grasses		0	396	96	203	130	16.97	1.02	1.79	0.68
Total for Perennial Grasses		34	98	59	38	57	0.66	0.41	0.90	1.72
Total for Grasses		34	494	155	241	187	17.63	1.44	2.70	2.41
F	Arabis sp.	-	-	-	-	5	-	-	-	.01
F	Astragalus convallarius	-	-	6	-	5	.00	.19	.00	.59
F	Astragalus sp.	1	8	1	11	-	.36	.00	1.50	-
F	Calochortus nuttallii	$_{a}$2	$_{a}$-	$_{a}$-	$_{a}$5	$_{b}$22	-	-	.01	.08
F	Castilleja linariaefolia	-	6	3	2	1	.06	.03	.00	.03
F	Chaenactis stevioides	-	-	-	3	-	-	-	.01	-
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{a}$-	$_{a}$10	$_{b}$67	-	-	.54	.49
F	Chenopodium leptophyllum(a)	-	3	-	-	-	.00	-	-	-
F	Delphinium sp.	-	-	-	-	2	-	-	-	.03
F	Descurainia pinnata (a)	-	$_{a}$8	$_{a}$-	$_{b}$94	$_{a}$-	.01	-	.83	-
F	Draba sp. (a)	-	$_{b}$18	$_{a}$2	$_{c}$57	$_{b}$8	.03	.00	.80	.02
F	Erigeron pumilus	-	-	1	3	1	-	.00	.04	.03
F	Erigeron utahensis	$_{ab}$1	$_{b}$8	$_{a}$-	$_{a}$-	$_{a}$-	.06	-	-	-
F	Eriogonum cernuum (a)	-	-	-	6	8	-	-	.02	.16
F	Eriogonum sp.	-	2	-	-	-	.00	-	-	-
F	Gilia hutchinifolia (a)	-	$_{b}$17	$_{a}$-	$_{d}$199	$_{c}$66	.04	-	2.35	.16
F	Lappula occidentalis (a)	-	$_{a}$8	$_{a}$-	$_{b}$125	$_{b}$98	.02	-	1.51	.19
F	Lepidium sp. (a)	-	-	-	2	1	-	-	.03	.00
F	Oenothera sp.	-	-	-	7	-	-	-	.02	-
F	Phlox longifolia	$_{ab}$39	$_{b}$60	$_{ab}$41	$_{a}$19	$_{ab}$39	.17	.13	.16	.33
F	Plantago patagonica (a)	-	$_{b}$18	$_{a}$-	$_{c}$43	$_{c}$65	.03	-	.45	.15
F	Salsola iberica (a)	-	$_{a}$-	$_{c}$29	$_{abc}$17	$_{ab}$1	-	.06	.03	.00
F	Schoencrambe linifolia	$_{a}$-	$_{ab}$4	$_{ab}$6	$_{a}$-	$_{c}$12	.01	.04	.03	.03
F	Sisymbrium altissimum (a)	-	-	-	6	-	-	-	.03	-
Total for Annual Forbs		0	72	31	559	314	0.15	0.06	6.62	1.18
Total for Perennial Forbs		43	88	58	50	87	0.67	0.40	1.78	1.15
Total for Forbs		43	160	89	609	401	0.82	0.46	8.41	2.34

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

BROWSE TRENDS--
Management unit 10, Study no: 17

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia nova	-	-	-	-	-	.15	-	-
B	Artemisia tridentata wyomingensis	91	97	87	78	17.57	19.38	17.38	19.57
B	Atriplex canescens	-	-	-	-	-	.38	-	-
B	Gutierrezia sarothrae	60	23	34	32	1.05	.21	1.92	1.72
B	Juniperus osteosperma	0	2	3	3	1.85	.03	1.56	1.14
B	Opuntia sp.	5	9	9	12	.30	.18	.33	.74
Total for Browse		156	131	133	125	20.77	20.33	21.21	23.20

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 17

Species	Percent Cover		
	'00	'05	'10
Artemisia tridentata wyomingensis	-	22.98	16.13
Gutierrezia sarothrae	-	3.40	.91
Juniperus osteosperma	3.40	3.63	3.98
Opuntia sp.	-	.60	.18

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 17

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	1.9	2.1

POINT-QUARTER TREE DATA--
Management unit 10, Study no: 17

Species	Trees per Acre		
	'00	'05	'10
Juniperus osteosperma	43	47	52

Average diameter (in)		
'00	'05	'10
2.5	3.8	2.5

BASIC COVER--
Management unit 10, Study no: 17

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	5.50	37.69	23.30	30.57	26.68
Rock	.25	.27	.69	.45	.47
Pavement	.25	.17	.43	.33	.33
Litter	47.00	38.50	33.78	22.35	30.27
Cryptogams	2.50	7.52	9.76	8.75	6.91
Bare Ground	44.50	29.38	47.86	47.38	45.00

SOIL ANALYSIS DATA --

Management unit 10, Study no: 17, Study Name: East Calf Canyon

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.7	7.2	44.0	29.4	26.6	0.8	6.6	67.2	0.5

PELLET GROUP DATA--

Management unit 10, Study no: 17

Type	Quadrat Frequency			
	'95	'00	'05	'10
Sheep	9	-	-	-
Rabbit	16	19	42	13
Elk	-	-	1	19
Deer	21	30	50	34

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	-
-	14 (170)	14 (35)
29 (72)	1 (2)	73 (180)

BROWSE CHARACTERISTICS--

Management unit 10, Study no: 17

		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 wyomingensis									
86	**3998**	12	33	55	1266	2	57	10	12/18
95	**5600**	20	62	18	700	74	4	4	20/33
00	**5880**	24	51	25	140	38	22	9	18/30
05	**5140**	32	37	31	112380	28	27	20	22/32
10	**7880**	44	38	17	160	29	16	8	17/27
Grayia spinosa									
86	**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	19/42
Gutierrezia sarothrae									
86	**1931**	21	66	14	533	0	0	0	9/7
95	**4940**	40	60	0	540	.80	0	0	9/9
00	**1000**	2	90	8	60	0	0	4	5/6
05	**1140**	11	89	0	1060	0	0	0	14/19
10	**2220**	19	78	3	20	0	0	3	6/7
Juniperus osteosperma									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**40**	50	50	-	20	0	0	0	-/-
05	**60**	100	0	-	-	0	0	0	-/-
10	**60**	100	0	-	20	0	0	0	-/-

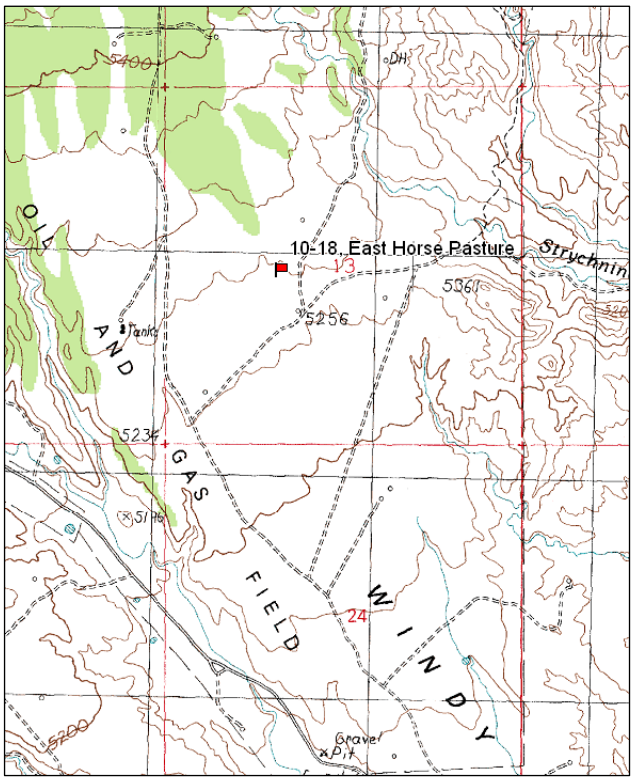
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
95	**100**	0	100	0	-	0	0	0	6/19
00	**240**	0	100	0	-	0	0	0	4/19
05	**200**	0	90	10	-	0	0	0	7/32
10	**260**	0	100	0	-	0	0	0	5/32
Pinus edulis									
86	**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	-	20	0	0	0	-/-
Sclerocactus sp.									
86	**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	3/5
10	**0**	0	0	-	-	0	0	0	-/-

EAST HORSE PASTURE - TREND STUDY NO. 10-18-10

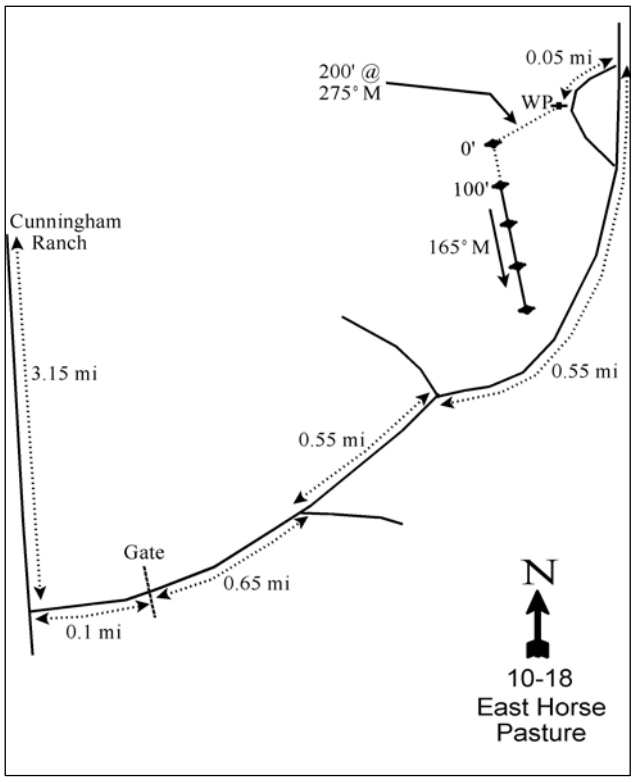
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 5320 ft. (1622 m)
Aspect: Southeast
Slope: 3%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From Cunningham Ranch travel south 3.15 miles to a fork. Turn left and go 0.1 miles to a gate. Continue another 0.65 miles to a fork. Stay left (on main road) and continue 0.55 miles to another fork. Turn right and go 0.55 miles to a faint road turning back to the left. Go 0.05 miles on this faint road to a 2-foot tall rebar witness post on the right. The 0' stake begins 200 feet (67 paces) west of the witness post on a bearing of 275°M, and is marked by browse tag # 9143.

Map Name: Sego Canyon



Diagrammatic Sketch:



Township: 20S Range: 21E Section: 13

GPS: NAD 83, UTM 12S 625491 E 4325098 N

EAST HORSE PASTURE - TREND STUDY NO. 10-18

Site Information

Site Description: The study lies in an area of mixed pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flats located to the east of Nash Wash and the Cunningham Ranch. Grazing in the area is managed by the Bureau of Land Management as part of the large Cisco allotment. The transect runs through a low lying depression where water run-off from the bench flows. This extra amount of water is part of the reason for higher amounts of cheatgrass (*Bromus tectorum*) in the draw compared to the rest of the bench. Pellet group transect data estimated fluctuating deer use with lightly moderate use in 2000, moderate use in 2005 and light use in 2010. More pellets were found on the first half of the transect near the cover of junipers. Estimated elk use has been light since 2005, and estimated sheep and cattle use have also been light since 2005 (Table - Pellet Group Data).

Browse: Wyoming big sagebrush is the key browse species on this site, though fourwing saltbush (*Atriplex canescens*) has increased in cover (Table - Browse Trends) and density on the site since 2000. Sagebrush, however, has been decreasing in density (Table - Browse Characteristics) and cover (Table - Browse Trends) over the same period. The sagebrush population is mostly mature with moderate to high amounts of decadence, and little new recruitment of young plants. Utilization of sagebrush has been moderate to heavy, with very heavy hedging noted in 1986. The fourwing saltbush was mostly young in 2000 and 2005, but was mostly mature in 2010. There was heavy use of fourwing saltbush in 2000, but more moderate use in 2010. Broom snakeweed (*Gutierrezia sarothrae*) is common on the site, but has fluctuated in density with precipitation patterns (Table - Browse Characteristics). Juniper trees appear to be encroaching from the north, although there are none within the sampling area. The nearby stand provides fair bedding and thermal cover. The older trees are highlined, with the younger trees appearing to be only lightly utilized.

Herbaceous Understory: Cheatgrass is the dominant species on the site, providing the majority of cover in most sample years. Cheatgrass was so robust in 2005 it completely engulfed some sagebrush plants so they could not be seen. Cheatgrass abundance was much lower in 2000, when conditions were dryer. Perennial grasses are sparse and include: galleta (*Hilaria jamesii*), bottlebrush squirreltail (*Sitanion hystrix*) and sand dropseed (*Sporobolus cryptandrus*). Desirable forbs are rare and annual forbs dominate the forb component. Annual forbs have steadily increased in cover and frequency since 2000 (Table - Herbaceous Trends).

Soil: The soil texture is a fine, sandy clay loam with a slightly alkaline soil reaction (pH 7.4). Phosphorus may have limited availability for plant growth and development at 4.8 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The soil has a dry crust formed on the surface which is easily broken and disturbed by animal activities. Since vegetation cover is poor, except for Wyoming big sagebrush and cheatgrass, any soil disturbance could leave the soil subject to wind and water erosion. Bare ground cover is abundant in the shrub interspaces on the slightly higher terrain (Table - Basic Cover). There are rills and gullies present with evidence of soil loss, but due to the gentle terrain, erosion does not appear to be excessive. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 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. Sagebrush decadence decreased from 60% to 18%, though recruitment of young plants is minimal.
- **1995 to 2000 - slightly up (+1):** Density of sagebrush increased 11% from 2,660 plants/acre to 2,940 plants/acre, and cover increased from 9% to 12%. Decadence increased slightly to 25% and recruitment of young plants remained very low. Fourwing saltbush was sampled for the first time.
- **2000 to 2005 - down (-2):** There was a 25% decrease in density of sagebrush to 2,200 plants/acre and cover decreased to 7%. Decadence of sagebrush increased to 41% and poor vigor increased from 12%

to 19%. Recruitment of young sagebrush plants remained low. Fourwing saltbush density increased substantially, but cover remained less than 1%.

- **2005 to 2010 - stable (0):** Sagebrush decreased in density by 14% to 1,900 plants/acre, and cover decreased to 6%. However, density of fourwing saltbush increased 41% from 340 plants/acre to 480 plants/acre, and cover increased to 5%.

Grass:

- **1986 to 1995 - up (+2):** The sum of nested frequency of perennial grasses increased substantially due to a significant increase in the nested frequency of galleta and sand dropseed. However, cheatgrass dominated the site with 27% cover and perennial grasses remained relatively rare.
- **1995 to 2000 - up (+2):** There was a 56% increase in the sum of nested frequency of perennial grasses and cover increased from 2% to 4%. Cheatgrass decreased significantly in nested frequency and cover decreased to 7%.
- **2000 to 2005 - down (-2):** The perennial grass sum of nested frequency decreased by 28% and cover decreased to 3%. There was a significant increase in the nested frequency of cheatgrass and cover increased to 34%.
- **2005 to 2010 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial grasses, but cover remained similar and perennial grasses were already rare on the site. Cheatgrass nested frequency decreased significantly, but cheatgrass remained the dominant species on the site providing 27% cover.

Forb:

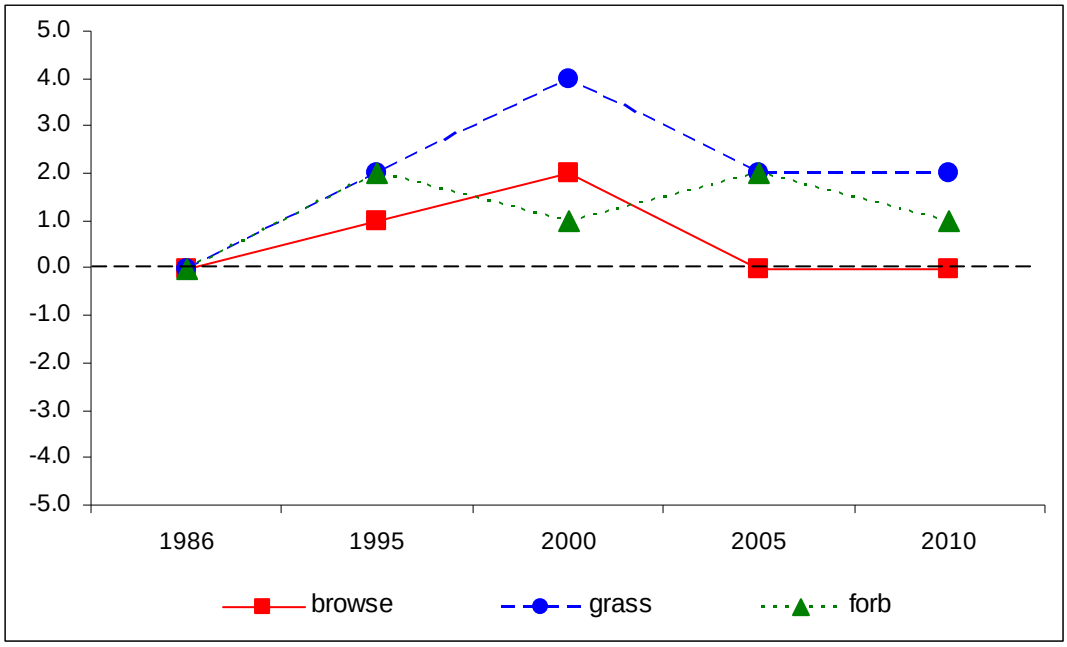
- **1986 to 1995 - up (+2):** The sum of nested frequency of perennial forbs increased by nearly two-fold, though annual species are more prevalent than perennial species.
- **1995 to 2000 - slightly down (-1):** There was a slight decrease in the sum of nested frequency of perennial forbs, though cover remained similar.
- **2000 to 2005 - slightly up (+1):** The perennial sum of nested frequency increased to 1995 levels and cover increased to 2%. Annual forbs also increased substantially in frequency and cover.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased to 2000 levels, though cover remained similar. Annual forbs continued to increase in frequency and cover.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 18

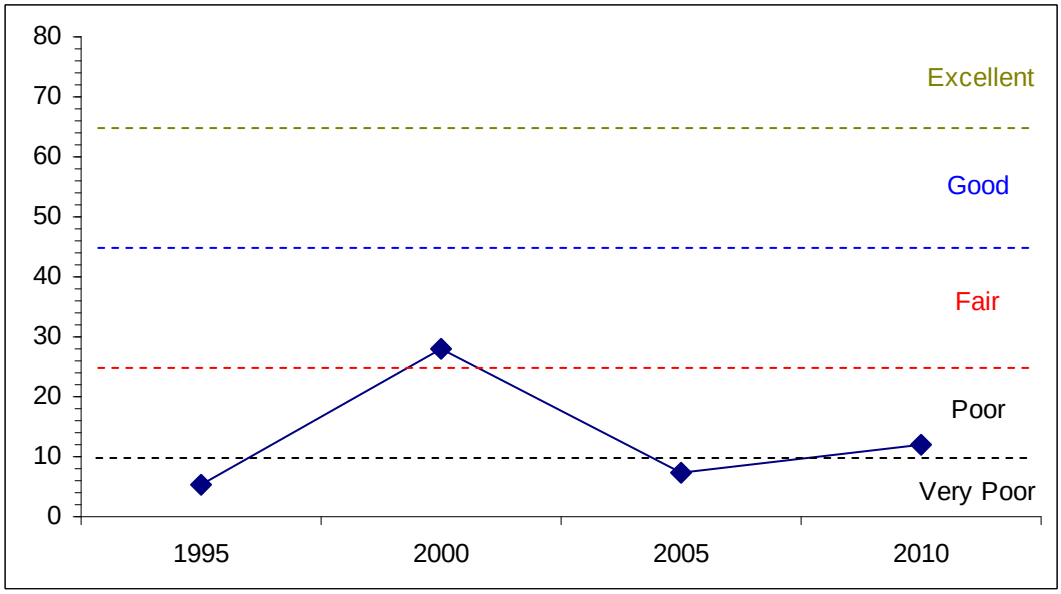
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	10.7	9.6	0.0	3.2	-20.0	1.7	0.0	**5.2**	Very Poor
00	14.6	7.5	0.5	8.6	-5.3	1.9	0.0	**27.9**	Fair
05	9.5	3.6	5.1	5.8	-20.0	3.2	0.0	**7.2**	Very Poor
10	12.4	9.2	0.9	5.9	-20.0	3.5	0.0	**12.0**	Very Poor-Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 18



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10, Study no: 18



HERBACEOUS TRENDS--
Management unit 10, Study no: 18

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Bromus tectorum (a)	-	bc352	a176	c348	b323	27.40	7.01	33.48	27.16
G	Hilaria jamesii	a6	b56	b84	b84	b68	1.25	3.27	2.53	2.25
G	Oryzopsis hymenoides	-	2	-	8	1	.00	.01	.21	.53
G	Sitanion hystrix	a4	ab19	b28	ab11	a5	.27	.47	.09	.09
G	Sporobolus cryptandrus	a-	b14	c32	ab3	ab5	.05	.55	.04	.06
G	Stipa comata	-	3	3	-	1	.03	.00	-	.00
G	Vulpia octoflora (a)	-	b28	a-	c77	a-	.06	-	.53	-
Total for Annual Grasses		0	380	176	425	323	27.47	7.01	34.02	27.16
Total for Perennial Grasses		10	94	147	106	80	1.61	4.32	2.88	2.95
Total for Grasses		10	474	323	531	403	29.09	11.33	36.90	30.12
F	Astragalus sp.	-	-	1	-	-	-	.00	-	-
F	Cryptantha sp.	-	-	-	5	2	-	-	.04	.00
F	Descurainia pinnata (a)	-	a7	a3	b83	b73	.02	.00	.71	2.21
F	Draba sp. (a)	-	-	1	-	3	-	.00	-	.15
F	Erigeron utahensis	7	4	-	-	-	.00	-	-	-
F	Erodium cicutarium (a)	-	a-	b11	ab13	b12	-	.21	.48	.10
F	Gilia hutchinifolia (a)	-	-	-	6	3	-	-	.03	.00
F	Lactuca serriola	-	3	-	-	-	.00	-	-	-
F	Lappula occidentalis (a)	-	b30	a-	c90	d143	.08	-	.52	1.37
F	Lepidium montanum	a-	bc31	a3	c45	ab6	.06	.03	.95	.46
F	Leucelene ericoides	a-	ab9	b15	a-	ab8	.06	.15	-	.36
F	Machaeranthera grindelioides	-	2	-	-	7	.00	-	-	.01
F	Orobanche corymbosa	3	-	-	-	-	-	-	-	-
F	Phlox longifolia	6	4	3	4	-	.01	.01	.01	-
F	Plantago patagonica (a)	-	c145	a-	c119	b18	.28	-	1.48	.04
F	Salsola iberica (a)	-	a-	b106	a9	b126	-	1.35	.01	9.42
F	Schoencrambe linifolia	-	2	-	6	-	.00	-	.01	-
F	Sisymbrium altissimum (a)	-	b30	bc51	c39	a-	.18	2.49	3.70	-
F	Sphaeralcea coccinea	15	27	31	32	36	.68	.76	.60	.94
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	212	172	359	378	0.57	4.07	6.95	13.31
Total for Perennial Forbs		32	82	53	92	59	0.84	0.96	1.62	1.77
Total for Forbs		32	294	225	451	437	1.41	5.03	8.58	15.09

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

BROWSE TRENDS--
Management unit 10, Study no: 18

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata wyomingensis	65	67	56	50	8.57	11.68	7.06	5.46
B	Atriplex canescens	0	1	13	17	-	.00	.55	4.47
B	Ceratoides lanata	1	0	0	0	-	-	-	-
B	Grayia spinosa	1	1	1	0	.00	1.01	.00	-
B	Gutierrezia sarothrae	68	29	42	24	2.53	.97	1.66	1.37
B	Opuntia sp.	5	4	7	6	.00	.01	.09	.30
Total for Browse		140	102	119	97	11.12	13.68	9.38	11.61

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 18

Species	Percent Cover	
	'05	'10
Artemisia tridentata wyomingensis	11.28	7.43
Atriplex canescens	.56	3.09
Grayia spinosa	.06	-
Gutierrezia sarothrae	2.31	.38
Opuntia sp.	.15	.41

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 18

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata	2.3	1.2

BASIC COVER--
Management unit 10, Study no: 18

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	8.25	43.52	32.86	51.50	49.77
Rock	0	.15	.04	.01	0
Pavement	.25	.12	.88	.47	.70
Litter	56.50	48.29	36.91	19.11	57.87
Cryptogams	1.75	2.11	1.41	.33	2.07
Bare Ground	33.25	28.83	44.73	36.01	23.15

SOIL ANALYSIS DATA --
Management unit 10, Study no: 18, Study Name: East Horse Pasture

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.0	7.4	48.0	24.0	28.0	1.1	4.5	108.8	0.7

PELLET GROUP DATA--
Management unit 10, Study no: 18

Type	Quadrat Frequency				Days use per acre (ha)		
	'95	'00	'05	'10	'00	'05	'10
Sheep	-	-	2	-	-	5 (12)	2 (5)
Rabbit	22	23	28	18	-	-	-
Elk	1	-	3	6	-	4 (10)	15 (36)
Deer/Antelope	17	41	28	43	27 (67)	44 (107)	18 (45)
Cattle	1	-	-	-	-	4 (9)	-

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 18

		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 wyomingensis									
86	**3831**	3	37	60	-	7	90	10	21/23
95	**2660**	0	82	18	-	50	14	8	22/34
00	**2940**	1	73	25	-	33	18	12	20/32
05	**2200**	5	55	41	-	45	38	19	24/36
10	**1900**	0	65	35	-	46	15	19	21/29
Atriplex canescens									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	43/65
00	**20**	100	0	-	-	0	0	0	32/65
05	**340**	76	24	-	20	0	35	0	26/33
10	**480**	4	96	-	20	46	4	0	25/30
Ceratoides lanata									
86	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	11/6
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus nauseosus									
86	**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	31/56
Grayia spinosa									
86	**33**	0	0	100	-	0	100	0	-/-
95	**20**	0	0	100	-	0	0	100	11/7
00	**20**	0	0	100	20	0	0	100	35/75
05	**20**	0	0	100	-	0	100	100	17/14
10	**0**	0	0	0	-	0	0	0	16/16

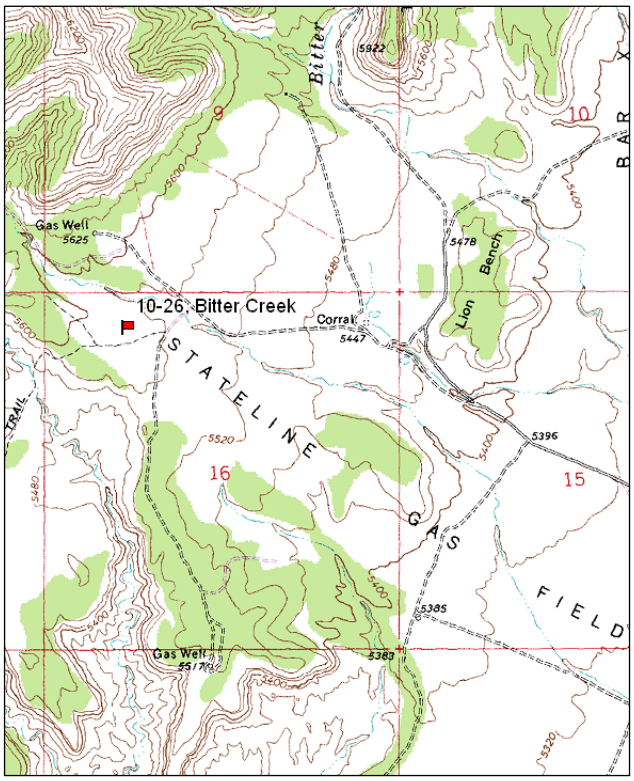
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
86	**5065**	34	63	3	333	0	0	0	9/6
95	**8860**	39	61	0	640	0	0	0	12/12
00	**1220**	46	54	0	-	0	0	0	8/9
05	**2640**	1	99	0	-	0	0	0	13/12
10	**1180**	15	69	15	100	0	0	8	9/11
Opuntia sp.									
86	**198**	17	33	50	-	0	0	0	5/4
95	**100**	20	80	0	-	0	0	0	5/14
00	**80**	0	100	0	20	0	0	0	4/14
05	**160**	13	75	13	-	0	0	13	7/20
10	**160**	0	100	0	-	0	0	0	6/20
Sclerocactus sp.									
86	**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	9/5
10	**0**	0	0	-	-	0	0	0	-/-

BITTER CREEK - TREND STUDY NO. 10-26-10

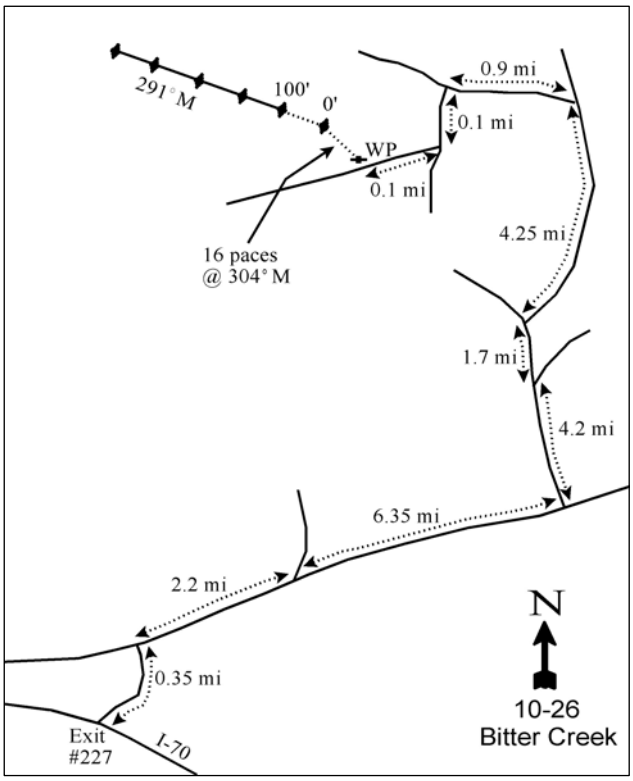
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: Private
Elevation: 5575 ft. (1700 m)
Aspect: East
Slope: 4%
Transect bearing: 291° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

Directions:
Take I-70 exit #227 Westwater and turn left to the Book Cliff area. Travel 0.35 miles to a "T" intersection and turn right (northeast). Proceed 2.2 miles to a fork and keep right. Stay on the main road for 6.35 miles to a dirt road on the left. Turn left traveling north-northwest. Proceed 4.2 miles and stay left on the main road. Continue 1.7 and turn right. Travel another 4.25 to a fork. Turn left at this fork and go 0.9 miles. At the next fork turn left and go 0.1 miles. Then take the right fork and go 0.1 miles to the witness post on the right side of the road. The 0-foot stake is 16 paces away at 304°M, marked with browse tag #9142.

Map Name: Bryson Canyon



Diagrammatic Sketch:



Township: 17S Range: 25E Section: 16

GPS: NAD 83, UTM 12S 658608 E 4355437 N

BITTER CREEK - TREND STUDY NO. 10-26

Site Information

Site Description: The study was established in 2000 to monitor crucial winter range for big game, primarily elk, and is located near the Utah-Colorado state line on the south Book Cliffs. The transect was placed on the alluvial fan that was deposited where Bitter Creek comes off of the cliffs. The study lies in a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands. The area is grazed as part of the Bureau of Land Management (BLM) San Arroyo allotment. According to DWR biologists, a moderate herd of elk are year round residents to this area. Pellet group transect data estimated heavy elk use in 2000, but elk use has been light since 2005. Estimated deer use was light in 2000 and 2010, but was lightly moderate in 2005. Sheep pellets were only sampled in 2005, but estimated use was heavy in that year (Table - Pellet Group Data).

Browse: Wyoming big sagebrush is the key browse species providing nearly all of the browse cover on the site (Table - Browse Trends). The sagebrush population is mostly mature with high decadence, high amounts of poor vigor and little recruitment of young sagebrush plants. Utilization of sagebrush has been moderate to heavy since the outset of the study in 2000. Other browse include: broom snakeweed (*Gutierrezia sarothrae*) and spiny hopsage (*Grayia spinosa*) in very low numbers (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are sparse on the site with limited diversity. Cheatgrass (*Bromus tectorum*) is the dominant grass species on the site, but frequency and density have fluctuated with precipitation patterns. The only perennial grass species sampled were Sandberg bluegrass (*Poa secunda*) and bottlebrush squirreltail (*Sitanion hystrix*). Perennial forbs are infrequent and not diverse (Table - Herbaceous Trends).

Soil: Soils have a sandy clay loam texture with a neutral soil reactivity (pH 7.1) and low organic matter at 0.4%. Phosphorus may have limited availability for plant growth and development at 4.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Shrub interspaces are high in bare ground cover except when cheatgrass is present, with pedestaling occurring around and underneath shrub canopies. Vegetation and litter cover appear to be adequate to minimize erosion (Table - Basic Cover). Some heavy localized erosion was noted in the general area of this transect with deep gullies, but erosion is not as severe on the site because of the gentle slope. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **2000 to 2005 - down (-2):** Wyoming big sagebrush density decreased by 33% from 5,320 plants/acre to 3,540 plants/acre, and cover decreased from 20% to 14%. Decadent sagebrush increased from 56% to 75% and sagebrush plants displaying poor vigor increased from 27% to 51%.
- **2005 to 2010 - slightly up (+1):** The density of sagebrush changed little with a slight increase to 3,640 plants/acre, but cover increased to 21%. Sagebrush decadence decreased to 36% and poor vigor decreased to 18%. Recruitment of young plants remained poor, but seedlings were sampled in low numbers for the first time.

Grass:

- **2000 to 2005 - down (-2):** The sum of nested frequency of perennial grasses decreased by 37% with a significant decrease in the nested frequency of bottlebrush squirreltail. The annual species cheatgrass and sixweeks fescue (*Vulpia octoflora*) increased significantly in nested frequency and cover of cheatgrass increased from 1% to 30%.
- **2005 to 2010 - up (+2):** There was a 36% increase in the sum of nested frequency of perennial grasses and cover increased from 2% to 3%. Cheatgrass decreased significantly in nested frequency and cover decreased to 9%, though it remains the dominant herbaceous species on the site.

Forb:

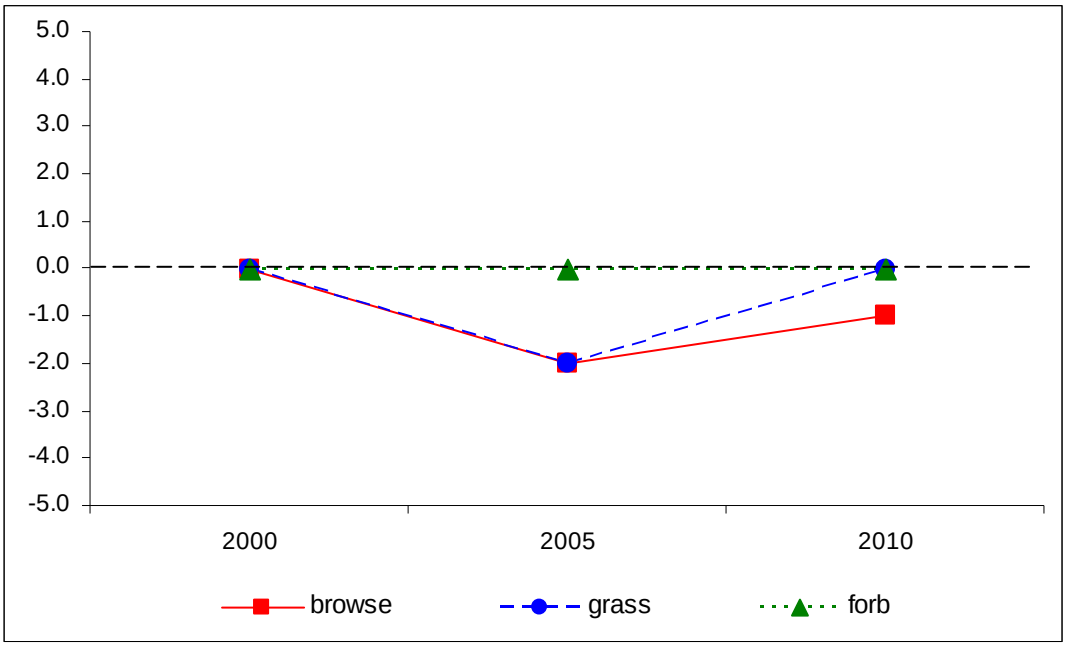
- **2000 to 2005 - stable (0):** Perennial forbs are rare.
- **2005 to 2010 - stable (0):** Perennial forbs are rare.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 26

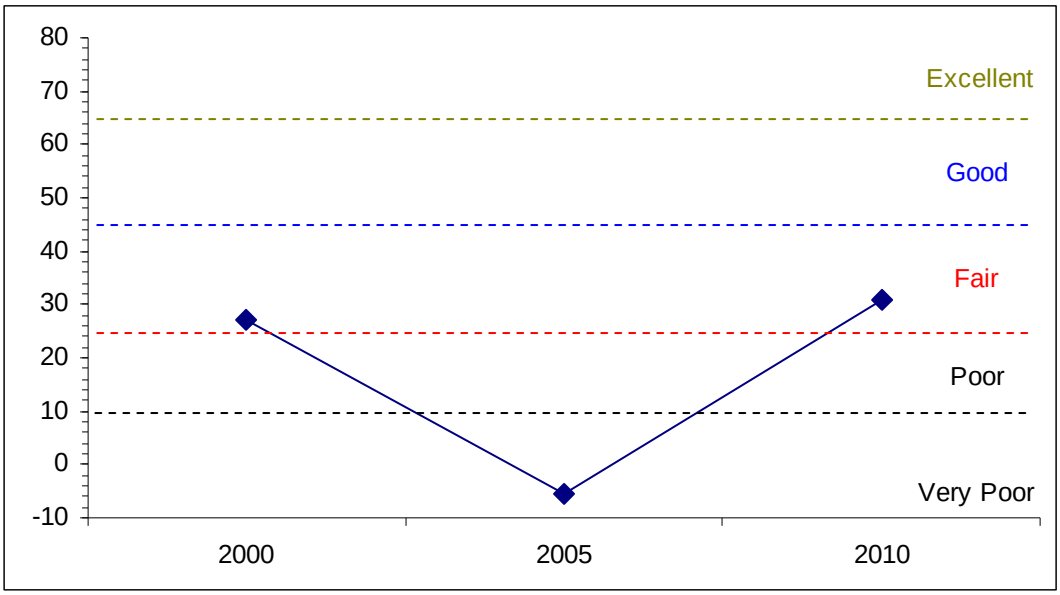
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
00	25.0	-1.8	0.0	4.3	-0.8	0.4	0.0	**27.1**	Fair
05	16.9	-7.5	0.5	4.5	-20.0	0.1	0.0	**-5.5**	Very Poor
10	25.9	4.2	0.5	6.4	-6.5	0.3	0.0	**30.8**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 26



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10, Study no: 26



HERBACEOUS TRENDS--
Management unit 10, Study no: 26

Type	Species	Nested Frequency			Average Cover %		
		'00	'05	'10	'00	'05	'10
G	Bromus tectorum (a)	$_{a}$203	$_{c}$467	$_{b}$346	1.02	30.21	8.61
G	Poa secunda	114	83	109	1.09	1.87	.68
G	Sitanion hystrix	$_{b}$78	$_{a}$38	$_{a}$55	1.04	.39	2.50
G	Vulpia octoflora (a)	$_{a}$4	$_{b}$186	$_{a}$-	.01	.86	-
Total for Annual Grasses		207	653	346	1.03	31.07	8.61
Total for Perennial Grasses		192	121	164	2.13	2.26	3.19
Total for Grasses		399	774	510	3.17	33.34	11.80
F	Astragalus sp.	-	2	-	-	.00	-
F	Calochortus nuttallii	-	6	10	-	.01	.02
F	Castilleja linariaefolia	-	-	1	-	-	.00
F	Descurainia pinnata (a)	$_{a}$-	$_{b}$75	$_{a}$1	-	.39	.00
F	Draba sp. (a)	-	3	-	-	.00	-
F	Erigeron pumilus	$_{b}$23	$_{a}$-	$_{a}$3	.07	-	.04
F	Erodium cicutarium (a)	3	1	3	.00	.00	.00
F	Gilia sp. (a)	$_{a}$-	$_{c}$61	$_{b}$15	-	.27	.03
F	Lappula occidentalis (a)	-	6	3	-	.04	.00
F	Lepidium sp. (a)	$_{a}$-	$_{b}$22	$_{a}$-	-	.07	-
F	Leucelene ericoides	12	-	-	.05	-	-
F	Phlox longifolia	6	8	6	.01	.02	.03
F	Plantago patagonica (a)	$_{a}$2	$_{c}$204	$_{b}$31	.00	.74	.07
F	Schoencrambe linifolia	$_{b}$23	$_{a}$3	$_{ab}$23	.06	.04	.06
Total for Annual Forbs		5	372	53	0.00	1.53	0.12
Total for Perennial Forbs		64	19	43	0.19	0.07	0.16

Type	Species	Nested Frequency			Average Cover %		
		'00	'05	'10	'00	'05	'10
Total for Forbs		69	391	96	0.20	1.61	0.28

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

BROWSE TRENDS--
Management unit 10, Study no: 26

Type	Species	Strip Frequency			Average Cover %		
		'00	'05	'10	'00	'05	'10
B	Artemisia tridentata wyomingensis	91	88	92	20.00	13.50	20.71
B	Grayia spinosa	1	1	1	-	.03	.15
B	Gutierrezia sarothrae	8	0	1	.30	-	-
B	Juniperus osteosperma	0	1	0	-	-	-
B	Opuntia sp.	6	7	9	.18	.21	1.16
Total for Browse		106	97	103	20.48	13.73	22.02

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 26

Species	Percent Cover	
	'05	'10
Artemisia tridentata wyomingensis	13.31	28.53
Grayia spinosa	.20	.18
Gutierrezia sarothrae	-	.13
Opuntia sp.	.68	.55

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 26

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata syomingensis	1.9	1.2

BASIC COVER--
Management unit 10, Study no: 26

Cover Type	Average Cover %		
	'00	'05	'10
Vegetation	27.48	45.09	34.59
Rock	.89	.97	.55
Pavement	.75	.80	.41
Litter	34.70	25.46	50.29
Cryptogams	14.39	4.30	7.40
Bare Ground	44.19	33.99	32.44

SOIL ANALYSIS DATA --

Management unit 10, Study no: 26, Study Name: Bitter Creek

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.8	7.1	60.0	17.4	22.6	0.4	4.5	99.2	0.5

PELLET GROUP DATA--

Management unit 10, Study no: 26

Type	Quadrat Frequency			Days use per acre (ha)		
	'00	'05	'10	'00	'05	'10
Sheep	-	18	-	-	67 (165)	-
Rabbit	5	33	23	-	-	-
Elk	44	23	2	82 (203)	8 (20)	17 (43)
Deer	18	31	35	4 (10)	26 (65)	18 (45)
Cattle	-	-	2	-	-	-

BROWSE CHARACTERISTICS--

Management unit 10, Study no: 26

		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 wyomingensis									
00	**5320**	0	44	56	-	59	24	27	20/31
05	**3540**	1	25	75	-	47	50	51	23/37
10	**3640**	1	63	36	240	32	12	18	25/37
Chrysothamnus viscidiflorus stenophyllus									
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	6/8
10	**0**	0	0	-	-	0	0	0	-/-
Echinocereus sp.									
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	7/18
10	**0**	0	0	-	20	0	0	0	7/8
Grayia spinosa									
00	**20**	0	100	-	-	0	0	0	10/16
05	**20**	0	100	-	-	0	0	0	24/27
10	**20**	0	100	-	-	0	100	0	24/32
Gutierrezia sarothrae									
00	**620**	19	68	13	80	0	0	13	8/9
05	**0**	0	0	0	-	0	0	0	-/-
10	**40**	0	100	0	-	0	0	0	11/16
Juniperus osteosperma									
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-

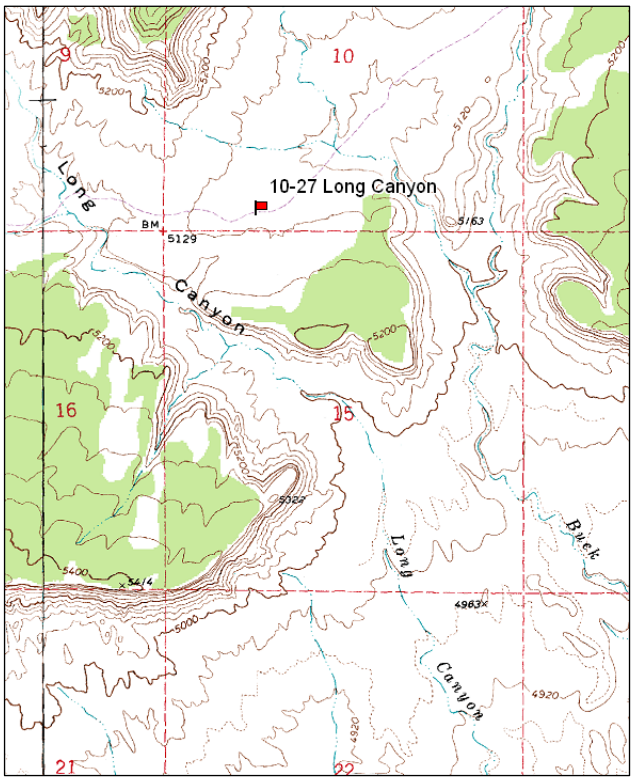
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
00	**120**	0	100	0	-	0	0	0	5/16
05	**140**	0	86	14	-	0	0	29	6/28
10	**220**	0	100	0	-	0	0	0	6/22
Sclerocactus sp.									
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	7/4
10	**0**	0	0	-	-	0	0	0	6/7

LONG CANYON - TREND STUDY NO. 10-27-10

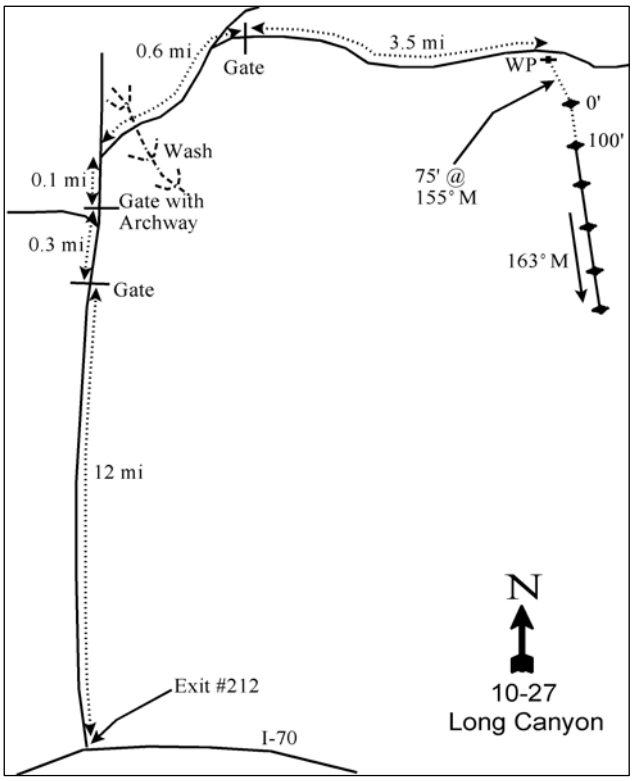
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 5112 ft. (1559 m)
Aspect: North
Slope: 3%
Transect bearing: 163° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

Directions:
From I-70, take the east Cisco exit (exit #212). From the north side of the overpass travel 12 miles to a gate. Go through the gate and proceed 0.3 miles to a sheep ranch gate with an archway. Go through the gate and continue 0.1 miles to a fork. Turn right and drive 0.6 miles to a road on the right with a gate. Turn right (south) and drive along the bench 3.5 miles to the witness post on the right (south) side of the road. From the witness post walk 75 ft at 155 °M to the 0' stake, which is marked with browse tag #147.

Map Name: Anotone Canyon



Diagrammatic Sketch:



Township: 19S Range: 23E Section: 10

GPS: NAD 83, UTM 12S 641287 E 4336038 N

LONG CANYON - TREND STUDY NO. 10-27

Site Information

Site Description: The study was established in 2005 and monitors the lowest bench of the Book Cliffs above the Cisco Desert, just above Cottonwood Wash. The bench is dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands. The area is considered an important deer winter range. Grazing is managed by the Bureau of Land Management as part of the San Arroyo allotment. Pellet group transect data has estimated moderate use by deer and light use by elk since 2005. A deer carcass was found on the site in 2005. The west end of the bench near Cottonwood Wash, appeared to be a sheep bedding area and showed signs of heavy use in 2005, but estimated sheep use was light in 2010. Cattle sign was only sampled in 2010 with light use (Table - Pellet Group Data).

Browse: Wyoming big sagebrush is the key browse species at this site and provides nearly all of the browse canopy cover (Table - Canopy Cover). The sagebrush population is mostly mature with moderate amounts of decadence. Recruitment of young sagebrush plants has been good since 2005 and sagebrush vigor at this site was much better than some of the other sites on the south end of the Book Cliffs. Utilization of sagebrush has been mostly heavy since 2005. Other palatable browse species sampled on the site include: fourwing saltbush (*Atriplex canescens*), winterfat (*Ceratoides lanata*) and spiny hopsage (*Grayia spinosa*). Fourwing saltbush has been heavily used (Table - Browse Characteristics). Black greasewood (*Sarcobatus vermiculatus*) was also seen near the transect location.

Herbaceous Understory: Perennial grasses are rare and the herbaceous community is dominated by annual species. Cheatgrass (*Bromus tectorum*) is the most abundant herbaceous species on the site. Cheatgrass cover was very high in 2005, but decreased substantially in 2010. Sixweeks fescue (*Vulpia octoflora*) was also very abundant in 2005, but was rare in 2010. Perennial grasses are infrequent with the most common species being bottlebrush squirreltail (*Sitanion hystrix*). Forbs are limited on the site, and annual forbs are much more abundant than perennial forbs (Table - Herbaceous Trends).

Soil: The soil is a shallow loam with a neutral soil reaction (pH 7.3). Bare ground cover is quite high on the site. Most of the vegetation cover in the shrub interspaces is provided by cheatgrass, which is susceptible to large changes with precipitation patterns (Table - Basic Cover). The soil erosion condition was classified stable in 2005 and 2010.

Trend Assessments

Browse:

- **2005 to 2010 - slightly up (+1):** The density of the key browse species, Wyoming big sagebrush, increased by 15% from 3,700 plants/acre to 4,260 plants/acre, though canopy cover remained similar. Decadence of sagebrush decreased from 30% to 11% and poor vigor decreased from 17% to 4%. Recruitment of young sagebrush plants increased from 6% to 28%, providing much of the increase in total density.

Grass:

- **2005 to 2010 - stable (0):** There was a decrease in the sum of nested frequency of perennial grasses, though perennial grasses were already rare on the site. There was a significant decrease in the nested frequency of the two annual species, cheatgrass and sixweeks fescue. Both annual species also decreased substantially in cover.

Forb:

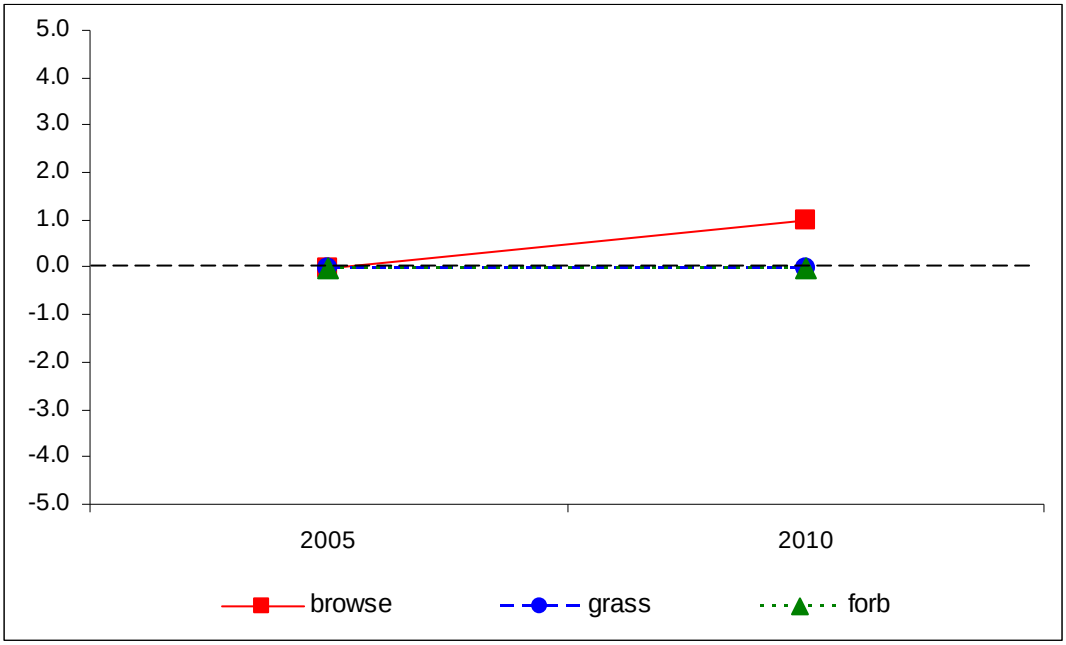
- **2005 to 2010 - stable (0):** Perennial forbs are rare.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10, study no: 27

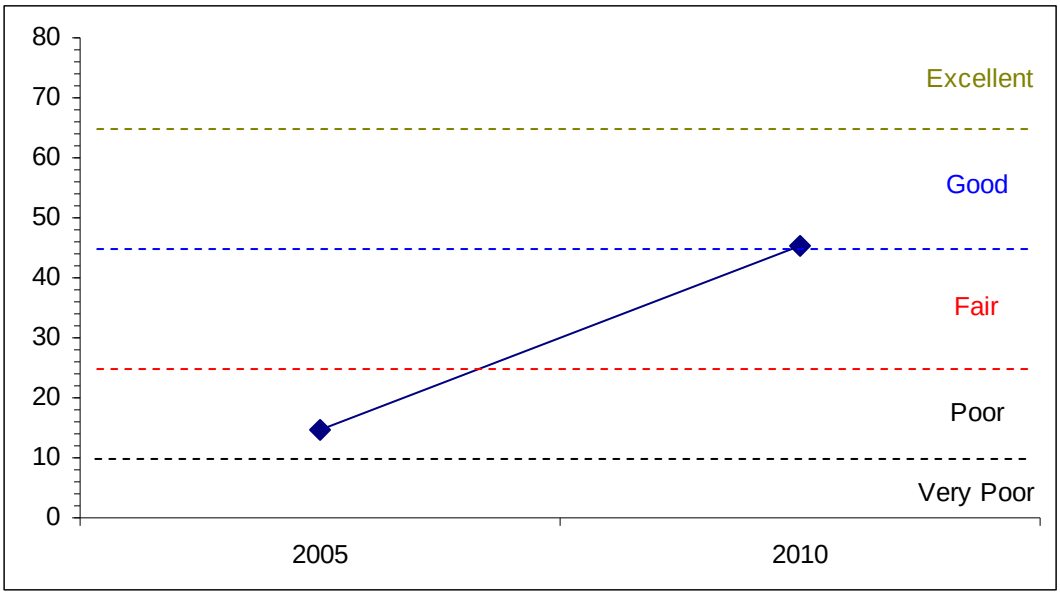
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
05	22.4	6.0	3.0	2.5	-20.0	1.0	0.0	**14.8**	Poor
10	20.0	11.7	14.0	1.8	-4.1	2.0	0.0	**45.2**	Fair-Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 27



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10, Study no: 27



HERBACEOUS TRENDS--
Management unit 10, Study no: 27

Type	Species	Nested Frequency '05	Nested Frequency '10	Average Cover % '05	Average Cover % '10
G	Bromus tectorum (a)	$_{b}$395	$_{a}$311	20.31	5.45
G	Hilaria jamesii	3	-	.15	-
G	Oryzopsis hymenoides	11	4	.34	.19
G	Sitanion hystrix	40	30	.68	.65
G	Sporobolus cryptandrus	5	-	.06	-
G	Stipa comata	-	4	-	.03
G	Vulpia octoflora (a)	$_{b}$354	$_{a}$33	8.70	.05
Total for Annual Grasses		749	344	29.02	5.50
Total for Perennial Grasses		59	38	1.23	0.88
Total for Grasses		808	382	30.25	6.38
F	Alyssum alyssoides (a)	$_{a}$61	$_{b}$182	.49	2.20
F	Calochortus nuttallii	-	5	-	.01
F	Chenopodium fremontii (a)	-	3	-	.01
F	Cryptantha sp.	8	9	.16	.01
F	Descurainia pinnata (a)	$_{b}$111	$_{a}$1	.86	.00
F	Draba sp. (a)	-	1	-	.00
F	Eriogonum cernuum (a)	-	9	-	.01
F	Gilia sp. (a)	$_{b}$52	$_{a}$18	.26	.04
F	Lactuca serriola	-	1	-	.00
F	Lappula occidentalis (a)	37	41	.26	.13
F	Lepidium sp. (a)	$_{a}$5	$_{b}$24	.18	.31
F	Mentzelia sp.	$_{a}$1	$_{b}$18	.00	.09
F	Phlox longifolia	22	33	.08	.68
F	Plantago patagonica (a)	$_{b}$61	$_{a}$2	.50	.01

Type	Species	Nested Frequency '05	Nested Frequency '10	Average Cover % '05	Average Cover % '10
F	Sphaeralcea coccinea	$_{b}$23	$_{a}$8	.24	.18
F	Townsendia incana	2	-	.00	-
Total for Annual Forbs		327	281	2.57	2.74
Total for Perennial Forbs		56	74	0.49	0.99
Total for Forbs		383	355	3.07	3.73

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

BROWSE TRENDS--
Management unit 10, Study no: 27

Type	Species	Strip Frequency '05	Strip Frequency '10	Average Cover % '05	Average Cover % '10
B	Artemisia tridentata wyomingensis	81	66	17.76	15.93
B	Atriplex canescens	5	2	.15	.03
B	Ceratoides lanata	1	0	-	-
B	Chrysothamnus viscidiflorus stenophyllus	4	1	-	.06
B	Echinocactus sp.	0	0	-	-
B	Grayia spinosa	1	1	.15	-
B	Gutierrezia sarothrae	11	9	.18	.03
B	Opuntia sp.	12	6	.91	.53
Total for Browse		115	85	19.15	16.58

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 27

Species	Percent Cover '05	Percent Cover '10
Artemisia tridentata wyomingensis	22.66	23.35
Atriplex canescens	1.14	.26
Grayia spinosa	.10	-
Gutierrezia sarothrae	.56	.03
Opuntia sp.	.91	.60

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 27

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

BASIC COVER--
Management unit 10, Study no: 27

Cover Type	Average Cover % '05	'10
Vegetation	42.81	26.45
Rock	.38	.19
Pavement	.56	2.71
Litter	17.82	25.52
Cryptogams	4.11	4.17
Bare Ground	46.40	35.34

SOIL ANALYSIS DATA --
Management unit 10, Study no: 27, Study Name: Long Canyon

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.7	7.3	47.7	33.7	18.6	1.0	9.7	182.4	0.6

PELLET GROUP DATA--
Management unit 10, Study no: 27

Type	Quadrat Frequency '05	'10	Days use per acre (ha) '05	'10
Sheep	3	-	50 (124)	1 (3)
Rabbit	43	25	-	-
Elk	7	-	11 (26)	9 (22)
Deer/Antelope	26	21	33 (81)	20 (50)
Cattle	-	2	-	5 (13)

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 27

		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 wyomingensis									
05	**3700**	6	64	30	40	43	50	17	26/43
10	**4260**	28	62	11	26020	19	39	4	22/36
Atriplex canescens									
05	**120**	0	67	33	-	50	17	17	29/32
10	**40**	0	50	50	-	0	50	50	20/27
Ceratoides lanata									
05	**20**	0	100	-	-	0	100	0	18/14
10	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus viscidiflorus stenophyllus									
05	**80**	25	75	-	-	0	0	0	13/15
10	**20**	0	100	-	-	0	0	0	11/14

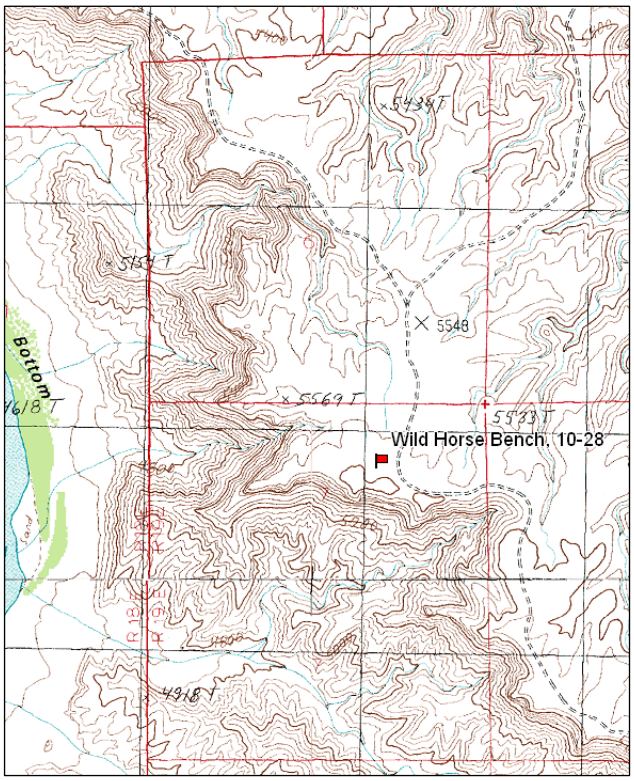
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Echinocactus sp.									
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	7/12
Grayia spinosa									
05	**40**	0	50	50	-	100	0	50	18/27
10	**20**	0	0	100	-	0	0	0	19/24
Gutierrezia sarothrae									
05	**280**	7	93	-	-	0	0	0	11/11
10	**200**	0	100	-	-	0	0	0	7/10
Opuntia sp.									
05	**460**	0	70	30	-	0	0	13	7/33
10	**220**	0	100	0	-	0	0	0	5/34
Sclerocactus sp.									
05	**0**	0	0	-	-	0	0	0	6/9
10	**0**	0	0	-	-	0	0	0	-/-

WILD HORSE BENCH - TREND STUDY NO. 10-28-10

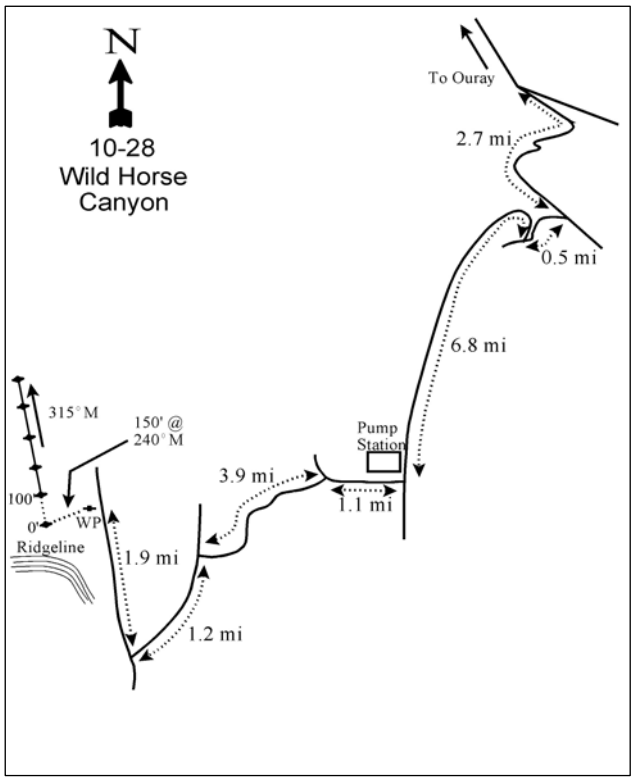
Vegetation Type: Black Sagebrush
Range Type: Bison Year-Long
NRCS Ecological Site Description: Semidesert Gravelly Sandy Loam (Wyoming Big Sagebrush), R034XY206UT
Land Ownership: BLM
Elevation: 5600 ft. (1707 m)
Aspect: North
Slope: 4%-5%
Transect bearing: 315° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95 ft)
Note: Soil sample needs to be collected.

Directions:
From Ouray, travel south towards the Bookcliffs for 9 miles until a major fork. Bear right and travel 2.7 miles to an intersection. Turn right and travel 0.5 miles to an intersection. Turn right going towards the top of the ridge and travel 6.8 miles to an intersection just past a pump station. Turn right and travel 1.1 miles to an intersection. Turn left and travel 3.9 miles to an intersection. Turn left and travel 1.2 miles to an intersection. Turn right and travel 1.9 miles to a witness post on the left (west) side of the road. The 0-foot stake is 150 feet from the witness post at 240°M, and is marked by browse tag #9175.

Map Name: Moon Bottom



Diagrammatic Sketch:



Township: 11S Range: 19E Section: 7

GPS: NAD 83, UTM 12S 600026 E 4414976 N

WILD HORSE BENCH - TREND STUDY NO. 10-28

Site Information

Site Description: The study is located in a desert shrub community on a bench overlooking the Green River. The study was established in 2010 to monitor bison habitat in the area. The steep cliffs of the bench make access to the Green River difficult and water is limited on the bench. There is a large amount of energy development in the area with oil wells and pipelines being common. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Lower Showalter cattle allotment and as part of the Hill Creek wild horse and burro herd area. Due to the difficulty in distinguishing the difference between species, cattle and bison pats were counted together. Pellet group transect data has estimated minimal animal use with light use by horses and bison/cattle (Table - Pellet Group Data).

Browse: Black sagebrush (*Artemisia nova*) is the dominant browse species on the site and provides the majority of the cover on the site (Table - Canopy Cover). The sagebrush population is mostly mature with low decadence, good recruitment of young plants and light use. Fourwing saltbush (*Atriplex canescens*) is found in low density, but showed heavy use and it was noted that plants showed signs of heavy use prior to the establishment of the study. Shadscale (*A. confertifolia*) is more common than fourwing saltbush, but shows much lighter use. Green molly (*Kochia americana*) was also sampled at low density, but showed little use. The weedy species broom snakeweed (*Gutierrezia sarothrae*) is prevalent on the site and is the second most common shrub species (Table - Browse Characteristics).

Herbaceous Understory: Grasses are not abundant on the site and diversity is low. The perennial species galleta (*Hilaria jamesii*) is the dominant grass on the site. Forbs are relatively diverse and fairly abundant for a desert shrub community, though weedy annual species such as halogeton (*Halogeton glomeratus*) are somewhat common. The perennial species gooseberryleaf globemallow (*Sphaeralcea grossulariifolia*) is the dominant forb species in cover on the site (Table - Herbaceous Trends).

Soil: No soil analysis data was collected for the site in 2010. Bare ground cover is low with good protective ground cover provided by a large amount of rock and pavement cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2010.

Trend Summary

HERBACEOUS TRENDS--
Management unit 10, Study no: 28

Type	Species	Nested Frequency '10	Average Cover % '10
G	Bromus tectorum (a)	5	.04
G	Hilaria jamesii	57	1.39
G	Oryzopsis hymenoides	2	.15
G	Sitanion hystrix	58	.91
G	Stipa comata	23	.46
Total for Annual Grasses		5	0.03
Total for Perennial Grasses		140	2.92
Total for Grasses		145	2.96
F	Astragalus sp.	2	.00
F	Astragalus sp.	23	.06
F	Chaenactis stevioides	51	.18
F	Cryptantha sp.	112	.43

Type	Species	Nested Frequency '10	Average Cover % '10
F	Eriogonum cernuum (a)	8	.02
F	Gilia sp. (a)	1	.00
F	Halogeton glomeratus (a)	56	.74
F	Lappula occidentalis (a)	53	.12
F	Lepidium sp. (a)	12	.47
F	Platyschkuhria integrifolia	4	.03
F	Schoencrambe linifolia	11	.20
F	Sphaeralcea grossulariifolia	45	1.58
F	Townsendia sp.	1	.03
Total for Annual Forbs		130	1.37
Total for Perennial Forbs		249	2.53
Total for Forbs		379	3.90

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

BROWSE TRENDS--
Management unit 10, Study no: 28

Type	Species	Strip Frequency '10	Average Cover % '10
B	Artemisia nova	52	5.01
B	Atriplex canescens	3	.18
B	Atriplex confertifolia	28	.70
B	Chrysothamnus viscidiflorus stenophyllus	1	-
B	Gutierrezia sarothrae	89	3.42
B	Kochia americana	3	.04
Total for Browse		176	9.36

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 28

Species	Percent Cover '10
Artemisia nova	6.30
Atriplex canescens	.01
Atriplex confertifolia	.85
Gutierrezia sarothrae	3.03
Kochia americana	.08

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 28

Species	Average leader growth (in) '10
Artemisia nova	1.7
Atriplex confertifolia	4.1

BASIC COVER--
Management unit 10, Study no: 28

Cover Type	Average Cover % '10
Vegetation	15.70
Rock	19.45
Pavement	38.69
Litter	19.38
Cryptogams	.01
Bare Ground	13.26

PELLET GROUP DATA--
Management unit 10, Study no: 28

Type	Quadrat Frequency '10	Days use per acre (ha) '10
Rabbit	1	-
Bison/attle	-	1 (2)
Horse	4	4 (10)

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 28

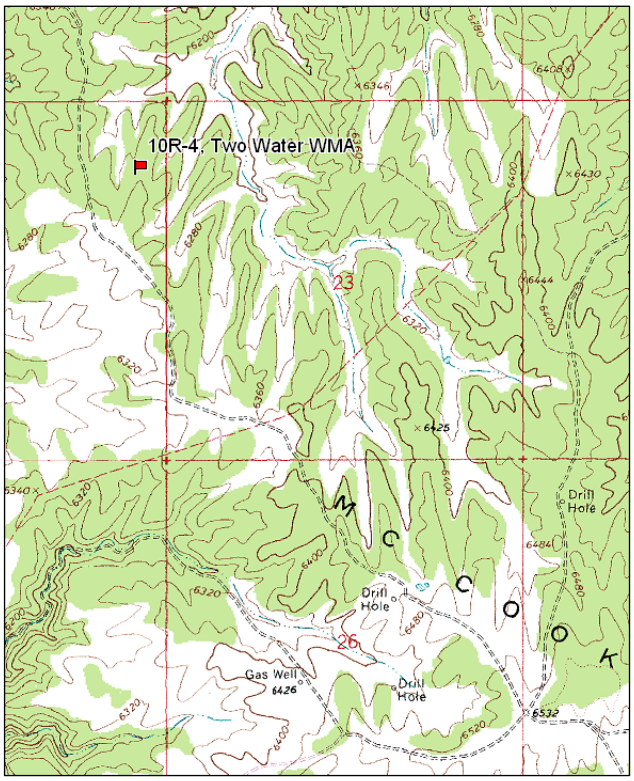
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia nova									
10	**3180**	23	67	9	-	3	3	4	9/21
Atriplex canescens									
10	**60**	0	100	-	-	0	67	0	8/19
Atriplex confertifolia									
10	**740**	5	84	11	-	0	0	5	10/20
Chrysothamnus viscidiflorus stenophyllus									
10	**20**	0	100	-	-	0	0	0	10/14
Grayia spinosa									
10	**0**	0	0	-	-	0	0	0	15/24
Gutierrezia sarothrae									
10	**9880**	15	83	2	180	0	0	1	7/9
Kochia americana									
10	**80**	25	75	-	-	0	0	0	5/10
Opuntia sp.									
10	**0**	0	0	-	-	0	0	0	6/12
Sarcobatus vermiculatus									
10	**0**	0	0	-	-	0	0	0	11/20

TWO WATER WMA - TREND STUDY NO. 10R-4-10

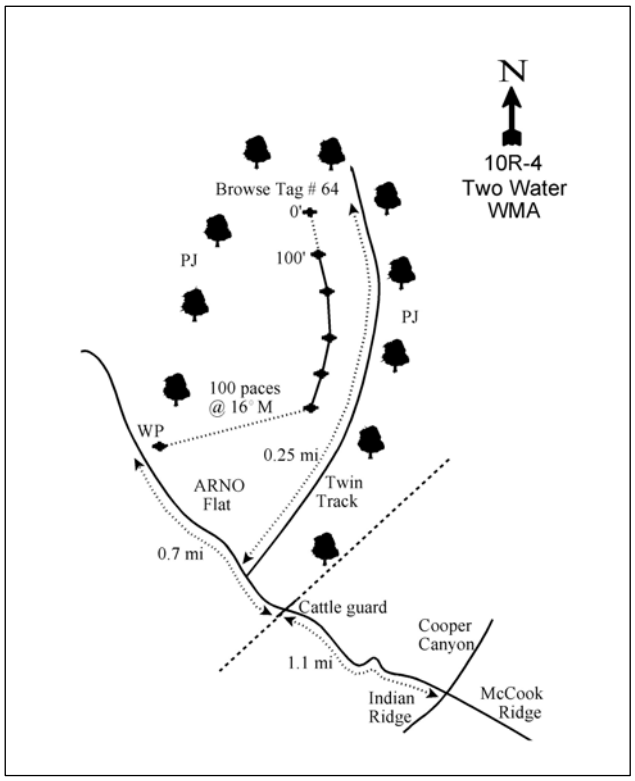
Vegetation Type: Black Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Semidesert Shallow Loam (Utah Juniper-Pinyon), R034XY233UT
Land Ownership: BLM
Elevation: 6300 ft. (1921 m)
Aspect: North
Slope: 3-5%
Transect bearing: 162° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Belt 2 rebar at 5ft., belt 5 rebar at 10ft.

Directions:
From the intersection of Cooper Canyon, Indian Ridge and McCook Ridge go northwest on McCook Ridge road. Travel 1.1 miles to a cattle guard. Go 0.7 miles past the cattle guard to a sage brush flat on the right and a witness post. The 500-foot stake is 100 paces into the sagebrush flat at an azimuth of 16°M. It is also possible to reach the site by taking the two track road on the east side of the chaining 0.25 miles to the 0-foot stake. The 0-foot stake is marked with browse tag #64.

Map Name: Cooper Canyon



Diagrammatic Sketch:



Township: 13S Range: 23E Section: 22

GPS: NAD 83, UTM 12S 643974 E 4393205 N

TWO WATER WMA - TREND STUDY NO. 10R-4

Site Information

Site Description: This study is located on a black sagebrush (*Artemisia nova*) flat just outside of the Two Water Wildlife Management Area. The site is surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands about 1/4 of a mile from a main road. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Olsen Amp allotment. Pellet group transect data has shown fluctuating use of wildlife. Estimated deer use was heavy in 2000 and 2010, and moderate in 2005. Estimated elk use was light in 2000, moderately heavy in 2005 and no elk sign was sampled in 2010. It was noted in 2010 that the majority of pellets were sampled on the west side of the transect, farther from the road. Estimated cattle use has been light since 2005 (Table - Pellet Group Data).

Browse: The dominant browse on the flat is black sagebrush, which provides the majority of the browse cover on the site (Table - Browse Trends). Other preferred browse includes winterfat (*Ceratoides lanata*), shadscale (*Atriplex confertifolia*) and fringed sage (*Artemisia frigida*). The black sagebrush population is mostly mature with low decadence and good vigor. Recruitment of young black sagebrush plants has been moderate to good, and utilization has been moderate to heavy with the heaviest use in 2010. Winterfat has a low growth form of only 8 to 10 inches in height with moderate to heavy use. Shadscale are widely scattered on the site and have shown moderate to heavy use. Fringed sagebrush density decreased substantially in 2005, and utilization has been mostly light (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are fairly diverse and have increased in cover each sample year since 1997. Cheatgrass (*Bromus tectorum*) was the most dominant grass species at the outset of the study in 1997, but cheatgrass nested frequency and cover decreased substantially in 2000 and has remained low. The most common perennial grasses are needle-and-thread (*Stipa comata*), bottlebrush squirreltail (*Sitanion hystrix*), galleta (*Hilaria jamesii*), blue grama (*Bouteloua gracilis*) and Indian ricegrass (*Oryzopsis hymenoides*). Thickspike wheatgrass (*Agropyron dasystachyum*) and bluebunch wheatgrass (*A. spicatum*) were also sampled, but only occasionally. Forbs are fairly diverse, but not particularly abundant. Scarlet globemallow (*Sphaeralcea coccinea*) is the most common forb, but cover of perennial forbs has only been about 1% with each reading (Table - Herbaceous Trends). Most of the forbs are found within the protective cover of black sagebrush canopies.

Soil: The soil is a clay loam texture with a neutral soil reaction (pH 7.25). Phosphorus may have limited availability for plant growth and development at 3.6 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The soil surface is cracked, indicating shrink-swell potential. Bare ground cover is moderate with a fairly high amount of pavement and cryptogams (Table - Basic Cover). Most cryptogams were found around the base of black sagebrush plants. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1997 to 2000 - up (+2):** There was a 60% increase in the density of the primary browse black sagebrush from 13,260 plants/acre to 21,180 plants/acre, and cover increased slightly from 20% to 21%. Decadence of black sagebrush has increased slightly from 5% to 12%. Recruitment of young sagebrush plants decreased, but remained good at 14%.
- **2000 to 2005 - stable (0):** The density of sagebrush decreased by 5%, though density remains very high at 20,180 plants/acre. Cover of black sagebrush increased slightly to 23%. Decadence increased to 23% and recruitment decreased to 6%.
- **2005 to 2010 - slightly down (-1):** Black sagebrush density decreased 18% to 16,460 plants/acre, and cover decreased to 20%. However, decadence decreased to 8% and recruitment of young sagebrush plants remained similar.

Grass:

- **1997 to 2000 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 12%, though cover increased slightly. Cheatgrass decreased significantly in nested frequency and cover decreased from 4% to less than 1%.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency of perennial grasses and cover increased slightly.
- **2005 to 2010 - stable (0):** The sum of nested frequency of perennial grasses changed little, though cover increased from 6% to 12% with a large increase in the cover of needle-and-thread.

Forb:

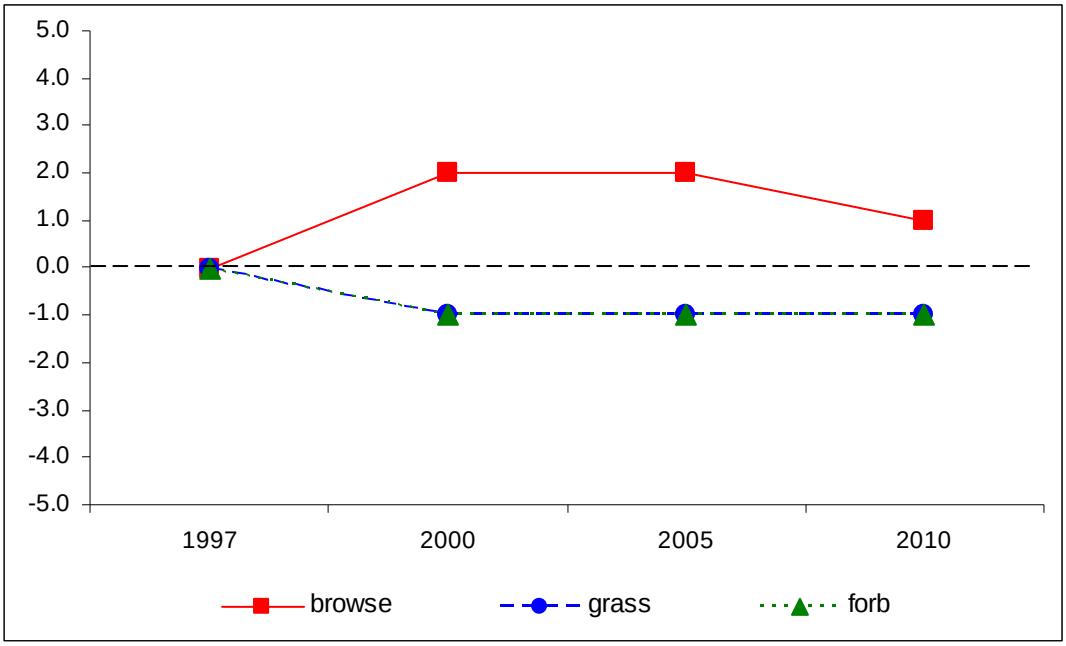
- **1997 to 2000 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 22%, but forbs were already fairly rare.
- **2000 to 2005 - stable (0):** There was little change in perennial forb sum of nested frequency or cover.
- **2005 to 2010 - stable (0):** There was little change in perennial forb sum of nested frequency or cover.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10R, study no: 4

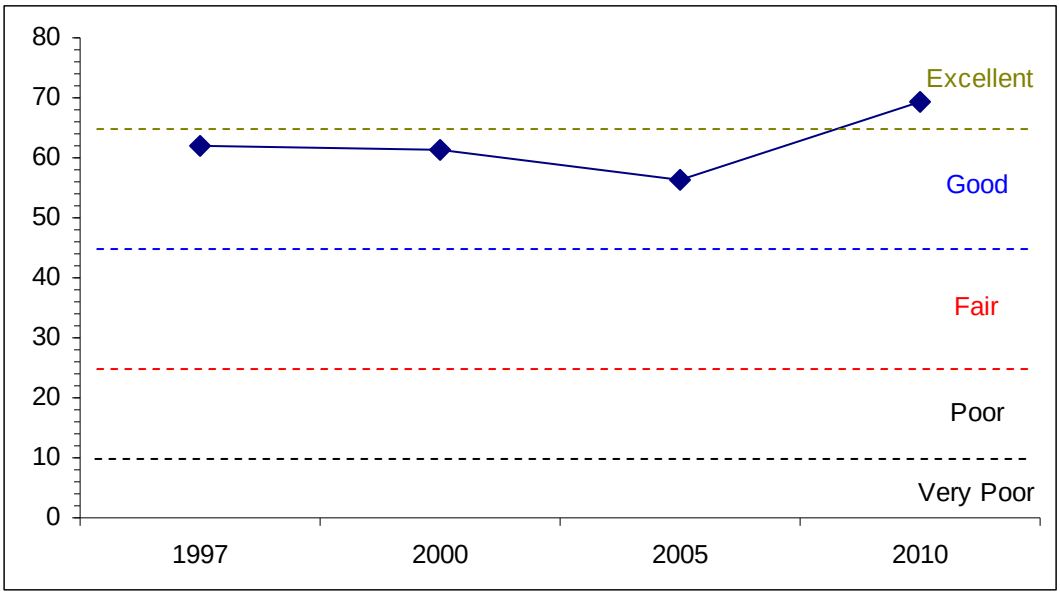
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
97	28.8	13.4	10.5	10.6	-3.0	1.6	0.0	**62.0**	Good
00	29.9	11.2	6.6	11.8	-0.1	1.8	0.0	**61.2**	Good
05	30.0	8.6	2.8	12.7	0.0	2.0	0.0	**56.2**	Good
10	26.8	12.8	3.6	23.8	0.0	2.5	0.0	**69.4**	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10R, Study no: 4



HERBACEOUS TRENDS--
Management unit 10R, Study no: 4

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
G	Agropyron dasystachyum	6	2	4	2	.06	.03	.00	.00
G	Agropyron spicatum	13	5	13	12	.36	.30	.37	.31
G	Bouteloua gracilis	a-	b25	b40	b43	-	.31	1.02	1.43
G	Bromus tectorum (a)	b215	a28	a10	a14	4.02	.11	.03	.02
G	Hilaria jamesii	b75	ab46	a43	a32	1.10	.82	.71	1.00
G	Oryzopsis hymenoides	b64	a34	b53	a18	.91	.51	.73	.62
G	Sitanion hystrix	b84	b92	a52	ab61	.87	1.02	.59	1.12
G	Stipa comata	a92	a90	a110	b146	2.01	2.87	2.92	7.40
Total for Annual Grasses		215	28	10	14	4.02	0.11	0.03	0.01
Total for Perennial Grasses		334	294	315	314	5.32	5.89	6.37	11.89
Total for Grasses		549	322	325	328	9.35	6.01	6.40	11.92
F	Alyssum alyssoides (a)	6	-	-	-	.01	-	-	-
F	Castilleja sp.	4	-	1	3	.01	-	.00	.00
F	Cryptantha sp.	b10	a-	b9	ab3	.13	-	.10	.00
F	Descurainia pinnata (a)	b32	a6	b33	a-	.10	.01	.33	-
F	Draba sp. (a)	a-	a-	b11	a-	-	-	.02	-
F	Erigeron sp.	3	-	2	-	.03	-	.00	-
F	Lappula occidentalis (a)	b69	a12	b59	b73	.40	.17	1.02	.21
F	Leucelene ericoides	-	-	-	2	-	-	-	.03
F	Linum lewisii	-	-	1	-	-	-	.03	-
F	Machaeranthera grindelioides	-	1	-	-	-	.03	-	-
F	Navarretia intertexta (a)	5	-	2	-	.01	-	.01	-
F	Penstemon sp.	2	-	-	-	.03	-	-	-
F	Schoencrambe linifolia	4	2	-	8	.03	.00	-	.07

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
F	Sphaeralcea coccinea	100	85	77	72	.57	.82	.84	1.12
F	Townsendia incana	-	8	4	6	-	.04	.04	.01
F	Tragopogon dubius	2	2	-	-	.00	.00	-	-
F	Unknown forb-annual (a)	9	-	-	-	.01	-	-	-
Total for Annual Forbs		121	18	105	73	0.53	0.18	1.39	0.21
Total for Perennial Forbs		125	98	94	94	0.82	0.90	1.02	1.24
Total for Forbs		246	116	199	167	1.36	1.08	2.42	1.45

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

BROWSE TRENDS--
Management unit 10R, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
B	Artemisia frigida	28	31	12	18	.62	1.00	.19	.54
B	Artemisia nova	92	96	96	98	19.72	21.10	22.46	19.69
B	Atriplex confertifolia	34	32	26	19	.85	.79	.34	.27
B	Ceratoides lanata	71	57	73	67	2.12	1.41	2.23	1.12
B	Gutierrezia sarothrae	12	3	12	16	-	.01	.19	.04
B	Opuntia sp.	2	3	3	1	-	-	.03	-
B	Pediocactus simpsonii	1	1	3	1	.00	.00	-	.00
Total for Browse		240	223	225	220	23.32	24.31	25.44	21.68

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 4

Species	Percent Cover	
	'05	'10
Artemisia frigida	.28	.25
Artemisia nova	23.54	23.73
Atriplex confertifolia	.20	.25
Ceratoides lanata	1.98	1.28
Gutierrezia sarothrae	.10	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 4

Species	Average leader growth (in)	
	'05	'10
Artemisia nova	1.3	.8
Ceratoides lanata	3.8	2.4

BASIC COVER--
Management unit 10R, Study no: 4

Cover Type	Average Cover %			
	'97	'00	'05	'10
Vegetation	28.09	33.27	30.62	38.26
Rock	5.72	5.38	3.32	2.11
Pavement	13.89	10.66	24.53	11.82
Litter	21.39	21.67	14.10	28.55
Cryptogams	6.80	7.54	6.41	5.26
Bare Ground	23.37	31.45	29.30	33.25

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 4, Study Name: Two Water WMA

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.5	7.3	25.6	37.8	36.6	2.0	3.6	198.4	0.7

PELLET GROUP DATA--
Management unit 10R, Study no: 4

Type	Quadrat Frequency			
	'97	'00	'05	'10
Rabbit	8	14	55	3
Elk	11	9	11	7
Deer	33	32	43	22
Cattle	-	1	-	-

Days use per acre (ha)			
'97	'00	'05	'10
-	-	-	-
13 (32)	5 (12)	44 (109)	-
33 (82)	60 (148)	29 (73)	57 (141)
1 (2)	-	2 (5)	2 (4)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 4

		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									
97	**1800**	14	86	-	-	0	0	0	10/10
00	**2000**	23	77	-	20	2	0	0	4/7
05	**380**	11	89	-	100	5	0	0	9/12
10	**760**	11	89	-	-	3	0	8	8/10
Artemisia nova									
97	**13260**	23	72	5	420	28	2	.30	8/17
00	**21180**	14	75	12	260	51	10	3	6/15
05	**20180**	6	72	23	80	40	3	7	8/17
10	**16460**	7	85	8	980	30	41	5	8/16
Atriplex confertifolia									
97	**880**	7	68	25	-	16	14	16	16/16
00	**860**	0	65	35	-	42	0	21	14/16
05	**600**	0	50	50	-	20	7	37	17/16
10	**480**	8	83	8	20	4	0	8	16/16

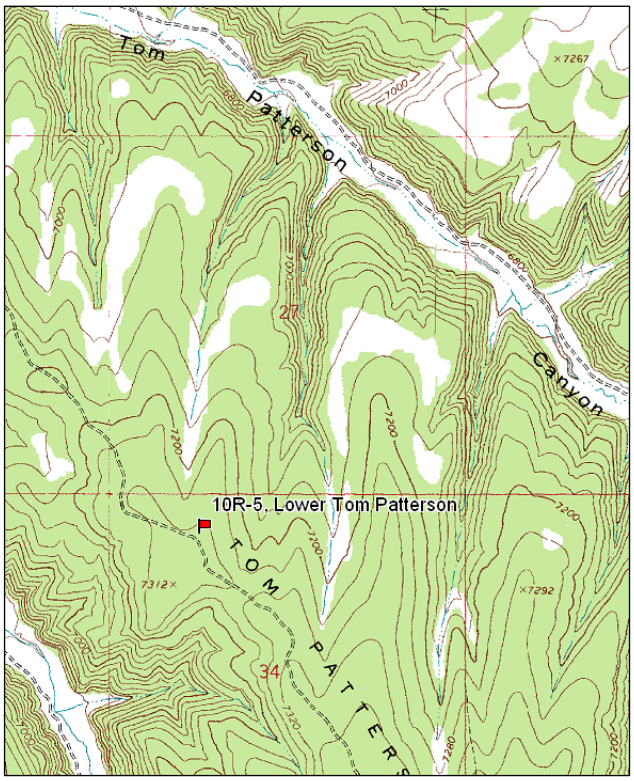
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Ceratoides lanata									
97	**4060**	10	89	1	60	22	3	.49	10/10
00	**2960**	0	82	18	-	35	7	11	8/8
05	**3520**	2	97	1	20	33	51	.56	9/9
10	**2800**	7	92	1	20	31	14	2	9/9
Gutierrezia sarothrae									
97	**280**	7	93	0	-	0	0	0	8/6
00	**100**	0	100	0	-	0	0	0	2/3
05	**400**	0	100	0	-	0	0	0	7/7
10	**680**	15	82	3	-	0	0	3	5/4
Opuntia sp.									
97	**60**	0	100	-	-	0	0	0	5/9
00	**140**	0	100	-	-	0	0	0	2/5
05	**100**	0	100	-	-	0	0	0	4/10
10	**20**	0	100	-	-	0	0	0	4/6
Pediocactus simpsonii									
97	**20**	100	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	0	0	0	-/-
05	**60**	0	100	-	-	0	0	0	1/2
10	**20**	0	100	-	-	0	0	0	-/-

LOWER TOM PATTERSON POINT - TREND STUDY NO. 10R-5-10

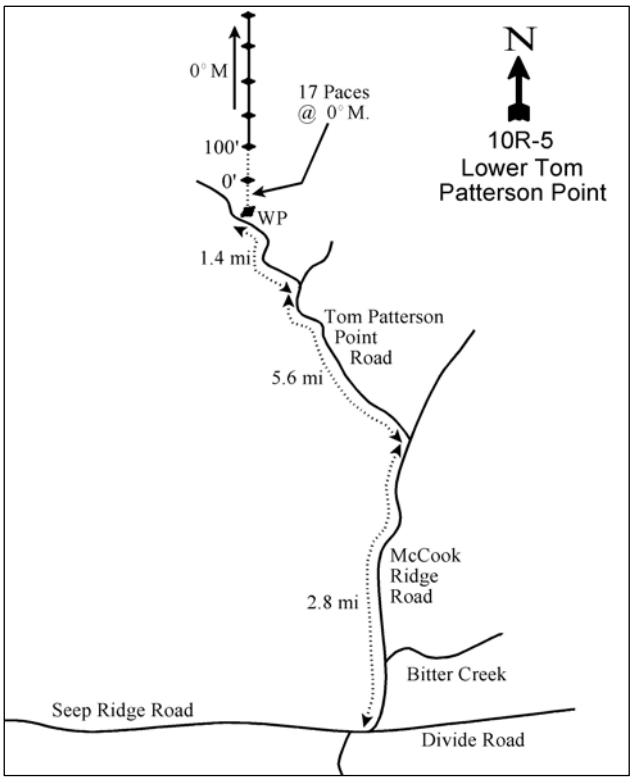
Vegetation Type: Chaining, Burn
Range Type: Substantial Deer Summer, Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper), R034XY322UT
Land Ownership: BLM
Elevation: 7281 ft. (2220 m)
Aspect: North
Slope: 5-7%
Transect bearing: 0° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

Directions:
From the intersection of McCook Ridge Road and Seep Ridge Road travel north on McCook Ridge Road for 2.8 miles. Turn left onto Tom Patterson Point Road and go 5.6 miles to a fork. Take the left fork and travel 1.4 miles to a witness post on the right (east) side of the road. From the witness post walk 17 paces due north to the 0-foot stake.

Map Name: Tom Patterson Canyon



Diagrammatic Sketch:



Township: 14S Range: 24E Section: 28

GPS: NAD 83, UTM 12S 652792 E 4380665 N

LOWER TOM PATTERSON POINT - TREND STUDY NO. 10R-5

Site Information

Site Description: The study is located in an area that was chained in the late 1960's and was burned by a wildfire in the mid-1980's. A water tank is located about a half mile south of the site, with water tanks scattered along this entire point in an attempt to better distribute livestock use. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Sweetwater allotment. Pellet transect data estimated very heavy elk use from 1997 to 2005, but was moderate in 2010. Estimated deer use was light from 1997 to 2005, but was moderate in 2010. Estimated cattle use has been light since 1997 (Table - Pellet Group Data).

Browse: Shrubs are scarce on this site following the fire. Species encountered on the site include small numbers of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), true mountain mahogany (*Cercocarpus montanus*), snowberry (*Symphoricarpos oreophilus*), broom snakeweed (*Gutierrezia sarothrae*), dwarf rabbitbrush (*Chrysothamnus depressus*) and rubber rabbitbrush (*C. nauseosus*). Mahogany plants have shown heavy use and have decreased in density on the site. Mountain big sagebrush had a large increase in density in 2010 due to a large increase in the recruitment of young plants (Table - Browse Characteristics).

Herbaceous Understory: Crested wheatgrass (*Agropyron cristatum*) dominates the site and was sampled in every quadrat since 2005. Other grasses occur only rarely and include: intermediate wheatgrass (*A. intermedium*), sedge (*Carex sp.*), Russian wildrye (*Elymus junceus*), Sandberg bluegrass (*Poa secunda*), needle-and-thread (*Stipa comata*) and smooth brome (*Bromus inermis*). A variety of forbs found on the site offer additional preferred spring and early summer forage. Common species include: thickleaf penstemon (*Penstemon pachyphyllus*), lobeleaf groundsel (*Senecio multilobatus*) and scarlet globe mallow (*Sphaeralcea coccinea*) (Table - Herbaceous Trends).

Soil: Soil on the site is a sandy clay loam with a neutral soil reaction (pH 6.8). Potassium may have limited availability for plant growth and development at just 38 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderate with good vegetation and litter cover (Table - Basic Cover). Some slight pedestaling has occurred in the past although there was no sign of recent erosion and protective ground cover is adequate to protect the soil. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1997 to 2000 - slightly down (-1):** Shrubs were already rare, but the density of mountain big sagebrush and true mountain mahogany decreased. There was no notable cover of true mountain mahogany sampled in 2000.
- **2000 to 2005 - stable (0):** There was a slight increase in the density of mountain big sagebrush, but no true mountain mahogany plants were sampled in the shrub density strip.
- **2005 to 2010 - up (+2):** The density of mountain big sagebrush increased from 160 plants/acre to 1,020 plants/acre due to a large increase in the recruitment of young sagebrush plants. Cover of big sagebrush increased to over 1% for the first time since the study began.

Grass:

- **1997 to 2000 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased from 14% to 18%. There was a significant decrease in crested wheatgrass nested frequency, but crested wheatgrass also provided the increase in cover.
- **2000 to 2005 - slightly up (+1):** The sum of nested frequency of perennial grasses changed little, but cover increased to 36% with a large increase in crested wheatgrass cover.
- **2005 to 2010 - stable (0):** There was little change in perennial grass sum of nested frequency or cover.

Forb:

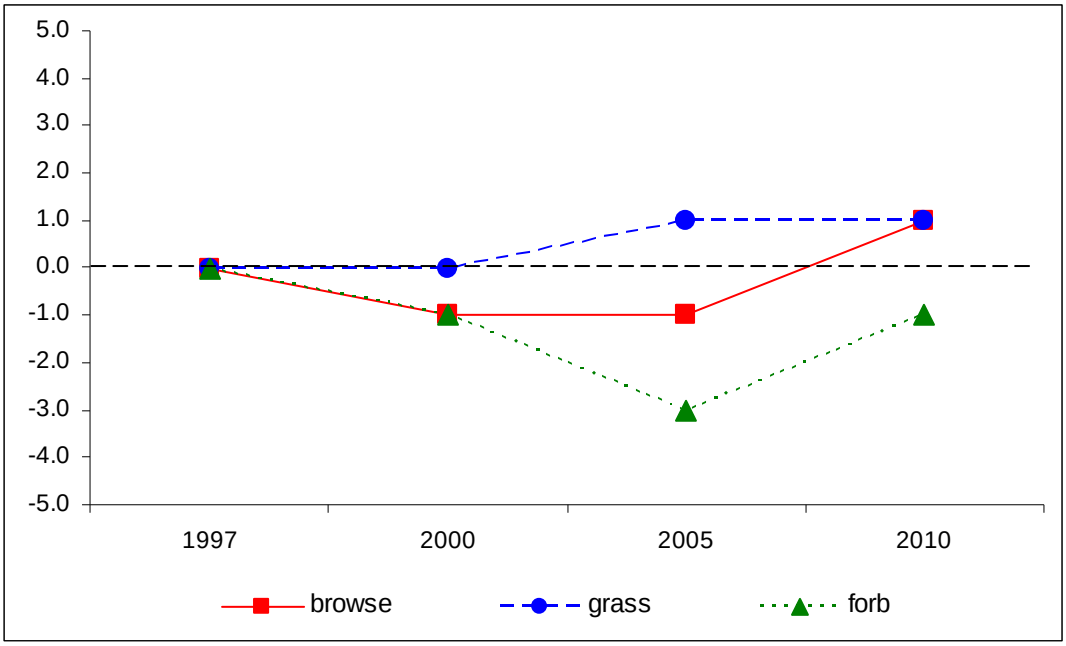
- **1997 to 2000 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 10% and cover decreased from 4% to 3%.
- **2000 to 2005 - down (-2):** There was a 48% decrease in the sum of nested frequency of perennial forbs, though cover remained similar.
- **2005 to 2010 - up (+2):** The perennial forb sum of nested frequency increased by 56% and cover increased to 5%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 10R, study no: 5

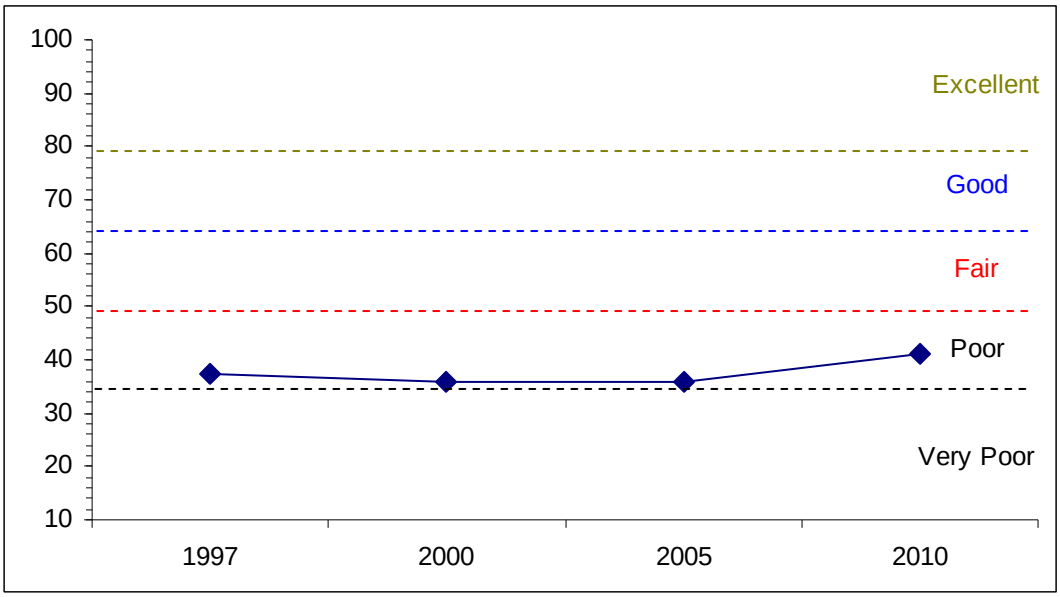
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
97	0.7	0.0	0.0	28.7	0.0	8.0	0.0	**37.4**	Poor
00	0.5	0.0	0.0	30.0	0.0	5.5	0.0	**35.9**	Very Poor-Poor
05	0.7	0.0	0.0	30.0	0.0	5.2	0.0	**35.9**	Very Poor-Poor
10	1.3	0.0	0.0	30.0	0.0	10.0	0.0	**41.3**	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 5



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 10R, Study no: 5



HERBACEOUS TRENDS--
Management unit 10R, Study no: 5

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
G	Agropyron cristatum	$_{b}$434	$_{a}$397	$_{a}$400	$_{ab}$419	13.75	17.73	34.31	32.32
G	Agropyron intermedium	-	5	3	8	-	.03	.03	.69
G	Bromus inermis	3	-	3	5	.03	-	.15	.15
G	Carex sp.	$_{b}$25	$_{b}$28	$_{ab}$14	$_{a}$7	.33	.49	.25	.02
G	Elymus junceus	2	-	2	3	.15	-	.15	.18
G	Poa secunda	$_{ab}$8	$_{a}$8	$_{b}$28	$_{a}$9	.09	.03	.37	.12
G	Stipa comata	$_{a}$-	$_{a}$3	$_{b}$20	$_{a}$3	-	.03	.99	.15
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		472	441	470	454	14.35	18.32	36.27	33.63
Total for Grasses		472	441	470	454	14.35	18.32	36.27	33.63
F	Agoseris glauca	-	-	3	4	-	-	.15	.06
F	Antennaria rosea	$_{ab}$7	$_{b}$14	$_{a}$3	$_{ab}$5	.33	.38	.15	.15
F	Arabis sp.	$_{b}$10	$_{ab}$3	$_{ab}$5	$_{a}$-	.02	.03	.04	-
F	Astragalus convallarius	$_{ab}$4	$_{a}$-	$_{b}$8	$_{b}$11	.06	-	.24	.28
F	Astragalus sp.	$_{ab}$4	$_{b}$13	$_{a}$-	$_{b}$16	.04	.40	-	1.01
F	Astragalus spatulatus	-	-	-	1	-	-	-	.03
F	Astragalus utahensis	-	3	1	8	-	.01	.00	.04
F	Chaenactis douglasii	1	-	-	-	.00	-	-	-
F	Chenopodium fremontii (a)	-	-	4	-	-	-	.01	-
F	Descurainia pinnata (a)	-	-	8	-	-	-	.05	-
F	Erigeron pumilus	-	-	-	3	-	-	-	.03
F	Erigeron sp.	8	7	2	10	.07	.04	.02	.22
F	Eriogonum sp.	-	1	-	-	-	.00	-	-
F	Hedysarum boreale	$_{c}$33	$_{a}$-	$_{b}$13	$_{a}$-	.82	-	.39	-

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
F	Lappula occidentalis (a)	$_{a}$-	$_{a}$-	$_{ab}$4	$_{b}$9	-	-	.01	.07
F	Lesquerella sp.	-	-	-	3	-	-	-	.01
F	Lygodesmia sp.	4	-	10	-	.03	-	.07	-
F	Machaeranthera grindelioides	$_{c}$25	$_{a}$-	$_{ab}$2	$_{bc}$13	.17	-	.01	.05
F	Penstemon pachyphyllus	$_{c}$81	$_{b}$52	$_{a}$1	$_{a}$14	1.23	.74	.01	.34
F	Penstemon sp.	6	-	5	3	.07	-	.03	.18
F	Phlox austromontana	8	12	11	12	.21	.06	.33	1.13
F	Phlox longifolia	-	3	4	-	-	.00	.00	-
F	Salsola iberica (a)	-	-	2	-	-	-	.01	-
F	Senecio multilobatus	$_{b}$46	$_{c}$70	$_{a}$10	$_{a}$16	.24	.48	.21	.22
F	Sphaeralcea coccinea	$_{a}$49	$_{ab}$60	$_{ab}$71	$_{b}$87	.38	.36	.90	1.02
F	Taraxacum officinale	$_{c}$24	$_{b}$9	$_{a}$-	$_{ab}$1	.23	.05	-	.00
F	Townsendia sp.	$_{a}$-	$_{a}$-	$_{ab}$4	$_{b}$13	-	-	.01	.06
F	Tragopogon dubius	$_{b}$15	$_{c}$46	$_{a}$-	18	.03	.15	.00	.18
Total for Annual Forbs		0	0	18	9	0	0	0.07	0.07
Total for Perennial Forbs		325	293	153	238	3.98	2.73	2.60	5.06
Total for Forbs		325	293	171	247	3.98	2.73	2.68	5.13

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

BROWSE TRENDS--
Management unit 10R, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
B	Artemisia tridentata vaseyana	6	2	5	8	.38	.38	.53	1.04
B	Cercocarpus montanus	2	1	0	0	.15	-	-	-
B	Chrysothamnus depressus	1	0	1	1	-	-	-	-
B	Chrysothamnus nauseosus	0	0	2	3	-	-	.01	.15
B	Chrysothamnus viscidiflorus	1	1	2	1	-	-	-	.00
B	Gutierrezia sarothrae	2	10	12	30	.01	.45	.27	.72
B	Symphoricarpos oreophilus	2	2	0	0	.00	.00	-	-
Total for Browse		14	16	22	43	0.55	0.84	0.81	1.93

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 5

Species	Percent Cover	
	'05	'10
Artemisia tridentata vaseyana	.38	1.00
Chrysothamnus nauseosus	-	.11
Chrysothamnus viscidiflorus	.10	-
Gutierrezia sarothrae	.55	.15

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 5

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	1.9	2.1
Cercocarpus montanus	1.5	1.6

BASIC COVER--
Management unit 10R, Study no: 5

Cover Type	Average Cover %			
	'97	'00	'05	'10
Vegetation	20.14	28.12	40.93	41.33
Rock	1.58	.43	1.96	.48
Pavement	7.10	2.22	3.55	4.92
Litter	24.71	33.69	18.95	43.23
Cryptogams	1.08	2.92	.58	.37
Bare Ground	27.13	35.46	46.19	26.10

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 5, Study Name: Lower Tom Patterson Point

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.9	6.8	48.0	28.8	23.2	3.1	7.4	38.4	2.0

PELLET GROUP DATA--
Management unit 10R, Study no: 5

Type	Quadrat Frequency			
	'97	'00	'05	'10
Rabbit	3	5	17	5
Elk	70	58	80	40
Deer	2	5	19	19
Cattle	4	3	1	3

Days use per acre (ha)			
'97	'00	'05	'10
-	-	-	-
143 (353)	101 (250)	106 (263)	54 (132)
1 (3)	1 (2)	5 (12)	70 (174)
22 (54)	14 (35)	5 (13)	13 (32)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 5

		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									
97	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	9/13
10	**0**	0	0	-	-	0	0	0	6/12

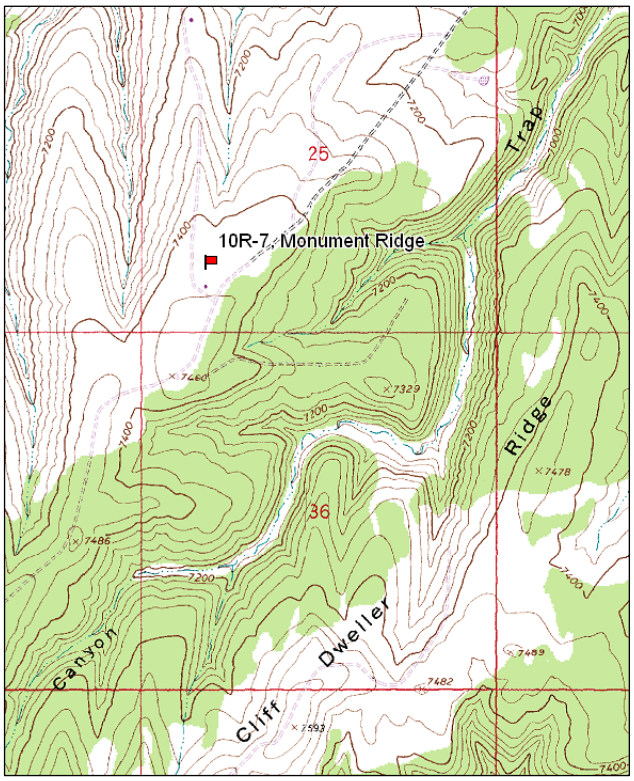
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana									
97	**180**	56	44	-	60	11	0	0	26/31
00	**40**	50	50	-	40	0	0	0	33/35
05	**160**	50	50	-	700	0	38	0	25/37
10	**1020**	88	12	-	180	4	2	0	24/36
Cercocarpus montanus									
97	**40**	0	100	-	-	100	0	0	38/35
00	**20**	0	100	-	-	0	100	0	37/35
05	**0**	0	0	-	-	0	0	0	33/30
10	**0**	0	0	-	-	0	0	0	29/29
Chrysothamnus depressus									
97	**20**	0	100	-	-	0	0	0	7/16
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	0	100	-	-	100	0	0	5/9
10	**20**	0	100	-	-	0	0	0	5/13
Chrysothamnus nauseosus									
97	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	14/17
05	**40**	100	0	-	-	0	0	0	25/28
10	**60**	33	67	-	-	100	0	0	24/24
Chrysothamnus viscidiflorus									
97	**20**	0	100	-	-	0	0	0	8/14
00	**20**	0	100	-	-	0	0	0	-/-
05	**40**	0	100	-	-	50	50	0	13/15
10	**20**	100	0	-	-	0	0	0	12/15
Gutierrezia sarothrae									
97	**40**	0	100	0	-	0	0	0	7/6
00	**260**	15	85	0	20	0	0	0	7/9
05	**1220**	2	98	0	-	26	3	0	7/8
10	**1460**	14	82	4	-	0	0	3	5/8
Opuntia sp.									
97	**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	1/3
Symphoricarpos oreophilus									
97	**40**	0	50	50	-	0	0	0	34/36
00	**40**	0	50	50	-	100	0	0	-/-
05	**0**	0	0	0	-	0	0	0	31/42
10	**0**	0	0	0	-	0	0	0	35/43

MONUMENT RIDGE - TREND STUDY NO. 10R-7-10

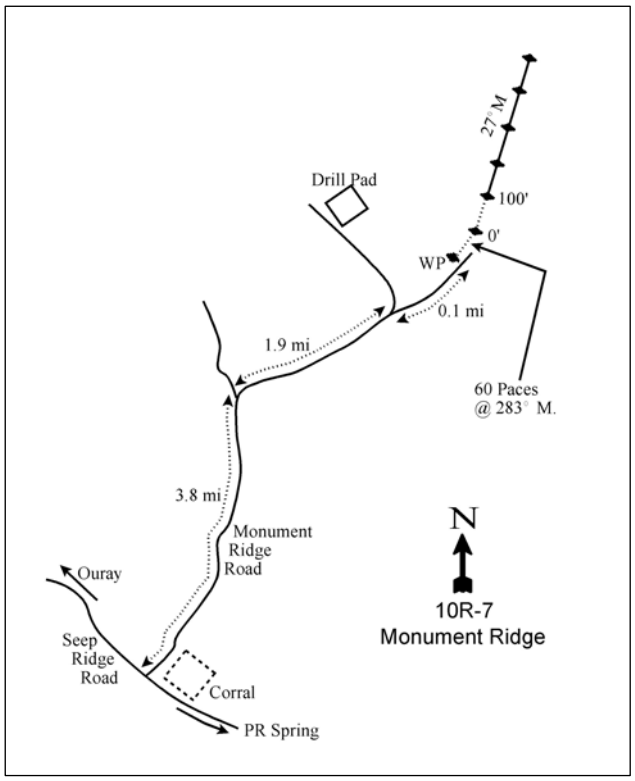
Vegetation Type: Chaining, Burn
Range Type: Substantial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper), R034XY322UT
Land Ownership: BLM
Elevation: 7200 ft. (2195 m)
Aspect: North
Slope: 1-2%
Transect bearing: 27° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

Directions:
From Seep Ridge Road turn north onto the Monument Ridge Road and drive 3.8 miles to a fork. Take the right fork and travel 1.9 miles to a turnoff to a drill pad. Go straight past this turnoff 0.1 miles to a witness post on the left (north) side of the road. From the witness post walk 60 paces at 283°M to the 0-foot stake which is marked with browse tag #88 DWR.

Map Name: Seep Canyon



Diagrammatic Sketch:



Township: 14S Range: 23E Section: 25

GPS: NAD 83, UTM 12S 646182 E 4381204 N

MONUMENT RIDGE - TREND STUDY NO. 10R-7

Site Information

Site Description: The study is located about two and a half miles from the Monument Ridge Road at the head of Monument Canyon, which drains into Sweetwater Canyon. The area was chained and seeded in the 1960's. In the 1980's, a wild fire burned through the area removing most of the chaining debris and shrub cover, though pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees are becoming reestablished. Energy development is common in the area and a drill pad is located to the southwest of the site. Grazing in the area is administered by the Bureau of Land Management as part of the Sweetwater allotment. The area is used heavily by elk in the fall and spring and pellet group transect data estimated heavy use by elk from 1997 to 2005, but more moderate use by elk in 2010. Estimated deer and cattle use has been light over the course of the study (Table - Pellet Group Data).

Browse: Preferred browse are limited to a few scattered mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), true mountain mahogany (*Cercocarpus montanus*) and rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *hololeucus*). Preferred browse species are not abundant enough to provide winter forage for wildlife species. Broom snakeweed (*Gutierrezia sarothrae*) and rubber rabbitbrush have had the highest cover for browse species (Table - Browse Trends). Although broom snakeweed is quite dense, it does not dominate the site (Table - Browse Characteristics). Pinyon and juniper trees are scattered over the site.

Herbaceous Understory: The site is dominated by crested wheatgrass (*Agropyron cristatum*) which has steadily increased in cover since 1997. Several other perennial grasses occur on the site, but in small numbers. Forbs are diverse but only a few species are abundant. Tufted milkvetch (*Astragalus spatulatus*) and scarlet globemallow (*Sphaeralcea coccinea*) are the most abundant forbs (Table - Herbaceous Trends).

Soil: The soil is a loam texture with a neutral soil reaction (pH 7.0). Phosphorus may have limited availability for plant growth and development at 5.0 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately high, but there is good protective ground cover provided by rock and pavement cover. Most vegetation and littler is provided by crested wheatgrass (Table - Basic Cover). The soil erosion condition was classified as slight in 2005 due to pedestaling and some shallow rills. The soil erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **1997 to 2000 - stable (0):** Preferred browse species are limited on the site and the weedy species broom snakeweed is the dominant browse species.
- **2000 to 2005 - stable (0):** There was little change in any of the preferred browse populations.
- **2005 to 2010 - stable (0):** The density of mountain big sagebrush doubled, but density remains low at 300 plants/acre and cover remains low at less than 1%.

Grass:

- **1997 to 2000 - stable (0):** The sum of nested frequency of perennial grasses decreased with a significant decrease in the nested frequency of crested wheatgrass, but cover increased from 13% to 17%.
- **2000 to 2005 - slightly up (+1):** There was little change in the sum of nested frequency of perennial grasses, but cover increased to 27%.
- **2005 to 2010 - slightly up (+1):** The perennial grass sum of nested frequency remained similar, but cover increased to 34%.

Forb:

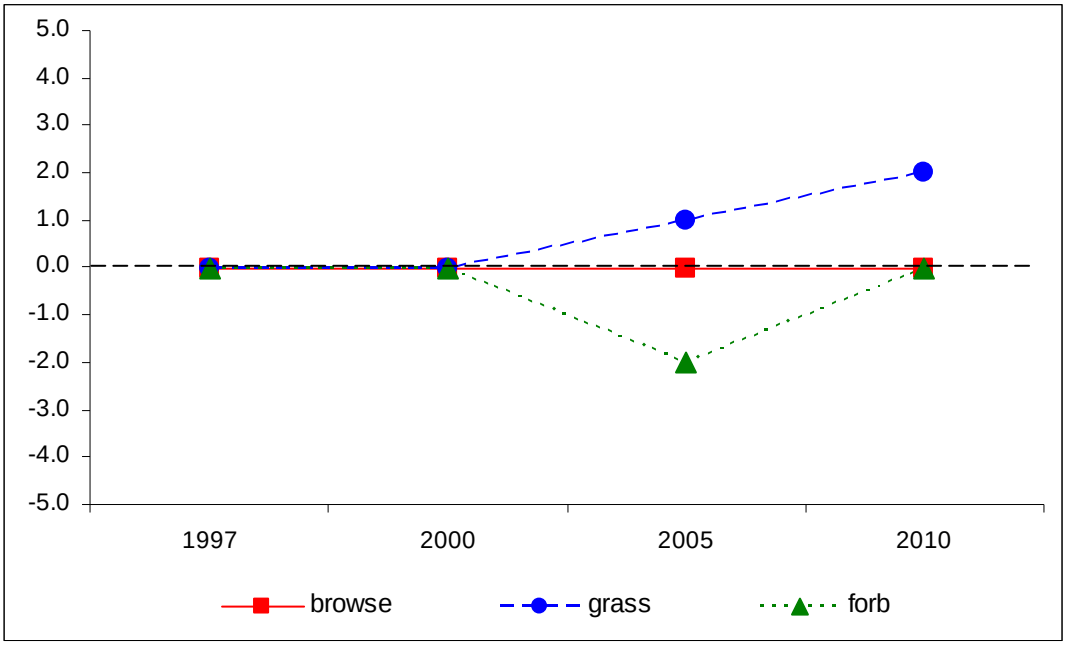
- **1997 to 2000 - stable (0):** The sum of nested frequency of perennial forbs decreased by 12%, but cover increased from 4% to 8%.
- **2000 to 2005 - down (-2):** There was a 52% decrease in the sum of nested frequency of perennial forbs and cover decreased to 2%. There was a significant decrease in the nested frequency of tufted milkvetch with a subsequent decrease in cover.
- **2005 to 2010 - up (+2):** The perennial forb sum of nested frequency increased 36%, though there was little change in cover.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 10R, study no: 7

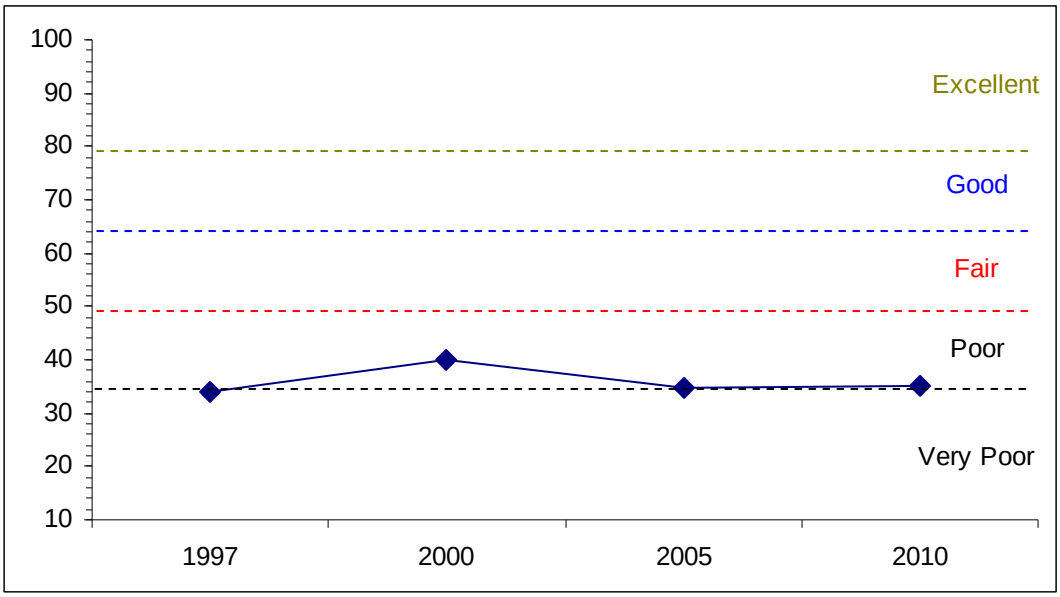
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
97	0.4	0.0	0.0	25.3	0.0	8.4	0.0	**34.1**	Very Poor-Poor
00	0.1	0.0	0.0	30.0	0.0	10.0	0.0	**40.1**	Poor
05	0.2	0.0	0.0	30.0	0.0	4.7	0.0	**34.9**	Very Poor-Poor
10	0.6	0.0	0.0	30.0	0.0	4.7	0.0	**35.3**	Very Poor-Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 7



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 10R, Study no: 7



HERBACEOUS TRENDS--
Management unit 10R, Study no: 7

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
G	Agropyron cristatum	b444	a405	a410	a391	12.07	16.14	26.90	33.15
G	Agropyron dasystachyum	5	2	-	11	.01	.03	-	.42
G	Bouteloua gracilis	5	-	-	-	.04	-	-	-
G	Carex sp.	b13	b20	b14	a-	.24	.30	.13	-
G	Oryzopsis hymenoides	ab6	a2	b15	ab12	.06	.03	.26	.10
G	Poa fendleriana	b22	a-	ab7	ab13	.19	-	.02	.36
G	Poa secunda	3	1	1	13	.01	.00	.00	.18
G	Stipa comata	5	-	3	3	.03	-	.15	.15
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		503	430	450	443	12.67	16.52	27.46	34.38
Total for Grasses		503	430	450	443	12.67	16.52	27.46	34.38
F	Alyssum alyssoides (a)	a-	a-	a-	b25	-	-	-	.07
F	Antennaria rosea	2	13	5	8	.01	.08	.07	.02
F	Arabis sp.	b37	a17	a2	a6	.12	.06	.00	.01
F	Arenaria fendleri	a-	a5	a2	b36	-	.03	.01	.45
F	Artemisia dracunculus	a5	b26	ab12	a7	.09	.61	.07	.18
F	Aster sp.	13	-	2	2	.19	-	.00	.03
F	Astragalus spatulatus	b155	b162	a53	a37	2.37	5.93	1.18	.50
F	Cryptantha sp.	7	-	-	-	.02	-	-	-
F	Descurainia pinnata (a)	3	-	-	-	.01	-	-	-
F	Erigeron sp.	b46	a17	a11	a6	.45	.04	.09	.06
F	Hymenoxys acaulis	-	7	1	4	-	.01	.00	.01
F	Machaeranthera grindelioides	a-	b9	a-	a-	-	.05	.03	.03
F	Penstemon pachyphyllus	b28	b28	a-	a-	.13	.41	-	-

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
F	Phlox longifolia	1	2	-	5	.00	.00	-	.03
F	Schoencrambe linifolia	$_{ab}$10	$_{a}$-	$_{ab}$3	$_{b}$11	.04	-	.00	.05
F	Senecio multilobatus	-	3	-	1	-	.01	-	.03
F	Sphaeralcea coccinea	$_{b}$106	$_{a}$67	$_{ab}$81	$_{b}$110	.74	.36	.89	.90
F	Taraxacum officinale	-	1	-	-	-	.00	-	-
F	Tragopogon dubius	-	3	-	1	-	.01	-	.00
Total for Annual Forbs		3	0	0	25	0.00	0	0	0.07
Total for Perennial Forbs		410	360	172	234	4.18	7.65	2.36	2.34
Total for Forbs		413	360	172	259	4.19	7.65	2.36	2.41

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

BROWSE TRENDS--
Management unit 10R, Study no: 7

Type	Species	Strip Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
B	Artemisia frigida	14	24	12	14	.14	.09	.09	.12
B	Artemisia tridentata vaseyana	6	6	5	10	.18	.03	.07	.36
B	Cercocarpus montanus	3	2	2	2	-	-	-	-
B	Chrysothamnus depressus	1	0	0	0	.00	-	-	-
B	Chrysothamnus nauseosus hololeucus	1	5	3	3	.30	.76	1.25	1.01
B	Gutierrezia sarothrae	97	96	87	96	2.33	1.76	1.46	5.03
B	Opuntia sp.	0	0	1	0	-	-	.03	-
Total for Browse		122	133	110	125	2.96	2.65	2.91	6.53

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 7

Species	Percent Cover	
	'05	'10
Artemisia frigida	.05	.03
Artemisia tridentata vaseyana	.26	.65
Cercocarpus montanus	-	.01
Chrysothamnus nauseosus hololeucus	.26	1.14
Gutierrezia sarothrae	1.39	3.26

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 7

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	2.7	1.7
Cercocarpus montanus	1.8	1.9

BASIC COVER--
Management unit 10R, Study no: 7

Cover Type	Average Cover %			
	'97	'00	'05	'10
Vegetation	23.26	32.34	31.30	45.77
Rock	7.60	7.85	6.38	7.92
Pavement	8.05	1.02	3.75	3.73
Litter	24.22	23.26	28.67	33.98
Cryptogams	3.00	6.57	.29	.03
Bare Ground	13.55	26.27	39.65	29.59

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 7, Study Name: Monument Ridge

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.5	7.0	40.0	35.4	24.6	3.5	5.0	115.2	3.3

PELLET GROUP DATA--
Management unit 10R, Study no: 7

Type	Quadrat Frequency			
	'97	'00	'05	'10
Rabbit	1	10	53	17
Elk	53	65	78	36
Deer	2	5	25	17
Cattle	1	1	11	8

Days use per acre (ha)			
'97	'00	'05	'10
-	-	-	-
166 (410)	72 (177)	94 (231)	34 (84)
-	11 (29)	9 (23)	21 (51)
20 (50)	-	12 (29)	8 (20)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 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)
Artemisia frigida									
97	**380**	42	53	5	40	0	0	5	7/8
00	**620**	42	55	3	40	0	0	3	3/5
05	**380**	26	74	0	40	0	0	0	4/4
10	**700**	17	83	0	60	3	23	0	4/7
Artemisia nova									
97	**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	7/18
Artemisia tridentata vaseyana									
97	**120**	50	50	-	20	33	0	0	15/22
00	**160**	38	63	-	-	50	13	0	13/21
05	**140**	0	100	-	80	14	57	0	16/26
10	**300**	20	80	-	-	27	47	0	16/27

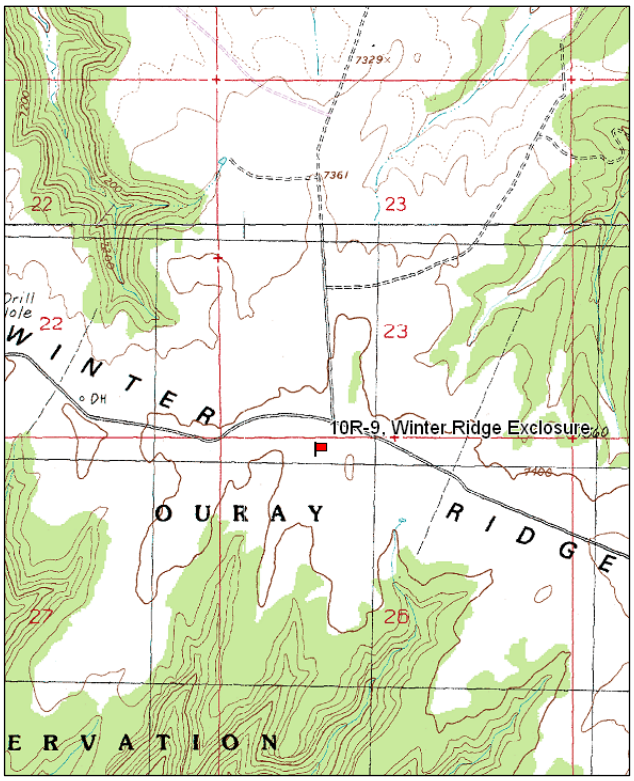
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Cercocarpus montanus									
97	**60**	0	67	33	-	0	100	0	23/37
00	**40**	0	0	100	-	50	50	50	39/43
05	**60**	33	33	33	-	0	100	0	33/39
10	**60**	33	33	33	-	0	67	0	28/37
Chrysothamnus depressus									
97	**20**	0	100	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus nauseosus hololeucus									
97	**20**	0	0	100	-	0	0	0	15/20
00	**120**	67	0	33	-	0	0	17	24/33
05	**80**	0	100	0	-	0	25	0	22/26
10	**80**	25	75	0	-	50	0	0	22/26
Gutierrezia sarothrae									
97	**15900**	19	81	0	140	0	0	0	5/5
00	**14320**	15	81	4	180	0	0	2	4/5
05	**11680**	29	69	1	2220	0	0	1	5/6
10	**16400**	23	77	0	1460	3	0	.24	5/6
Opuntia sp.									
97	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	4/3
10	**0**	0	0	-	-	0	0	0	5/13
Purshia tridentata									
97	**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	16/49

WINTER RIDGE EXCLOSURE OUT - TREND STUDY NO. 10R-9-10

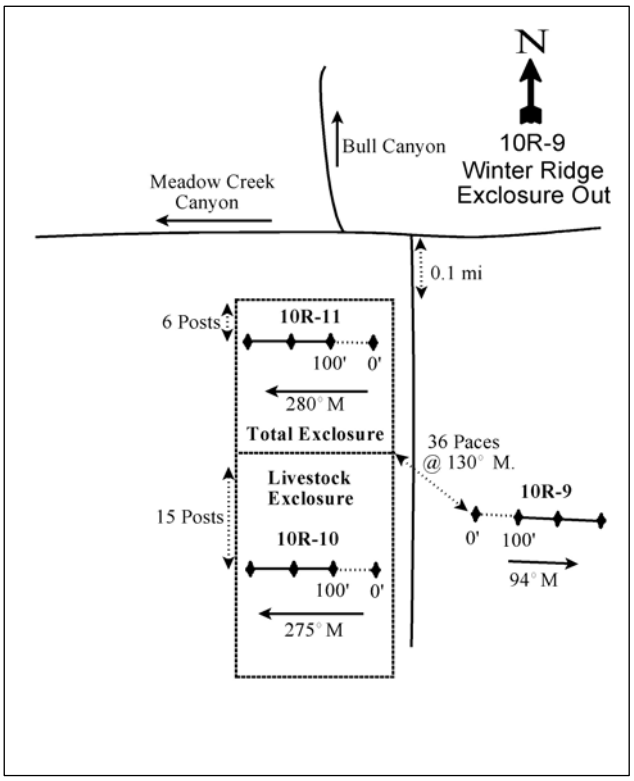
Vegetation Type: Mountain Big Sagebrush
Range Type: Substantial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Loam (Wyoming Big Sagebrush), R034XY306UT
Land Ownership: BLM
Elevation: 7420 ft. (2262 m)
Aspect: West
Slope: 4%
Transect bearing: 94° magnetic
Belt placement: line 1 (11 & 71ft), line 2 (34 & 95ft), line 3 (59ft).

Directions:
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 130°M to the 0-foot stake which is marked by browse tag #63.

Map Name: Tenmile Canyon North



Diagrammatic Sketch:



Township: 15S Range: 21E Section: 26

GPS: NAD 83, UTM 12S 625704 E 4372166 N

WINTER RIDGE EXCLOSURE OUT - TREND STUDY NO. 10R-9

Site Information

Site Description: The study is located outside of the exclosure complex on Winter Ridge that was constructed in 1964. The area is comprised of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass in association with scattered pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). The area is used as winter range for deer and elk. Grazing in the area is managed by the Bureau of Land Management as part of the Horse Point allotment. Pellet group data has estimated moderate use by elk from 1997 to 2005, with lighter use in 2010. Estimated deer use has been light since 1997. Estimated cattle use has been mostly light with more moderate use in 1997 and estimated horse use has been light since 2005 (Table - Pellet Group Data).

Browse: Mountain big sagebrush is the most abundant browse species, but has decreased in cover since 2000. Broom snakeweed (*Gutierrezia sarothrae*) provided as much cover as sagebrush in 2005, but has been less abundant in all other sample years (Table - Browse Trends). The sagebrush population is a mixture of mature and decadent plants with moderate to heavy use over the sample years. Recruitment of young sagebrush has been mostly marginal, but was very good in 2010. Other browse species encountered in low densities include dwarf rabbitbrush (*Chrysothamnus depressus*), stickyleaf low rabbitbrush (*C. viscidiflorus* ssp. *viscidiflorus*) and winterfat (*Ceratoides lanata*) (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are diverse and abundant on the site. Thickspike wheatgrass (*Agropyron dasystachyum*), mutton bluegrass (*Poa fendleriana*), Sandberg bluegrass (*P. secunda*), blue grama (*Bouteloua gracilis*), prairie junegrass (*Hilaria jamesii*) and needle-and-thread (*Stipa comata*) are all common on the site. There was a change in composition after 2000 with a decrease in the two bluegrass species and an increase in prairie junegrass and needle-and-thread. Forbs are diverse, but most species provide little cover. Desert phlox (*Phlox austromontana*) and scarlet globemallow (*Sphaeralcea coccinea*) have been the most abundant forbs. Most of the forbs associated with this site are low growing species, and although they afford some protection to the soil, they offer little forage value. Other prevalent species include rose pussytoes (*Antennaria rosea*), mat penstemon (*Penstemon caespitosus*) and longleaf phlox (*Phlox longifolia*) (Table - Herbaceous Trends).

Soil: The soil has a loam texture with a neutral soil reaction (pH 7.2). Phosphorus and potassium may have limited availability for plant growth and development at 5.4 ppm and 3.2 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately high, but vegetation and litter cover are adequate to provide good protective cover (Table - Basic Cover). Soil pedestaling is evident around the base of shrubs, indicative of soil loss in the past. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1997 to 2000 - stable (0):** The density of mountain big sagebrush increased by 15% from 6,920 plants/acre to 7,960 plants/acre, and cover increased from 13% to 16%. However, decadence and poor vigor of sagebrush doubled from 24% to 51% decadence and from 10% to 20% poor vigor. Recruitment of young sagebrush plants remains low.
- **2000 to 2005 - down (-2):** Mountain big sagebrush density decreased by 35% to 5,140 plants/acre, and cover decreased to 9%. Decadence decreased slightly, but remained high at 42%. Poor vigor of sagebrush increased slightly to 27% and recruitment of young sagebrush remained very low. Broom snakeweed cover was higher than sagebrush cover.
- **2005 to 2010 - stable (0):** There was little change in the density of mountain big sagebrush, though cover decreased to 6%. Decadence of sagebrush decreased, but is still high at 34%, and poor vigor

decreased to 11%. Recruitment of young sagebrush increased to 25% of the population. Broom snakeweed decreased in cover back to 2000 levels.

Grass:

- **1997 to 2000 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased from 11% to 16%.
- **2000 to 2005 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 10%, but cover remained similar. There was a change in composition with a significant decrease in the nested frequency of the two bluegrass species and a significant increase in the nested frequency of needle-and-thread.
- **2005 to 2010 - stable (0):** The perennial grass sum of nested frequency changed little, but cover decreased from 17% to 14%. There was a significant increase in the nested frequency of prairie junegrass.

Forb:

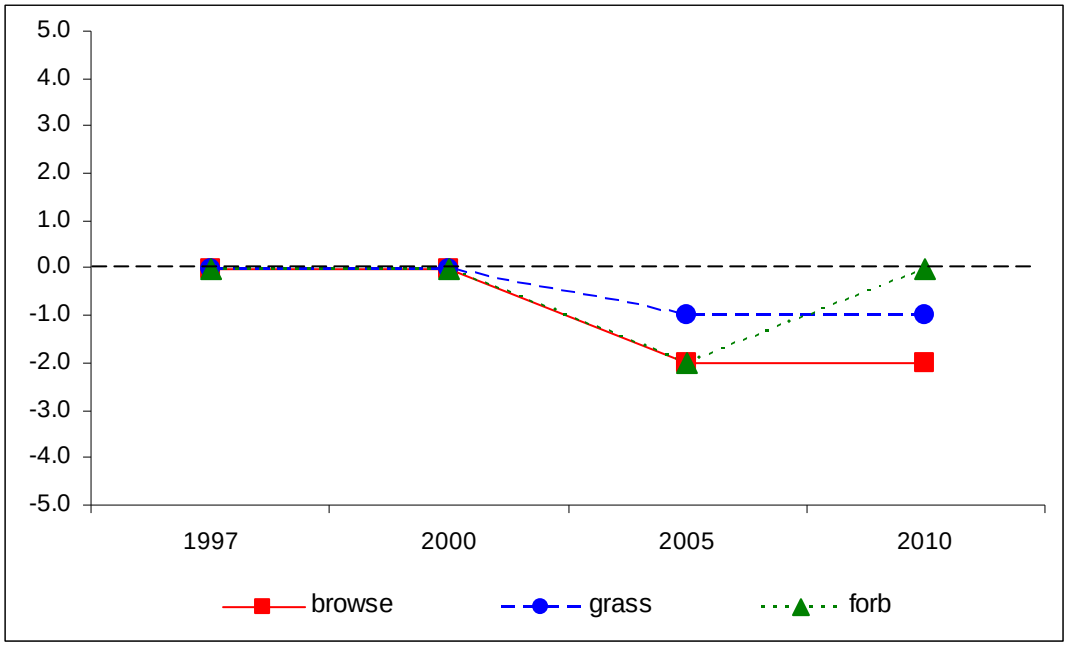
- **1997 to 2000 - stable (0):** The perennial forb sum of nested frequency changed little, but cover increased slightly from 5% to 6%.
- **2000 to 2005 - down (-2):** There was a 51% decrease in the sum of nested frequency of perennial forbs and cover decreased to 4%.
- **2005 to 2010 - up (+2):** The sum of nested frequency of perennial forbs increased by 46%, though there was little change in cover.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 10R, study no: 9

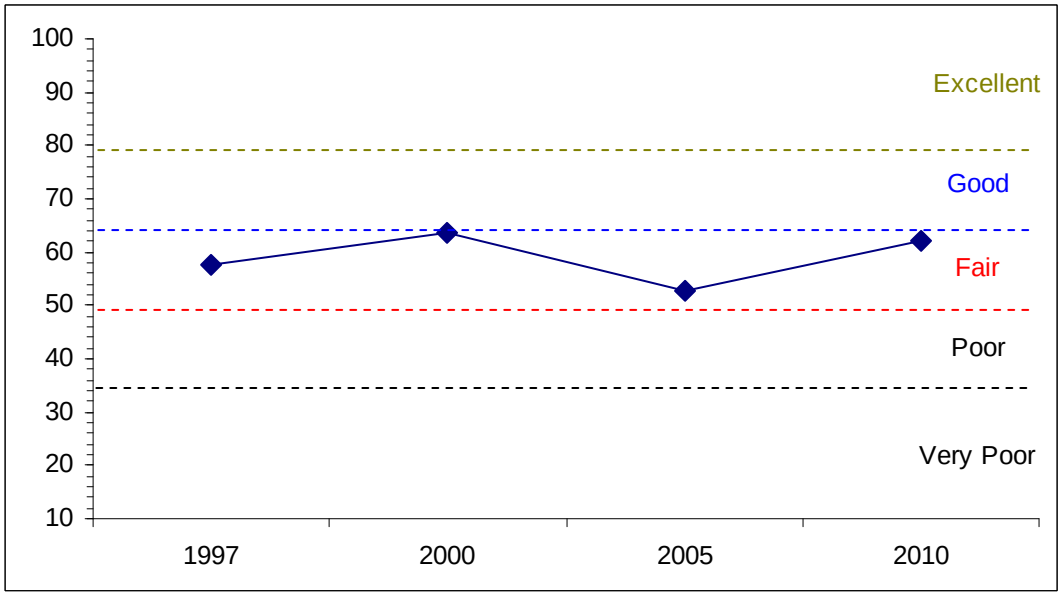
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
97	16.4	7.9	1.6	21.7	0.0	10.0	0.0	**57.5**	Fair
00	19.7	-0.2	4.1	30.0	0.0	10.0	0.0	**63.6**	Fair-Good
05	11.6	2.5	1.5	30.0	0.0	7.2	0.0	**52.8**	Fair
10	7.8	5.4	11.8	28.6	0.0	8.6	0.0	**62.3**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 9



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 10R, Study no: 9



HERBACEOUS TRENDS--
Management unit 10R, Study no: 9

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
G	Agropyron dasystachyum	$_{b}$340	$_{b}$324	$_{ab}$296	$_{a}$247	3.00	4.00	4.88	3.19
G	Bouteloua gracilis	$_{a}$26	$_{ab}$37	$_{ab}$39	$_{b}$59	.93	1.74	2.40	1.58
G	Koeleria cristata	$_{b}$152	$_{a}$45	$_{a}$84	$_{b}$186	1.75	.48	1.77	4.28
G	Poa fendleriana	$_{b}$171	$_{c}$249	$_{b}$184	$_{a}$79	2.79	5.97	3.26	.78
G	Poa secunda	$_{b}$191	$_{c}$251	$_{a}$43	$_{a}$79	2.06	3.75	.50	.55
G	Stipa comata	$_{b}$56	$_{a}$11	$_{c}$177	$_{c}$202	.26	.07	4.30	3.90
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		936	917	823	852	10.83	16.03	17.12	14.31
Total for Grasses		936	917	823	852	10.83	16.03	17.12	14.31
F	Antennaria rosea	$_{c}$28	$_{bc}$25	$_{a}$1	$_{d}$7	.53	.32	.00	.06
F	Arabis sp.	$_{b}$17	$_{a}$2	$_{a}$1	$_{a}$-	.03	.00	.00	-
F	Arenaria fendleri	-	3	-	2	-	.00	-	.00
F	Astragalus convallarius	12	10	9	19	.02	.05	.08	.29
F	Astragalus lentiginosus	-	-	1	-	-	-	.00	-
F	Balsamorhiza sagittata	-	-	-	5	-	-	-	.03
F	Castilleja flava	-	-	-	8	-	-	-	.04
F	Castilleja linariaefolia	7	3	-	-	.04	.00	-	.00
F	Crepis acuminata	4	-	1	1	.03	-	.03	.00
F	Cryptantha sp.	4	-	6	7	.04	-	.04	.02
F	Erigeron eatonii	$_{b}$30	$_{b}$16	$_{a}$-	$_{a}$6	.06	.06	-	.05
F	Erigeron pumilus	$_{a}$-	$_{c}$48	$_{b}$14	$_{b}$21	-	.19	.14	.17
F	Eriogonum alatum	-	-	4	2	-	-	.03	.00
F	Hymenoxys acaulis	-	-	6	13	-	-	.06	.21
F	Lesquerella sp.	22	13	19	15	.10	.20	.06	.07
F	Lithospermum sp.	-	2	-	-	-	.00	-	-
F	Lygodesmia grandiflora	1	-	-	-	.03	-	-	-
F	Machaeranthera grindelioides	-	-	2	2	-	-	.03	.15
F	Penstemon caespitosus	$_{b}$64	$_{b}$54	$_{a}$-	$_{a}$6	1.02	.94	-	.07
F	Petradoria pumila	-	3	-	-	-	.03	-	-
F	Phlox austromontana	$_{b}$190	$_{b}$228	$_{a}$65	$_{a}$86	2.20	3.54	.62	1.12
F	Phlox longifolia	$_{b}$56	$_{a}$22	$_{a}$6	$_{b}$41	.15	.06	.02	.14
F	Physaria acutifolia	-	3	-	-	-	.15	-	-
F	Sphaeralcea coccinea	$_{a}$78	$_{a}$104	$_{b}$126	$_{b}$138	.70	.61	2.48	1.80
F	Townsendia sp.	-	-	4	4	-	-	.01	.02
F	Tragopogon dubius	-	-	-	3	-	-	-	.00
Total for Annual Forbs		0	0	0	0	0	0	0	0
Total for Perennial Forbs		513	536	265	386	4.98	6.19	3.62	4.30
Total for Forbs		513	536	265	386	4.98	6.19	3.62	4.30

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	'10	'97	'00	'05	'10
B	Artemisia tridentata vaseyana	94	98	91	89	12.95	15.57	9.22	5.88
B	Ceratoides lanata	1	2	3	3	.03	-	.03	.03
B	Chrysothamnus depressus	6	7	4	8	.16	.19	.06	.36
B	Chrysothamnus viscidiflorus viscidiflorus	0	0	0	4	-	.00	-	.00
B	Gutierrezia sarothrae	30	75	81	63	.16	2.52	10.31	1.21
B	Pediocactus simpsonii	6	8	8	3	.01	.01	-	-
B	Pinus edulis	0	2	2	2	.03	-	.15	.38
B	Tetradymia canescens	0	1	0	0	-	-	-	-
Total for Browse		137	193	189	172	13.34	18.30	19.78	7.88

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 9

Species	Percent Cover	
	'05	'10
Artemisia tridentata vaseyana	9.25	9.53
Chrysothamnus depressus	.08	.16
Chrysothamnus viscidiflorus viscidiflorus	-	.06
Gutierrezia sarothrae	13.08	1.85
Pinus edulis	-	.41

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 9

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	1.9	1.2

BASIC COVER--
Management unit 10R, Study no: 9

Cover Type	Average Cover %			
	'97	'00	'05	'10
Vegetation	31.92	40.52	37.43	35.50
Rock	.11	.04	.05	.00
Pavement	.54	.18	.07	.01
Litter	25.17	33.08	29.99	42.45
Cryptogams	15.88	12.26	1.79	.41
Bare Ground	31.46	35.23	42.84	34.21

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 9, Study Name: Winter Ridge Exclosure Outside

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.4	7.2	35.6	38.8	25.6	1.4	5.4	3.2	0.5

PELLET GROUP DATA--
Management unit 10R, Study no: 9

Type	Quadrat Frequency			
	'97	'00	'05	'10
Rabbit	14	5	20	7
Horse	-	-	5	9
Elk	24	15	24	10
Deer	4	9	9	-
Cattle	2	3	8	4

Days use per acre (ha)			
'97	'00	'05	'10
-	-	-	-
-	-	5 (13)	4 (10)
44 (109)	22 (55)	32 (79)	1 (3)
2 (5)	2 (5)	2 (5)	13 (33)
30 (74)	19 (47)	7 (16)	2 (5)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 9

		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									
97	**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	9/7
Artemisia tridentata vaseyana									
97	**6920**	3	73	24	40	53	25	10	21/27
00	**7960**	8	40	51	60	44	30	20	20/22
05	**5140**	3	56	42	1100	49	9	27	19/23
10	**5080**	25	41	34	600	42	26	11	20/25
Ceratoides lanata									
97	**20**	0	100	-	-	0	0	0	6/6
00	**40**	0	100	-	-	0	100	0	4/5
05	**80**	0	100	-	-	0	100	0	3/4
10	**80**	25	75	-	-	25	0	0	5/8
Chrysothamnus depressus									
97	**260**	15	85	0	-	0	0	0	3/7
00	**420**	24	62	14	-	0	5	10	3/7
05	**280**	0	86	14	-	100	0	0	3/7
10	**380**	0	100	0	-	0	0	0	5/8
Chrysothamnus viscidiflorus viscidiflorus									
97	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**140**	71	29	-	-	0	0	0	7/7
Gutierrezia sarothrae									
97	**1440**	11	89	0	-	0	0	0	5/6
00	**19460**	28	72	0	1140	0	0	0	4/4
05	**29480**	13	87	0	520	0	0	.06	7/9
10	**8360**	53	46	1	880	0	0	1	5/5

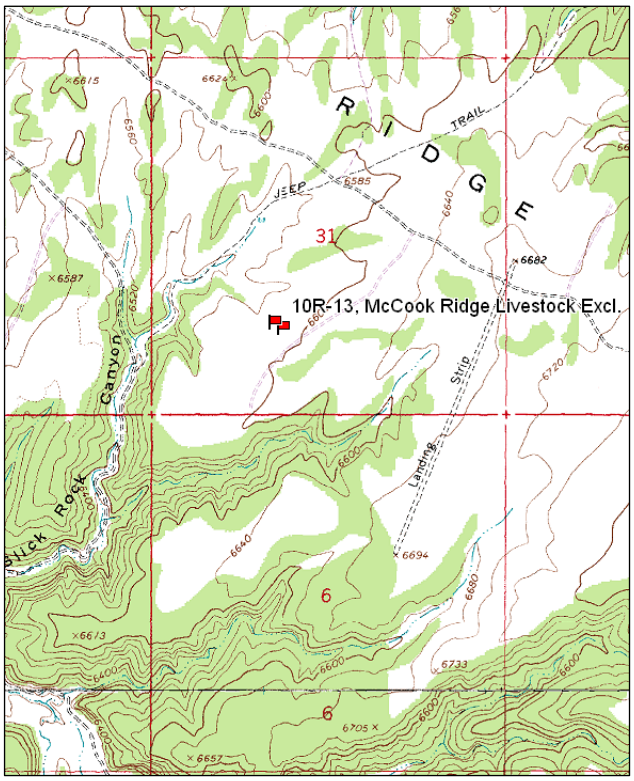
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
97	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	4/5
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Pediocactus simpsonii									
97	**120**	17	83	-	-	0	0	0	1/3
00	**200**	50	50	-	-	0	0	0	1/2
05	**300**	0	100	-	-	0	0	0	1/2
10	**60**	67	33	-	-	0	0	0	1/2
Pinus edulis									
97	**0**	0	0	-	-	0	0	0	-/-
00	**40**	100	0	-	-	0	0	0	-/-
05	**40**	100	0	-	-	0	0	0	-/-
10	**40**	100	0	-	-	0	0	0	-/-
Tetradymia canescens									
97	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-

LOWER MCCOOK RIDGE LIVESTOCK EXCLOSURE - TREND STUDY NO. 10R-13-10

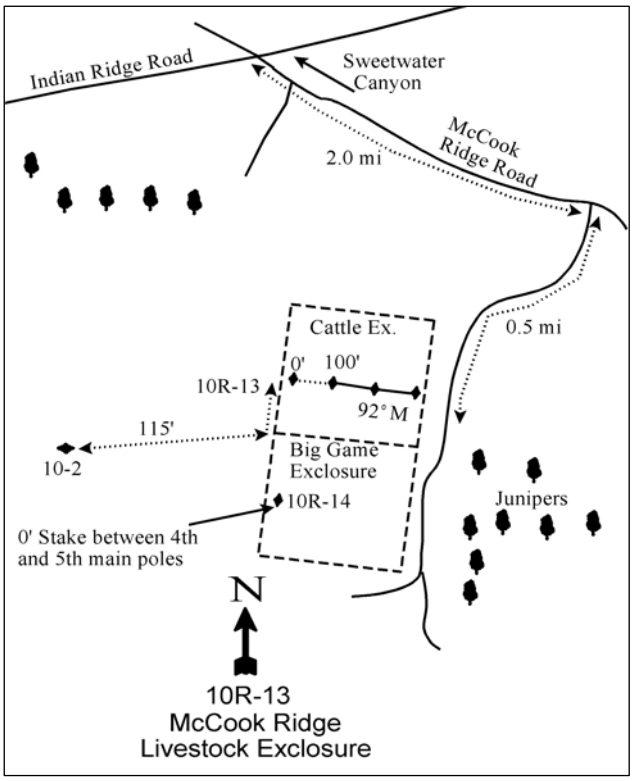
Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R034XY334UT
Land Ownership: BLM
Elevation: 6570 ft. (2003 m)
Aspect: Northwest
Slope: 4%
Transect bearing: 92° magnetic
Belt placement: line 1 (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 exclosure can be seen off the south side of the road.). Turn right and drive approximately 0.5 miles to the exclosure. The 0-foot stake is located near the middle of the west fence.

Map Name: Cooper Canyon



Diagrammatic Sketch:



Township: 13S Range: 24E Section: 31

GPS: NAD 83, UTM 12S 647981 E 4389250 N

LOWER MCCOOK RIDGE LIVESTOCK EXCLOSURE - TREND STUDY NO. 10R-13

Site Information

Site Description: The study is located within the Lower McCook Ridge exclosure complex that was constructed in 1964. The exclosure complex is within the Lower McCook allotment, which is managed by the Bureau of Land Management (BLM). This trend study is located within the livestock exclosure and was established in 1997. The livestock exclosure was rebuilt between 2005 and 2010 and the original size was decreased. The original transect did not fall within the rebuilt exclosure, so the transect was relocated in 2010 to sample inside the livestock exclosure. Pellet group transect data estimated heavy use by elk in 1997 with light use since 2000. Estimated deer use was moderate to heavy from 1997 to 2005, but was lighter in 2010 (Table - Pellet Group Data).

Browse: There are several important browse species on this site including: basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), fourwing saltbush (*Atriplex canescens*) and winterfat (*Ceratoides lanata*). Sagebrush on the site has characteristics of both basin big sagebrush and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Identification was difficult due to the high level of hybridization, as a result, all sagebrush were classified as basin big sagebrush. Sagebrush is the dominant browse species on the site providing the majority of the browse cover, though sagebrush cover has steadily decreased since 2000 (Table - Browse Trends). The big sagebrush population has been mostly mature with moderate to low amounts of decadence and poor vigor, and good recruitment of young plants. However, decadence and poor vigor were high, and recruitment of young plants low in the big sagebrush population in 2005. Utilization of big sagebrush has been moderate to heavy, with the heaviest use measured in 2005. The population of fourwing saltbush has a high amount of decadence and poor vigor with little new recruitment of young plants. Utilization of fourwing saltbush has been moderate to heavy since 1997. The winterfat population is mostly mature with low decadence and good vigor. Recruitment of young winterfat plants has been marginal over the course of the study and utilization has been mostly moderate, though there was very heavy use in 2005 (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are neither diverse nor abundant on the site. Cheatgrass (*Bromus tectorum*) is the dominant grass species and appears in scattered dense patches throughout the area. Perennial grasses consist of a few thickspike wheatgrass (*Agropyron dasystachyum*), Indian ricegrass (*Oryzopsis hymenoides*), Sandberg bluegrass (*Poa secunda*) and bottlebrush squirreltail (*Sitanion hystrix*). Forbs contribute very little to the herbaceous understory. Scarlet globemallow (*Sphaeralcea coccinea*) is the most abundant perennial forb, but no perennial forb provides over 1% cover (Table - Herbaceous Trends).

Soil: The soil texture is clay loam with a neutral soil reaction (pH 6.7) (Table - Soil Analysis Data). Vegetation cover is abundant with most being provided by the browse species, and bare ground cover is relatively low (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1997 to 2000 - slightly up (+1):** There was a 19% increase in the density of the primary browse species basin big sagebrush from 5,780 plants/acre to 6,900 plants/acre, and cover increased from 13% to 22%. However, decadence increased from 10% to 31%. Recruitment of young plants decreased, but remained good at 14% of the population.
- **2000 to 2005 - slightly down (-1):** There was little change in the density of big sagebrush, but cover decreased to 16%. Sagebrush decadence increased to 40% and poor vigor increased from 3% to 25%. Recruitment of young sagebrush plants decreased to 4%.
- **2005 to 2010 - slightly up (+1):** Due to the relocation of the transect, direct comparison is not possible between these years. There was a large decrease in the density of basin big sagebrush, but this is

likely due to the relocation of the transect. Basin big sagebrush decadence and poor vigor decreased substantially on the site. Recruitment of young sagebrush increased markedly in the population.

Grass:

- **1997 to 2000 - up (+2):** The sum of nested frequency of perennial grasses increased by 31% and cover increased from 2% to 8%. Cheatgrass decreased significantly in nested frequency, though remained similar in cover.
- **2000 to 2005 - stable (0):** There was a 10% increase in the sum of nested frequency of perennial grasses, but cover decreased to 5%. There was a substantial increase in cheatgrass cover from 5% to 10%.
- **2005 to 2010 - down (-2):** Due to the relocation of the transect, direct comparison is not possible between these years. The perennial grass sum of nested frequency and cover decreased substantially on the site. Cheatgrass increased significantly in nested frequency and cover increased to 18%.

Forb:

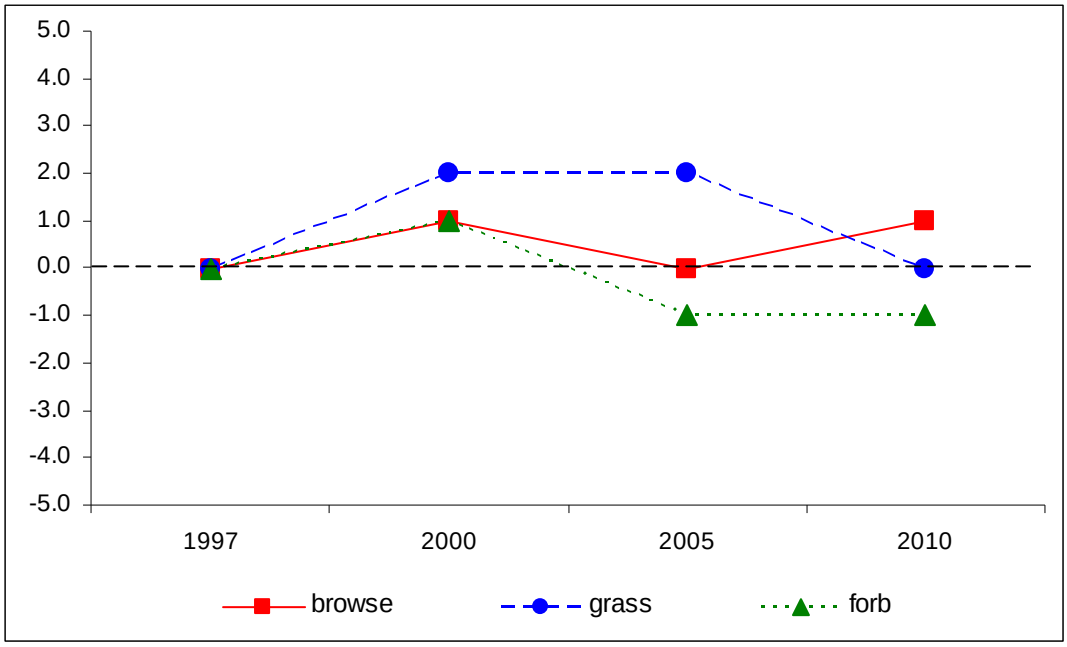
- **1997 to 2000 - slightly up (+1):** There was a slight increase in the sum of nested frequency of perennial forbs, but perennial forbs remained fairly rare on the site.
- **2000 to 2005 - down (-2):** The perennial forb sum of nested frequency decreased by 65% and perennial forbs became rare on the site. Annual forbs increased substantially in frequency and cover.
- **2005 to 2010 - stable (0):** Due to the relocation of the transect, direct comparison is not possible between these years. There was a slight increase in the sum of nested frequency of perennial forbs, but perennial forbs remained rare on the site. Annual forbs increased again in frequency and cover.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10R, study no: 13

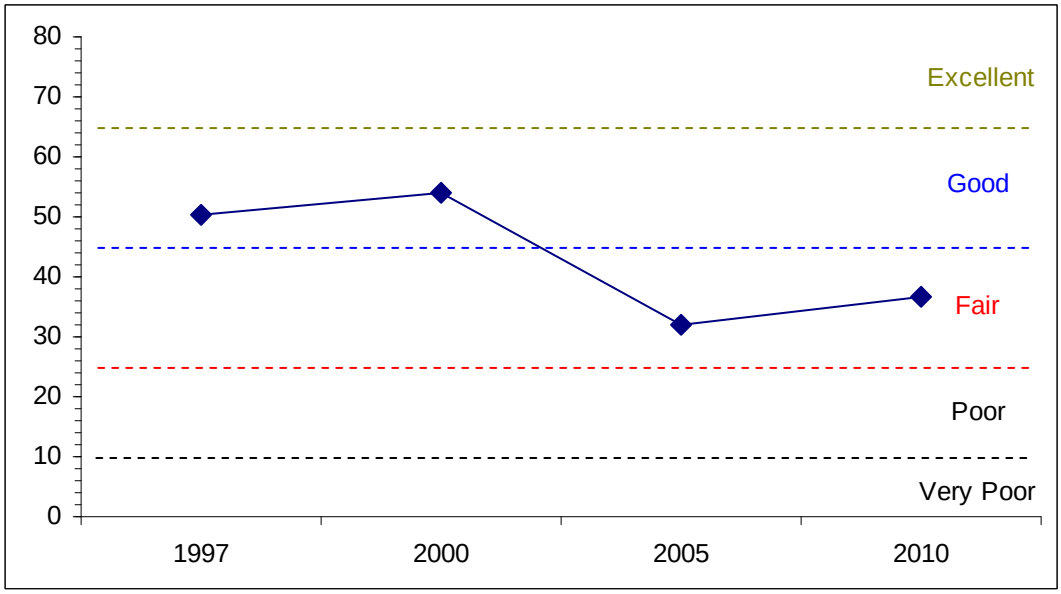
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
97	27.8	10.2	10.9	4.8	-4.4	1.3	0.0	**50.5**	Good
00	30.0	5.5	4.9	15.5	-3.6	1.7	0.0	**54.0**	Good
05	23.6	3.2	2.2	9.6	-7.6	0.9	0.0	**32.0**	Fair
10	19.9	12.0	13.9	2.5	-13.5	2.0	0.0	**36.7**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 13



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10R, Study no: 13



HERBACEOUS TRENDS--
Management unit 10R, Study no: 13

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
G	Agropyron dasystachyum	$_{ab}$18	$_{b}$28	$_{b}$24	$_{a}$3	.49	2.15	.16	.00
G	Bromus tectorum (a)	$_{b}$339	$_{a}$241	$_{a}$221	$_{b}$347	5.82	4.84	10.17	18.03
G	Oryzopsis hymenoides	1	1	-	3	.15	.18	.00	.03
G	Poa secunda	$_{b}$131	$_{ab}$116	$_{b}$162	$_{a}$69	1.31	2.68	3.20	1.14
G	Sitanion hystrix	$_{b}$43	$_{c}$107	$_{c}$91	$_{a}$10	.44	2.74	1.45	.05
Total for Annual Grasses		339	241	221	347	5.82	4.84	10.17	18.03
Total for Perennial Grasses		193	252	277	85	2.40	7.75	4.81	1.23
Total for Grasses		532	493	498	432	8.22	12.59	14.99	19.26
F	Arabis sp.	2	-	-	-	.00	-	-	-
F	Castilleja sp.	-	6	-	-	.03	.01	-	-
F	Descurainia pinnata (a)	$_{b}$23	$_{a}$3	$_{c}$46	$_{a}$5	.07	.00	1.14	.01
F	Draba sp. (a)	$_{a}$-	$_{a}$-	$_{b}$13	$_{a}$-	-	-	.05	-
F	Erigeron pumilus	$_{b}$25	$_{b}$42	$_{a}$-	$_{a}$7	.15	.22	-	.03
F	Lappula occidentalis (a)	$_{a}$8	$_{a}$6	$_{b}$72	$_{c}$213	.02	.03	.52	2.13
F	Phlox longifolia	-	1	-	-	-	.00	-	-
F	Schoencrambe linifolia	$_{b}$19	$_{a}$-	$_{a}$-	$_{a}$5	.04	-	-	.06
F	Sphaeralcea coccinea	57	63	45	42	.41	.53	.45	.92
F	Tragopogon dubius	$_{a}$-	$_{b}$17	$_{a}$-	$_{a}$-	-	.08	-	-
Total for Annual Forbs		31	9	131	218	0.09	0.03	1.73	2.15
Total for Perennial Forbs		103	129	45	54	0.63	0.85	0.45	1.01
Total for Forbs		134	138	176	272	0.73	0.89	2.18	3.16

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

BROWSE TRENDS--
Management unit 10R, Study no: 13

Type	Species	Strip Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
B	Artemisia frigida	66	69	28	75	2.56	3.62	.21	4.03
B	Artemisia tridentata tridentata	75	78	79	42	13.35	21.68	15.86	8.65
B	Atriplex canescens	35	36	29	29	3.79	5.64	1.32	2.87
B	Ceratoides lanata	61	66	58	71	3.03	2.51	1.57	1.14
B	Chrysothamnus nauseosus	0	0	0	1	-	-	-	-
B	Gutierrezia sarothrae	7	19	9	14	.15	.19	.03	.21
B	Juniperus osteosperma	0	0	1	0	-	-	-	-
B	Opuntia sp.	5	5	1	0	.15	.38	.03	-
B	Sclerocactus sp.	0	1	0	0	-	-	-	-
Total for Browse		249	274	205	232	23.06	34.05	19.03	16.92

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 13

Species	Percent Cover	
	'05	'10
Artemisia frigida	.23	3.03
Artemisia tridentata tridentata	14.00	7.69
Atriplex canescens	.85	3.79
Ceratoides lanata	.86	.85
Gutierrezia sarothrae	.03	.15

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 13

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata tridentata	2.1	1.5
Atriplex canescens	4.4	1.8
Ceratoides lanata	3.2	1.9

BASIC COVER--
Management unit 10R, Study no: 13

Cover Type	Average Cover %			
	'97	'00	'05	'10
Vegetation	32.47	45.88	33.21	40.25
Rock	.75	.20	.25	.06
Pavement	8.74	3.42	3.87	2.73
Litter	35.06	51.30	35.02	51.26
Cryptogams	3.60	1.75	2.04	.38
Bare Ground	21.07	27.85	39.18	24.78

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 13, Study Name: McCook Ridge Livestock Exclosure

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.6	6.7	31.0	37.8	31.2	5.0	7.2	153.6	0.7

PELLET GROUP DATA--
Management unit 10R, Study no: 13

Type	Quadrat Frequency			
	'97	'00	'05	'10
Rabbit	10	12	73	15
Elk	18	16	13	3
Deer	36	41	85	38

Days use per acre (ha)			
'97	'00	'05	'10
-	-	-	-
96 (237)	12 (30)	26 (65)	15 (36)
59 (146)	64 (158)	166 (410)	23 (58)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 13

		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									
97	**6260**	12	87	1	100	.31	0	.31	13/10
00	**6500**	6	91	3	10620	17	.61	0	5/8
05	**1120**	25	75	0	140	11	5	0	5/5
10	**6180**	11	89	0	700	0	0	0	7/9
Artemisia tridentata tridentata									
97	**5780**	31	58	10	400	36	25	3	24/29
00	**6900**	14	54	31	-	44	30	3	20/26
05	**6600**	4	56	40	-	28	66	25	21/27
10	**4860**	43	50	7	400	27	23	6	23/30
Atriplex canescens									
97	**880**	7	32	61	-	34	9	16	30/35
00	**1100**	0	33	67	-	25	13	13	31/38
05	**900**	4	13	82	-	33	38	47	22/20
10	**680**	12	50	38	-	18	35	38	31/36
Ceratoides lanata									
97	**4960**	8	88	3	20	34	17	.40	10/11
00	**5920**	2	84	14	20	33	3	3	8/8
05	**6200**	7	84	9	-	4	93	6	5/6
10	**3460**	13	86	1	20	17	0	3	9/9
Chrysothamnus nauseosus									
97	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**60**	100	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
97	**300**	0	100	-	-	0	0	0	8/8
00	**840**	7	93	-	80	0	0	0	5/7
05	**180**	0	100	-	20	0	0	0	6/6
10	**720**	17	83	-	-	0	0	0	7/7
Juniperus osteosperma									
97	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	20	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
97	**180**	0	100	-	-	0	0	0	5/9
00	**180**	11	89	-	20	0	0	0	3/9
05	**20**	0	100	-	-	0	0	0	4/8
10	**0**	0	0	-	-	0	0	0	-/-

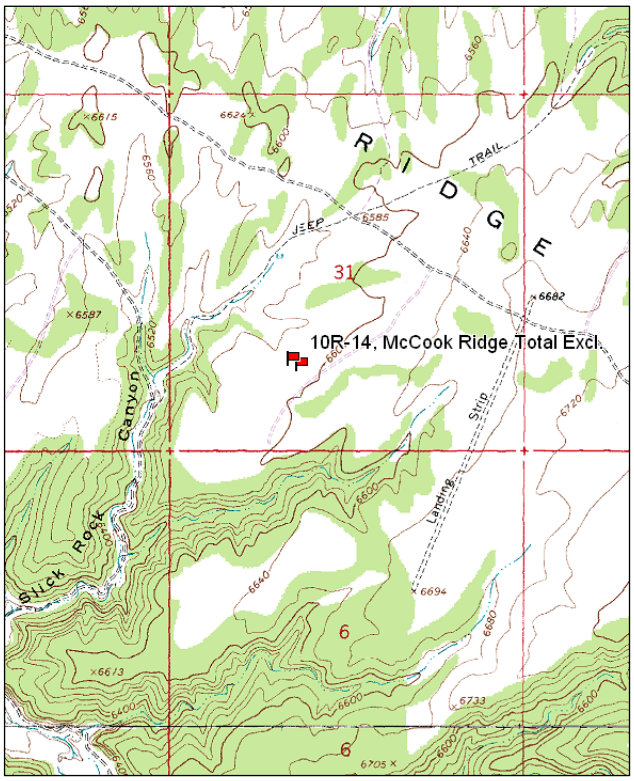
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Sclerocactus sp.									
97	**0**	0	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-

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

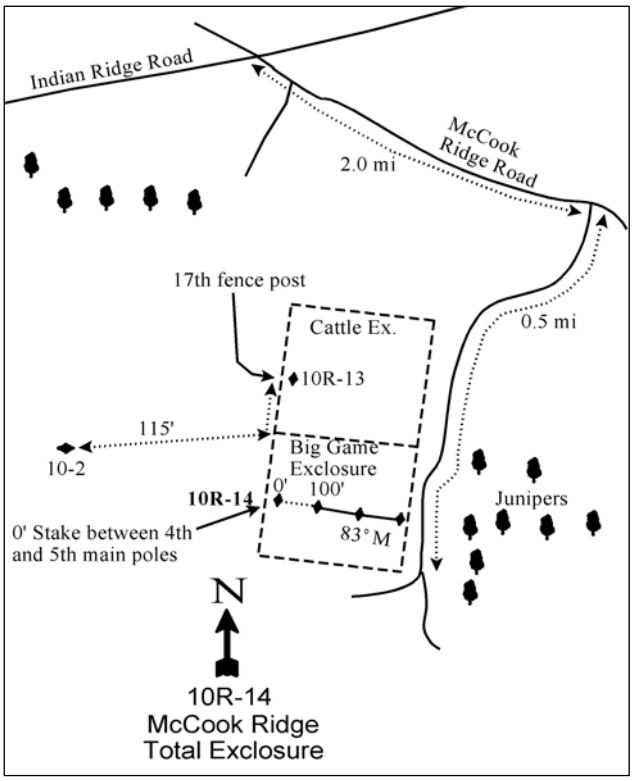
Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R034XY334UT
Land Ownership: BLM
Elevation: 6580 ft. (2006 m)
Aspect: Southwest
Slope: 4%
Transect bearing: 83° magnetic
Belt placement: line 1 (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 exclosure can be seen off the south side of the road.). Turn right and drive approximately 0.5 miles to the exclosure. Go inside the total exclosure. The 0-foot stake is on the west side between the 4th and 5th main poles of the fence. The 0-foot stake is marked with browse tag #78.

Map Name: Cooper Canyon



Diagrammatic Sketch:



Township: 13S Range: 24E Section: 31

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 exclosure complex that was constructed in 1964. The exclosure 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 exclosure, which excludes grazing. Parts of the exclosure were in poor repair in 2005, but were fixed between the 2005 and 2010 sample years. As a result, evidence of deer entering the exclosure 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 exclosure 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 exclosure, 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 exclosure 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 exclosure 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:

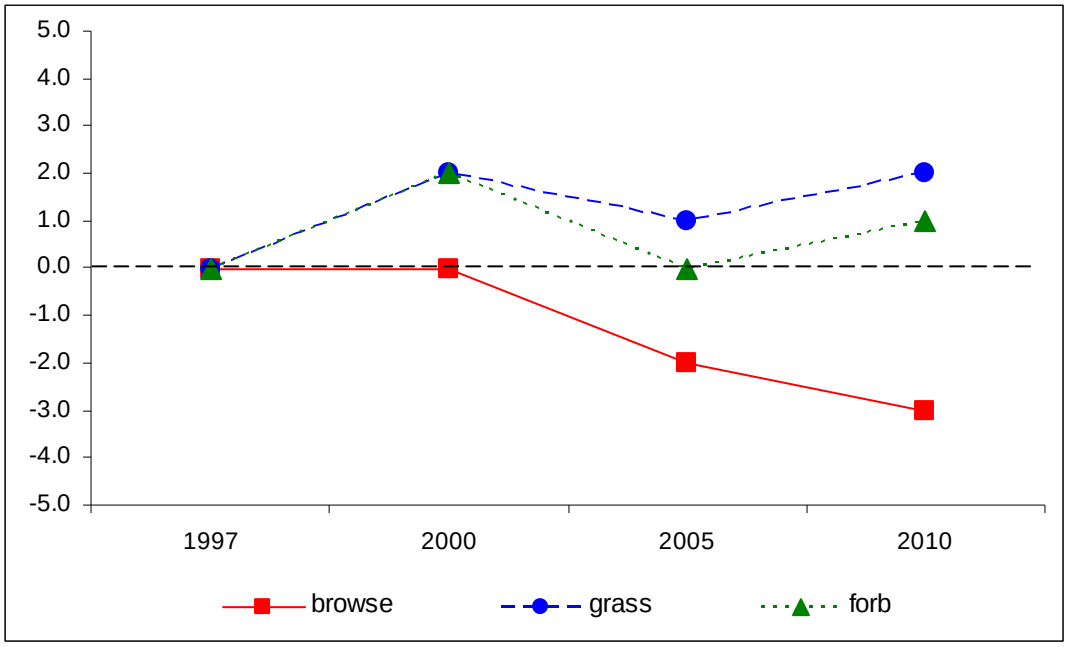
- **1997 to 2000 - up (+2):** The sum of nested frequency of perennial forbs increased four-fold and cover increased to 2%.
- **2000 to 2005 - down (-2):** The perennial forb sum of nested frequency decreased to 1997 levels and perennial forbs provided almost no cover.
- **2005 to 2010 - slightly up (+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

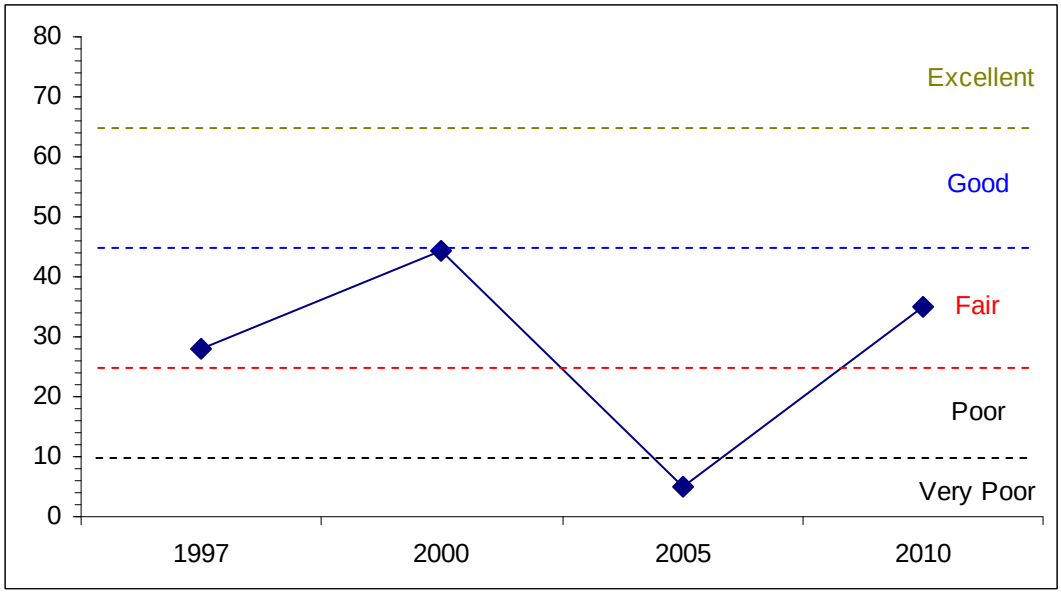
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
97	30.0	9.9	6.2	1.1	-20.0	0.8	0.0	**28.0**	Fair
00	30.0	5.9	4.2	2.3	-1.6	3.7	0.0	**44.5**	Fair-Good
05	11.0	7.6	3.1	1.0	-17.8	0.1	0.0	**5.0**	Very Poor
10	20.2	12.3	10.9	9.5	-20.0	2.0	0.0	**34.9**	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}$5	$_{a}$23	$_{a}$26	$_{b}$71	.15	.84	.31	4.49
G	Bromus tectorum (a)	$_{d}$473	$_{a}$178	$_{b}$369	$_{c}$422	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}$16	$_{a}$25	$_{b}$52	$_{a}$5	.23	.13	.92	.01
F	Draba sp. (a)	-	2	-	-	-	.00	-	-
F	Lactuca serriola	$_{a}$-	$_{b}$61	$_{a}$-	$_{a}$7	-	.88	-	.04
F	Lappula occidentalis (a)	$_{a}$3	$_{a}$5	$_{b}$137	$_{c}$178	.01	.01	2.61	1.91
F	Orobanche fasciculata	-	-	-	2	-	-	-	.00
F	Schoencrambe linifolia	-	-	4	1	-	-	.01	.00
F	Sisymbrium altissimum (a)	-	1	1	-	-	.00	.03	-
F	Sphaeralcea coccinea	$_{ab}$25	$_{ab}$31	$_{a}$16	$_{b}$39	.31	.36	.06	.95
F	Taraxacum officinale	-	-	-	-	.00	-	-	-
F	Tragopogon dubius	$_{b}$9	$_{c}$45	$_{a}$-	$_{a}$-	.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 Exclosure

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

		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									
97	**2320**	9	90	1	-	0	0	0	15/16
00	**4620**	13	80	6	2060	0	0	0	6/13
05	**3140**	22	78	1	60	26	0	.63	4/6
10	**4120**	25	75	0	140	0	0	0	10/13
Artemisia tridentata tridentata									
97	**640**	81	19	0	2480	0	0	0	33/37
00	**1200**	68	32	0	80	0	0	0	30/31
05	**700**	6	86	9	-	14	0	0	37/45
10	**1260**	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)
Atriplex canescens									
97	**1280**	2	58	41	-	0	0	14	34/40
00	**1160**	0	60	40	-	2	0	5	38/52
05	**920**	2	7	91	20	2	2	72	37/40
10	**680**	6	76	18	-	3	0	18	35/52
Ceratoides lanata									
97	**8020**	12	80	8	-	0	0	2	23/18
00	**9060**	3	60	37	20	0	.22	2	17/19
05	**8860**	6	90	4	-	24	19	4	10/11
10	**4560**	12	86	1	20	.87	.87	1	11/12
Juniperus osteosperma									
97	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	20	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
97	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**20**	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 exclosure (10R-13) than outside the exclosure (10-2). Deer use was extremely heavy both outside the exclosure and in the livestock exclosure 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 exclosure and within the livestock exclosure 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 exclosure and within the livestock exclosure typically display moderate to heavy use. Density and cover of sagebrush varies between the exclosures with the total exclosure (10R-14) having the lowest density of sagebrush plants, the livestock exclosure having the highest and outside the exclosure 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 exclosure and within the livestock exclosure than it is within the total exclosure (Table 2).

At the outset of the studies in 1997, winterfat had the highest density and cover inside the total exclosure with lower rates outside the exclosure and inside the livestock exclosure. There was a general decline in winterfat on all three studies in 2010, but particularly so within the total exclosure. Cover and density of winterfat were similar on all three studies in 2010. Winterfat cover was about six times greater in the total exclosure than in both the livestock exclosure and outside the exclosure in 2000, but cover within the total exclosure 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 exclosure in 2010 with slight increases in recruitment within both the livestock exclosure and total exclosure. Average height and crown measurements also show winterfat inside the total exclosure 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 exclosure, it is likely that competition is greater here and may be responsible for the highest rate of decadence inside the total exclosure (Table 4).

Fourwing saltbush has similar densities in the total and livestock exclosures, with a lower density outside the exclosure. 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 exclosure and the lowest outside of the exclosure. The herbaceous understories have been similar for each transect.

Soil: Soils within the livestock exclosure and total exclosure have a clay loam texture and neutral pH. Soils on the transect outside the exclosure 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 exclosure than on the other two transects.

Exclosure Complex Summary

Study Name	Year	Deer *days use/acre (ha)*	Elk *days use/acre (ha)*	Cattle *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 (*Plants/acre*)	Percent Mature (*Plants/acre*)	Percent Decadent (*Plants/acre*)	Ave. height/crown (*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 (*Plants/acre*)	Percent Mature (*Plants/acre*)	Percent Decadent (*Plants/acre*)	Ave. height/crown (*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 *Plants/acre*	Percent Young (*Plants/acre*)	Percent Mature (*Plants/acre*)	Percent Decadent (*Plants/acre*)	Ave. height/crown (*in*)
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		
		n	*Sum of Nested Frequency*	*Percent Cover*	*n*	*Sum of Nested Frequency*	*Percent Cover*
Outside Exlcosure (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

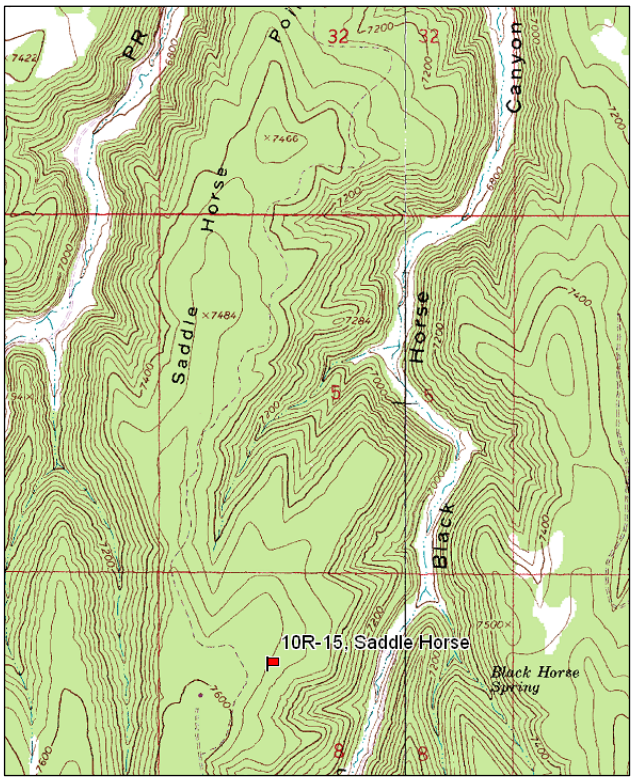
Table 5. Number of species sampled (n), sum of nested frequency and cover of perennial grasses and perennial forbs in the three studies at the Lower McCook Ridge exclosure complex.

SADDLE HORSE - TREND STUDY NO. 10R-15-10

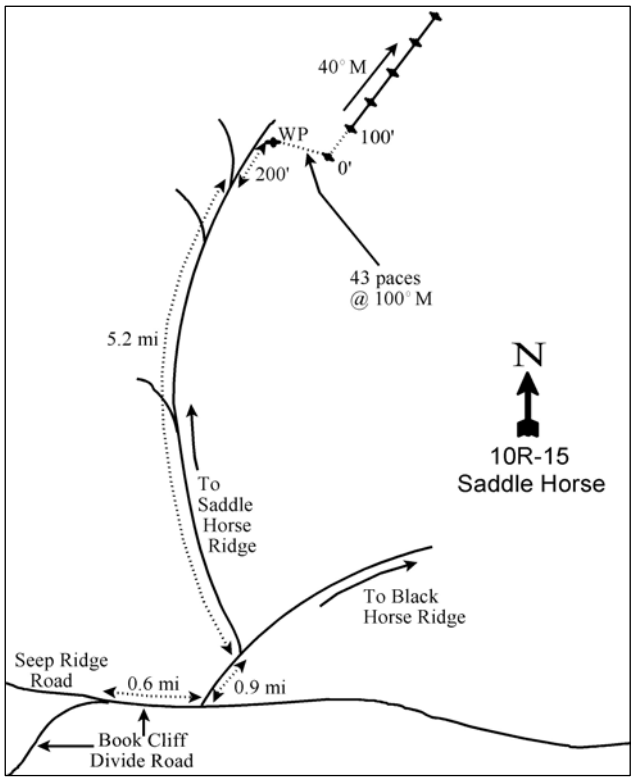
Vegetation Type: Mountain Brush
Range Type: Substantial Deer Summer, Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper), R034XY322UT
Land Ownership: BLM
Elevation: 7540 ft. (2299 m)
Aspect: Southeast
Slope: 12%
Transect bearing: 40° magnetic
Belt placement: line 1(11ft), line 2(34 ft), line 3(59 ft), line 4(71 ft) line 5 (95 ft).

Directions:
From the intersection of Seep Ridge road and Book Cliffs Divide road, continue 0.6 miles to an intersection with the road to Black Horse Ridge. Turn left and go 0.9 miles to the intersection with the road to Saddle Horse Ridge. Go left here and continue 5.2 miles to the third fork (staying right through two forks). From the third fork the witness post is approximately 200 feet on the right side of the road. From the witness post the 0' stake is 43 paces at 100°M.

Map Name: Seep Canyon



Diagrammatic Sketch:



Township: 15S Range: 24E Section: 8

GPS: NAD 83, UTM 12S 649728 E 4377121 N

SADDLE HORSE - TREND STUDY NO. 10R-15

Site Information

Site Description: The study samples a chaining that was done in the 1960's on Saddle Horse Ridge, which is between PR Canyon and Black Horse Canyon. The site supports a mixed community of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), true mountain mahogany (*Cercocarpus montanus*), antelope bitterbrush (*Purshia tridentata*), pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). A small fire burned the last 100 feet of the baseline sometime between 2000 and 2005. The area has moderate to heavy use by elk, but there is little cattle use here since there is no available water on the ridge. Grazing in the area is managed by the Bureau of Land Management as part of the Sweetwater allotment. Pellet group transect data has estimated fluctuating use by elk with heavy use in 1998 and 2005, more moderate use in 2000 and light use in 2010. Estimated deer use was light in 1998 and 2000, but increased to more moderate use in 2005 and 2010. Cattle use was sampled at light rates in 1998 and 2010 (Table - Pellet Group Data).

Browse: The site supports a variety of browse with the key species being mountain big sagebrush, true mountain mahogany and bitterbrush. Mountain big sagebrush is not the preferred shrub in this area and has displayed mostly light to moderate use. The key shrub with respect to abundance and preference is bitterbrush. The bitterbrush population is mostly mature with low to moderate decadence, good vigor and very heavy utilization. Recruitment of young bitterbrush plants has been mostly good over the course of the study. The other key browse species, true mountain mahogany, consists of a small population of mature and healthy, but heavily used plants. Recruitment of young mahogany plants has been minimal since 1998. Other shrubs encountered include rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *hololeucus*), snowberry (*Symphoricarpos oreophilus*) and pinyon and juniper trees that have reestablished on the site since the chaining (Table - Browse Characteristics). Point-center quarter data has shown a fairly stable population of mature trees (Table - Point-Quarter Tree Data) with little change in cover since 1998 (Table - Browse Trends).

Herbaceous Understory: Grasses are fairly diverse on the site, though intermediate wheatgrass (*Agropyron intermedium*) provides nearly all of the grass cover. The other grass species that are not very abundant include species such as sedge (*Carex sp.*), Indian ricegrass (*Oryzopsis hymenoides*), mutton bluegrass (*Poa fendleriana*) and bottlebrush squirreltail (*Sitanion hystrix*). Cheatgrass (*Bromus tectorum*) is present on the site, but is not abundant. Forbs are not abundant and do not provide much additional forage. The most common species are Watson penstemon (*Penstemon watsonii*) and scarlet globemallow (*Sphaeralcea coccinea*) (Table - Herbaceous Trends).

Soil: The soil has a sandy clay loam to sandy loam texture with a neutral soil reaction (pH 7.0) (Table - Soil Analysis Data). Calcium carbonate deposits are common on rocks within the soil, some up to 1/4 inch thick. Bare ground cover is low with good protective cover provided by vegetation, litter, rock and pavement cover (Table - Basic Cover). The soil erosion condition was classified as slight in 2005 due to some rill erosion and minor soil pedestaling. The soil erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **1998 to 2000 - stable (0):** There was a decrease in the densities of all three key browse species, mountain big sagebrush, true mountain mahogany and bitterbrush, though cover remained similar for all three species. Decadence of bitterbrush increased slightly from 0% to 13%. Recruitment of young plants decreased in mountain big sagebrush and bitterbrush, though it remained good for both species.
- **2000 to 2005 - slightly down (-1):** The density of the three key browse species returned to 1998 levels, though the cover of bitterbrush decreased from 6% to 4%. Decadence of bitterbrush increased to 31% and decadence of true mountain mahogany increased to 33%.
- **2005 to 2010 - slightly up (+1):** There was little change in the density or cover of the three browse species, but decadence of bitterbrush and mahogany decreased to low levels.

Grass:

- **1998 to 2000 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 16% and cover decreased from 19% to 14%.
- **2000 to 2005 - down (-2):** There was a 31% decrease in the sum of nested frequency of perennial grasses and cover decreased to 11%. Intermediate wheatgrass had a significant decrease in nested frequency.
- **2005 to 2010 - slightly up (+1):** The perennial grass sum of nested frequency increased by 16% and cover increased to 13%.

Forb:

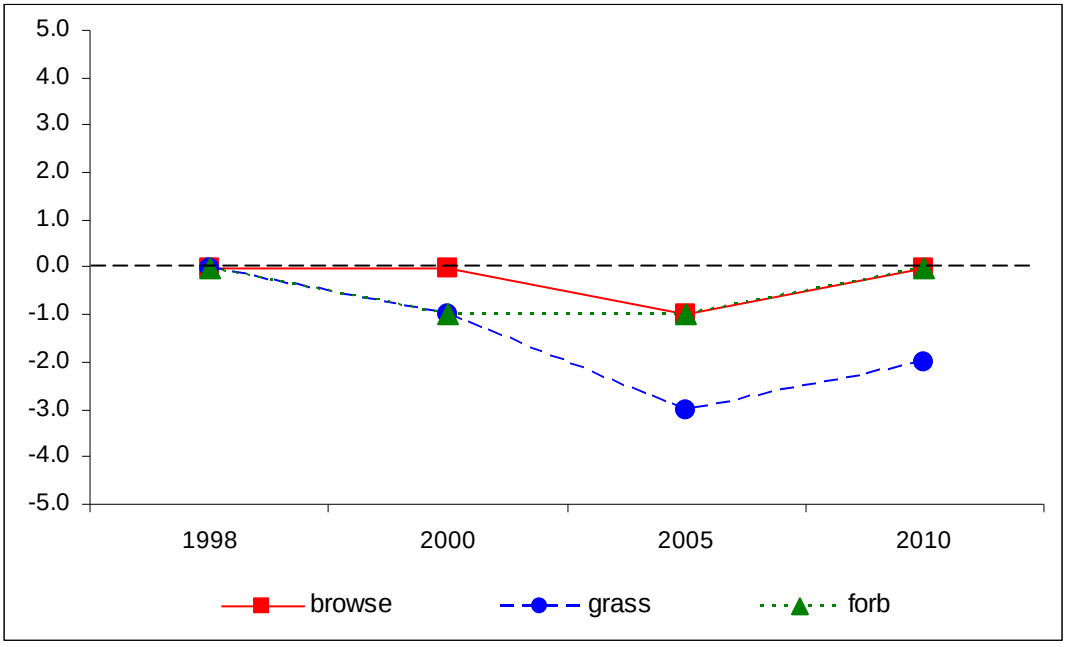
- **1998 to 2000 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased and cover decreased from 2% to around 1%. Forbs were not abundant on the site.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs.
- **2005 to 2010 - slightly up (+1):** The perennial forb sum of nested frequency increased to 1998 levels, though cover remained low.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 10R, study no: 15

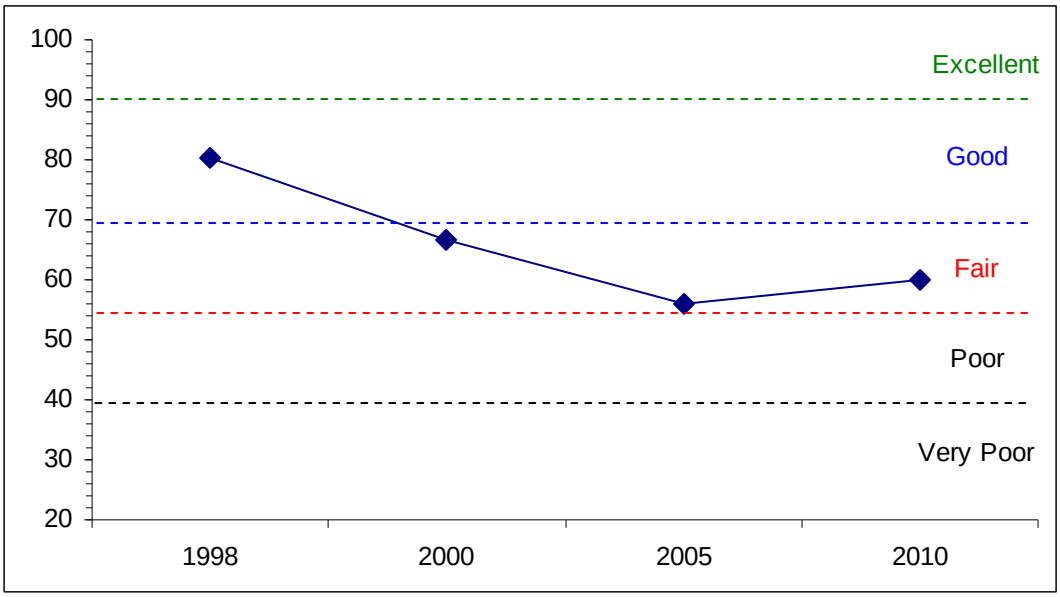
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
98	17.9	15.0	14.3	30.0	-0.2	3.5	0.0	**80.5**	Good
00	15.5	12.6	9.5	27.6	0.0	1.6	0.0	**66.8**	Fair
05	13.3	8.0	11.1	22.1	-0.7	2.2	0.0	**56.0**	Poor-Fair
10	15.0	13.3	3.9	25.7	-0.7	2.7	0.0	**60.1**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 15



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL--
Management unit 10R, Study no: 15



HERBACEOUS TRENDS--
Management unit 10R, Study no: 15

Type	Species	Nested Frequency				Average Cover %			
		'98	'00	'05	'10	'98	'00	'05	'10
G	Agropyron cristatum	b16	a-	ab4	a-	.19	-	.15	-
G	Agropyron intermedium	b332	b321	a213	a246	16.06	12.37	9.80	12.44
G	Bromus inermis	-	-	-	5	-	-	-	.00
G	Bromus tectorum (a)	b29	a-	bc43	c72	.23	-	.87	.88
G	Carex sp.	c63	bc53	a23	ab28	1.82	1.10	.31	.14
G	Oryzopsis hymenoides	14	3	5	9	.48	.00	.12	.10
G	Poa fendleriana	29	18	10	23	.40	.30	.10	.14
G	Sitanion hystrix	b18	a-	ab16	a3	.38	-	.55	.03
Total for Annual Grasses		29	0	43	72	0.23	0	0.87	0.87
Total for Perennial Grasses		472	395	271	314	19.36	13.78	11.04	12.86
Total for Grasses		501	395	314	386	19.59	13.78	11.92	13.74
F	Antennaria rosea	6	3	3	8	.19	.06	.09	.21
F	Arabis sp.	11	6	14	4	.02	.01	.04	.03
F	Astragalus convallarius	4	-	-	-	.04	-	-	.01
F	Astragalus sp.	3	-	-	-	.07	-	-	-
F	Chenopodium fremontii (a)	a-	a-	b11	a2	-	-	.05	.03
F	Descurainia pinnata (a)	a-	a-	b62	a10	-	-	.98	.02
F	Erigeron sp.	-	-	2	2	.00	-	.00	.00
F	Lappula occidentalis (a)	a15	a3	c93	b68	.10	.00	2.24	.20
F	Lepidium sp. (a)	-	-	-	8	-	-	-	.02
F	Machaeranthera grindelioides	2	2	3	3	.03	.03	.04	.03
F	Penstemon caespitosus	3	-	-	-	.03	-	-	-
F	Penstemon pachyphyllus	a-	b11	ab3	b17	-	.08	.04	.11
F	Penstemon watsonii	b39	a8	a7	a10	.56	.45	.33	.04

Type	Species	Nested Frequency				Average Cover %			
		'98	'00	'05	'10	'98	'00	'05	'10
F	Polygonum douglasii (a)	-	-	4	-	-	-	.00	-
F	Senecio multilobatus	3	4	7	6	.04	.01	.01	.19
F	Sphaeralcea coccinea	$_{ab}$35	$_{a}$28	$_{a}$32	$_{b}$55	.71	.14	.51	.72
F	Tragopogon dubius	2	-	-	-	.00	-	-	-
F	Viguiera multiflora	3	1	3	-	.03	.03	.00	-
Total for Annual Forbs		15	3	170	88	0.10	0.00	3.29	0.27
Total for Perennial Forbs		111	63	74	105	1.73	0.81	1.08	1.37
Total for Forbs		126	66	244	193	1.84	0.81	4.37	1.64

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

BROWSE TRENDS--
Management unit 10R, Study no: 15

Type	Species	Strip Frequency				Average Cover %			
		'98	'00	'05	'10	'98	'00	'05	'10
B	Amelanchier utahensis	1	0	1	0	.00	-	.00	-
B	Artemisia tridentata vaseyana	36	24	29	36	4.28	3.15	3.34	4.94
B	Cercocarpus montanus	10	3	9	9	2.29	2.12	1.72	1.92
B	Chrysothamnus nauseosus hololeucus	2	2	3	2	.30	.06	.18	.03
B	Chrysothamnus viscidiflorus viscidiflorus	1	1	2	1	-	-	-	-
B	Ephedra viridis	0	0	0	1	-	-	-	-
B	Juniperus osteosperma	6	5	3	6	4.44	3.50	4.03	4.63
B	Opuntia fragilis	2	3	5	1	.38	-	.15	.03
B	Pinus edulis	7	7	5	9	1.37	2.27	2.54	3.70
B	Purshia tridentata	26	28	23	25	6.08	5.57	4.36	3.98
B	Symphoricarpos oreophilus	2	1	1	1	.15	.66	-	-
Total for Browse		93	74	81	91	19.33	17.34	16.36	19.24

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 15

Species	Percent Cover			
	'98	'00	'05	'10
Artemisia tridentata vaseyana	-	-	5.08	7.94
Cercocarpus montanus	-	.80	1.89	3.36
Chrysothamnus nauseosus hololeucus	-	-	.05	-
Juniperus osteosperma	2.59	1.60	4.08	7.11
Juniperus scopulorum	-	1.60	-	-
Opuntia fragilis	-	-	.06	-
Pinus edulis	-	1.39	4.15	7.21
Purshia tridentata	-	-	2.70	7.38
Symphoricarpos oreophilus	-	-	.08	.08

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 15

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	2.3	1.9
Cercocarpus montanus	1.3	1.8
Purshia tridentata	1.5	1.1

POINT-QUARTER TREE DATA--
Management unit 10R, Study no: 15

Species	Trees per Acre			
	'98	'00	'05	'10
Juniperus osteosperma	79	134	53	79
Pinus edulis	53	99	51	68

Average diameter (in)			
'98	'00	'05	'10
2.7	3.5	5.0	3.8
1.8	1.9	2.4	2.3

BASIC COVER--
Management unit 10R, Study no: 15

Cover Type	Average Cover %			
	'98	'00	'05	'10
Vegetation	41.13	34.22	30.35	36.93
Rock	3.09	4.38	3.45	3.03
Pavement	2.00	1.38	1.82	3.12
Litter	57.48	56.59	41.66	56.71
Cryptogams	.20	.83	1.43	.03
Bare Ground	16.27	21.62	33.52	21.67

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 15, Study Name: Saddle Horse

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.5	7.0	52.7	26.7	20.6	4.5	8.4	70.4	0.9

PELLET GROUP DATA--
Management unit 10R, Study no: 15

Type	Quadrat Frequency			
	'98	'00	'05	'10
Rabbit	6	52	45	4
Elk	30	29	31	19
Deer	14	15	16	12
Cattle	1	-	-	-

Days use per acre (ha)			
'98	'00	'05	'10
-	-	-	-
78 (193)	36 (90)	62 (154)	16 (40)
11 (28)	15 (38)	37 (91)	39 (96)
6 (14)	-	-	2 (4)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 15

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
98	**40**	100	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	8/13
10	**0**	0	0	-	-	0	0	0	-/-
Artemisia frigida									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	4/11
10	**0**	0	0	-	-	0	0	0	7/10
Artemisia tridentata vaseyana									
98	**1480**	46	54	0	180	7	0	0	30/43
00	**1080**	39	57	4	60	9	0	0	23/33
05	**1280**	28	64	8	420	27	0	3	20/29
10	**1340**	10	82	7	180	34	0	4	22/34
Cercocarpus montanus									
98	**260**	0	100	0	-	38	62	0	52/50
00	**60**	0	100	0	-	100	0	0	54/54
05	**180**	11	56	33	-	22	56	0	41/40
10	**200**	0	90	10	-	40	50	10	39/37
Chrysothamnus nauseosus hololeucus									
98	**40**	50	50	0	-	0	0	0	17/19
00	**40**	0	50	50	-	0	0	50	17/19
05	**60**	0	67	33	-	0	0	0	17/26
10	**40**	0	100	0	-	0	0	0	26/36
Chrysothamnus viscidiflorus viscidiflorus									
98	**40**	0	100	0	-	0	0	0	19/20
00	**40**	0	50	50	-	100	0	0	11/14
05	**60**	0	100	0	-	0	0	0	11/10
10	**20**	0	100	0	-	0	0	0	22/24
Ephedra viridis									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**20**	0	100	-	-	0	100	0	-/-
Juniperus osteosperma									
98	**160**	75	13	13	-	0	13	13	-/-
00	**180**	67	22	11	-	0	0	0	-/-
05	**160**	0	63	38	-	0	0	25	-/-
10	**280**	36	64	0	-	0	0	0	-/-

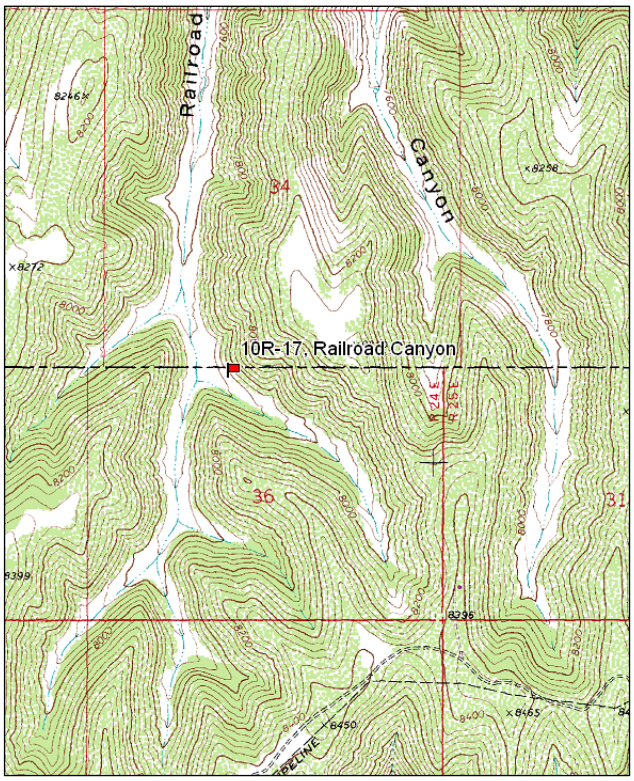
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia fragilis									
98	**40**	0	100	0	-	0	0	0	5/29
00	**60**	0	100	0	-	0	0	0	3/13
05	**420**	14	38	48	-	0	0	48	3/9
10	**40**	50	50	0	20	0	0	0	-/-
Pinus edulis									
98	**140**	57	43	-	-	0	0	14	-/-
00	**160**	75	25	-	-	0	0	0	-/-
05	**100**	20	80	-	-	0	0	0	-/-
10	**180**	22	78	-	-	0	0	0	-/-
Purshia tridentata									
98	**980**	27	73	0	40	37	18	0	23/58
00	**800**	15	73	13	-	15	65	3	18/51
05	**980**	22	47	31	-	31	45	14	15/33
10	**900**	9	89	2	40	47	20	0	16/34
Symphoricarpos oreophilus									
98	**40**	0	100	0	-	0	0	0	44/68
00	**20**	0	0	100	-	0	0	100	27/59
05	**20**	0	100	0	-	0	0	0	19/31
10	**20**	100	0	0	-	100	0	0	14/30

RAILROAD CANYON - TREND STUDY NO. 10R-17-10

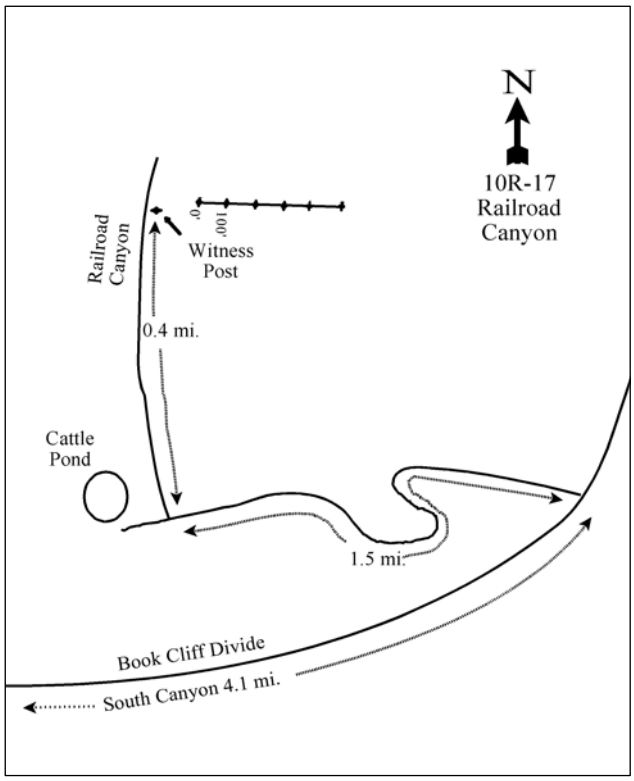
Vegetation Type: Burned Mountain Big Sagebrush
Range Type: Crucial Deer Summer (Fawning Habitat), Crucial Elk Summer (Calving Habitat)
NRCS Ecological Site Description: Mountain Loamy Bottom (Basin Wildrye), R048AY410UT
Land Ownership: BLM
Elevation: 7700 ft. (2347 m)
Aspect: West
Slope: 7%
Transect bearing: 104° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95 ft)

Directions:
From the intersection of South Canyon Road and Book Cliff Divide Road, follow the Book Cliff Divide Road east for 4.1 miles to an intersection. Turn right and follow the road into Railroad Canyon for 1.5 miles to a faint road before a cattle pond. Turn right onto the faint road and follow it for 0.4 miles to a witness post on the right side of the road. From the witness post the 0-foot stake is 85 paces away at 64°M and is marked by browse tag #103.

Map Name: Tom Patterson



Diagrammatic Sketch:



Township: 15 1/2S Range: 24E Section: 36

GPS: NAD 83, UTM 12S 653107 E 4369525 N

RAILROAD CANYON - TREND STUDY NO. 10R-17

Site Information

Site Description: The study samples a small narrow side canyon in Railroad Canyon. There are aspen (*Populus tremuloides*) growing on the steep slope to the south of the site. The site was dominated by large basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) in the summer of 1998, when the study was established. The canyon was burned by the Bureau of Land Management (BLM) in the fall of 1998, removing much of the browse component. Energy development is common in the area with development to the south of the site. Grazing in the area is managed by the BLM as part of the Sweetwater allotment. The area serves as a travel corridor with two different trails for game and livestock noted in 2010. Pellet group transect data estimated mostly moderate elk use in 1998 and 2000, but light use in 2010. Estimated deer increased from light use in 1998 and 2000 to more moderate use in 2010 (Table - Pellet Group Data).

Browse: The site was dominated by basin and mountain big sagebrush prior to the burn. All of the sagebrush sampled was classified as mountain big sagebrush due to high amounts of hybridization between the two species. Prior to the fire the big sagebrush population was mostly mature with moderate decadence, good recruitment of young plants and light use. Following the fire, most sagebrush was removed from the site, but had begun to reestablish in 2010 with a mixed population of young and mature plants. Other common browse sampled on the site includes rubber rabbitbrush (*Chrysothamnus nauseosus*), snowberry (*Symphoricarpos oreophilus*) and fringed sagebrush (*Artemisia frigida*) (Table - Browse Characteristics).

Herbaceous Understory: The key component of this site due to the elevation and season of use is the herbaceous understory. Grasses are diverse and abundant on the site. Kentucky bluegrass (*Poa pratensis*) was the dominant grass on the site in 1998 and 2000, but decreased significantly in 2010. Needle-and-thread (*Stipa comata*) and intermediate wheatgrass (*Agropyron intermedium*) both increased significantly in 2010 with needle-and-thread becoming the dominant grass species in cover. Cheatgrass (*Bromus tectorum*) was rare in 1998 and 2000, but increased significantly in 2010. Perennial forbs are diverse, but are not overly abundant. There was a large increase in the frequency and cover of perennial forbs in 2000, following the fire, but frequency and cover decreased to 1998 levels in 2010. Annual forbs were abundant in 2010 (Table - Herbaceous Trends).

Soil: The soil texture is sandy loam with a neutral soil reaction (pH 6.7) (Table - Soil Analysis Data). Bare ground cover was high in 2000, following the fire, but has been low in the other sample years. Good protective ground cover is provided by vegetation and litter cover from the herbaceous species on the site (Table - Basic Cover). The soil erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **1998 to 2000 - down (-2):** Most of the browse component was removed by the prescribed fire.
- **2000 to 2010 - slightly up (+1):** There was a large increase in the density of big sagebrush with a large amount of recruitment. Big sagebrush has begun to reestablish on the site, but most plants remain small and cover is low at 2%.

Grass:

- **1998 to 2000 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover decreased from 35% to 29%.
- **2000 to 2010 - stable (0):** The sum of nested frequency of perennial grasses increased 9% and cover increased to 33%. There was a change in composition with a significant decrease in the nested frequency of Kentucky bluegrass, and a significant increase in the nested frequency of needle-and-thread and intermediate wheatgrass. Cheatgrass also increased significantly in nested frequency.

Forb:

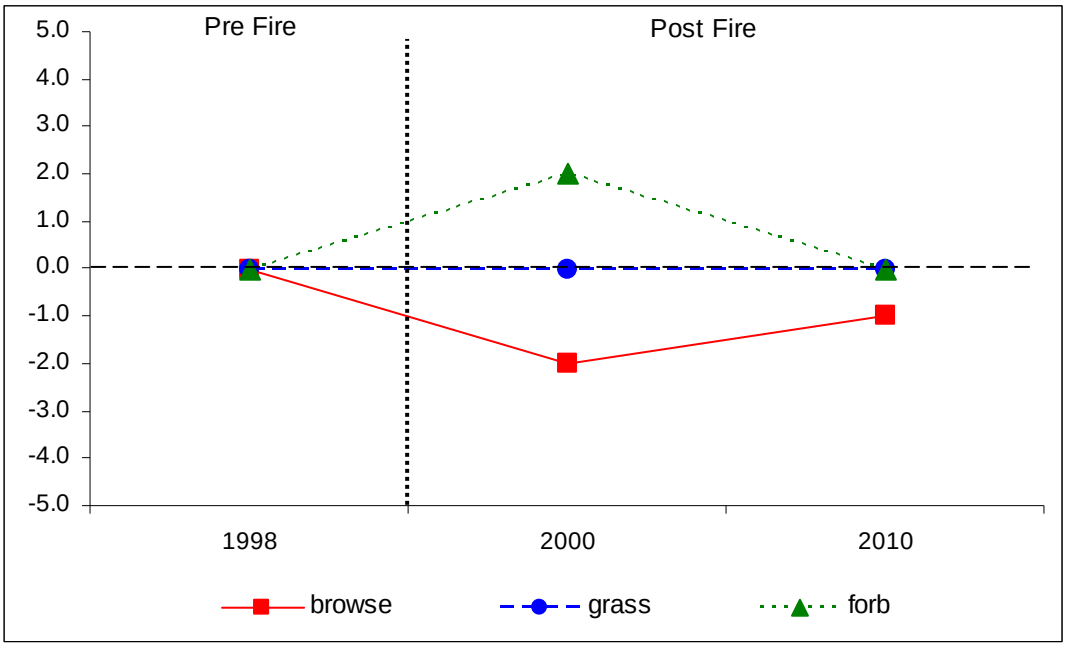
- **1998 to 2000 - up (+2):** The sum of nested frequency of perennial forbs increased by 85% and cover increased from 2% to 4%.
- **2000 to 2010 - down (-2):** The perennial forb sum of nested frequency decreased by 37% and cover decreased to 1%. Annual forbs increased substantially in frequency and cover with a significant increase in the nested frequency of annual stickseed (*Lappula occidentalis*).

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 10R, study no: 17

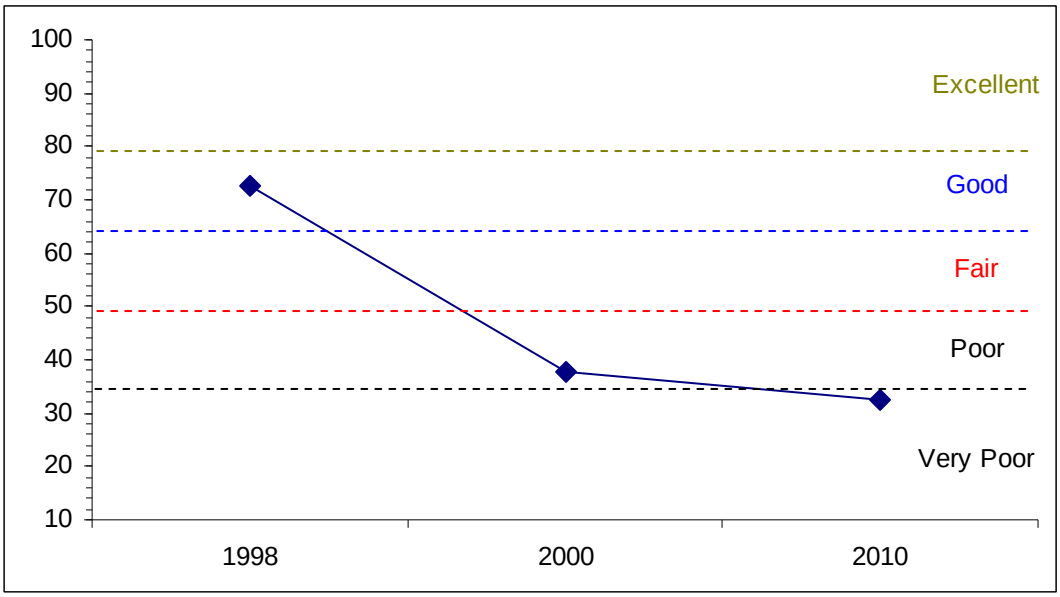
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
98	27.1	7.8	4.0	30.0	0.0	3.8	0.0	**72.7**	Good
00	0.2	0.0	0.0	30.0	0.0	7.7	0.0	**37.9**	Poor
10	2.8	0.0	0.0	30.0	-2.8	2.6	0.0	**32.5**	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 17



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 10R, Study no: 17



HERBACEOUS TRENDS--
Management unit 10R, Study no: 17

Type	Species	Nested Frequency			Average Cover %		
		'98	'00	'10	'98	'00	'10
G	Agropyron intermedium	a50	b143	c215	.59	3.69	7.25
G	Bouteloua gracilis	24	17	15	.66	.08	.40
G	Bromus anomalus	-	-	5	-	-	.15
G	Bromus tectorum (a)	a7	a1	b154	.02	.00	3.79
G	Carex sp.	3	2	13	.15	.06	.54
G	Elymus cinereus	9	8	7	1.00	1.61	.82
G	Oryzopsis hymenoides	11	4	4	.52	.33	.18
G	Poa pratensis	b410	b394	a197	25.38	18.96	7.67
G	Sitanion hystrix	b15	ab6	a-	.15	.06	-
G	Sporobolus cryptandrus	a-	a-	b28	-	-	.21
G	Stipa comata	a102	a84	b231	6.92	4.19	15.36
Total for Annual Grasses		7	1	154	0.01	0.00	3.79
Total for Perennial Grasses		624	658	715	35.38	29.00	32.59
Total for Grasses		631	659	869	35.40	29.00	36.38
F	Achillea millefolium	4	10	2	.15	.47	.00
F	Agoseris glauca	-	3	-	-	.00	-
F	Androsace septentrionalis (a)	b17	a4	a-	.04	.01	-
F	Aster sp.	-	4	-	-	.00	-
F	Astragalus convallarius	7	6	3	.04	.09	.03
F	Castilleja sp.	2	-	-	.03	-	-
F	Chaenactis douglasii	b14	b13	a-	.09	.03	-
F	Chenopodium leptophyllum(a)	-	-	9	-	-	.01
F	Corydalis aurea	-	5	-	-	.03	-
F	Cryptantha sp.	10	3	-	.12	.06	-

Type	Species	Nested Frequency			Average Cover %		
		'98	'00	'10	'98	'00	'10
F	Descurainia pinnata (a)	-	3	8	-	.00	.01
F	Eriogonum umbellatum	-	-	3	-	-	.00
F	Lappula occidentalis (a)	a-	a-	b253	-	-	3.54
F	Oenothera trichocalyx	a3	b46	a-	.15	1.02	-
F	Penstemon sp.	19	22	17	.85	.84	.46
F	Phlox longifolia	a3	b77	b75	.00	.62	.48
F	Senecio multilobatus	b38	a18	ab18	.23	.31	.09
F	Sphaeralcea coccinea	2	3	7	.15	.03	.04
F	Streptanthus cordatus	2	-	-	.03	-	-
F	Taraxacum officinale	12	13	21	.03	.33	.16
F	Tragopogon dubius	10	10	2	.03	.01	.00
Total for Annual Forbs		17	7	270	0.04	0.01	3.56
Total for Perennial Forbs		126	233	148	1.91	3.87	1.28
Total for Forbs		143	240	418	1.96	3.88	4.85

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

BROWSE TRENDS--
Management unit 10R, Study no: 17

Type	Species	Strip Frequency			Average Cover %		
		'98	'00	'10	'98	'00	'10
B	Artemisia frigida	0	0	51	-	-	.79
B	Artemisia tridentata vaseyana	79	5	15	21.65	.15	1.56
B	Ceratoides lanata	0	2	2	-	-	-
B	Chrysothamnus nauseosus	15	2	8	.93	-	1.44
B	Chrysothamnus viscidiflorus	4	2	6	.06	-	-
B	Gutierrezia sarothrae	0	0	1	-	-	.03
B	Symphoricarpos oreophilus	57	23	37	7.75	1.47	3.95
Total for Browse		155	34	120	30.40	1.63	7.78

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 17

Species	Percent Cover '10
Artemisia frigida	.78
Artemisia tridentata vaseyana	2.50
Chrysothamnus nauseosus	1.64
Chrysothamnus viscidiflorus	.40
Symphoricarpos oreophilus	4.16

BASIC COVER--
Management unit 10R, Study no: 17

Cover Type	Average Cover %		
	'98	'00	'10
Vegetation	68.31	37.76	57.20
Rock	.09	1.21	.17
Pavement	2.33	7.20	3.32
Litter	68.18	30.60	52.35
Cryptogams	1.03	.00	.03
Bare Ground	8.18	35.35	18.54

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 17, Study Name: Railroad Canyon

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
29.6	6.7	72.7	14.7	12.6	2.4	13.6	92.8	0.9

PELLET GROUP DATA--
Management unit 10R, Study no: 17

Type	Quadrat Frequency		
	'98	'00	'10
Sheep	-	-	1
Rabbit	-	1	2
Elk	3	27	9
Deer	-	1	9
Cattle	4	2	15

Days use per acre (ha)		
'98	'00	'10
-	-	-
-	-	-
27 (68)	55 (136)	8 (20)
1 (2)	12 (30)	26 (65)
14 (34)	-	48 (118)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 17

		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									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
10	**5380**	38	62	-	980	0	0	0	4/6
Artemisia tridentata vaseyana									
98	**3740**	8	68	24	60	16	.53	21	40/45
00	**120**	50	50	0	-	0	0	0	5/8
10	**1180**	44	56	0	40	2	0	0	25/42
Ceratoides lanata									
98	**0**	0	0	-	-	0	0	0	-/-
00	**60**	33	67	-	-	100	0	0	-/-
10	**60**	33	67	-	-	0	0	0	6/7

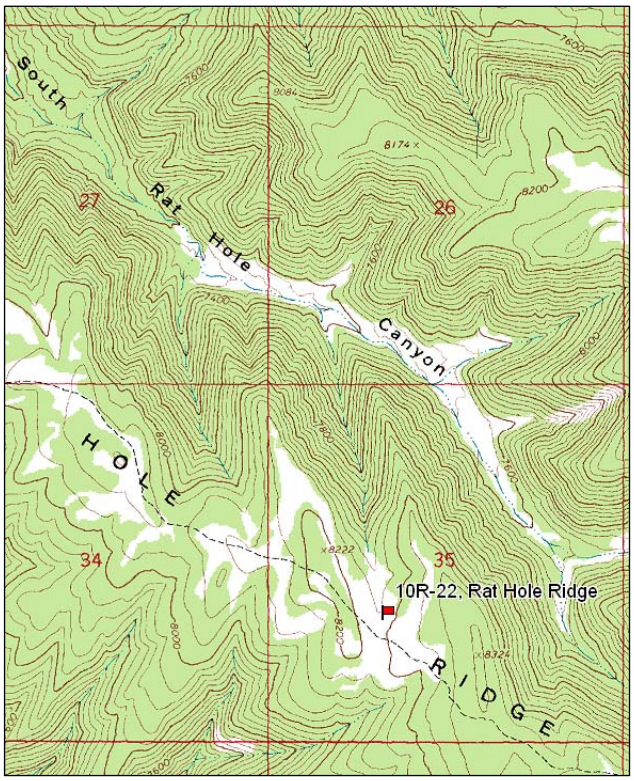
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Cercocarpus montanus									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	15/22
Chrysothamnus nauseosus									
98	**580**	14	83	3	-	0	0	0	33/35
00	**40**	0	100	0	-	0	0	0	21/24
10	**200**	30	70	0	-	10	10	0	36/56
Chrysothamnus viscidiflorus									
98	**80**	0	100	-	-	0	0	0	20/16
00	**60**	100	0	-	-	67	0	0	5/5
10	**140**	0	100	-	-	0	0	0	11/15
Gutierrezia sarothrae									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
10	**40**	0	100	-	-	0	0	0	6/8
Peraphyllum ramosissimum									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	7/16
Symphoricarpos oreophilus									
98	**2580**	31	62	7	40	14	10	7	27/37
00	**1360**	54	46	0	-	50	28	0	7/16
10	**1280**	27	73	0	-	13	0	0	16/30
Tetradymia canescens									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	8/13

RATHOLE RIDGE - TREND STUDY NO. 10R-22-10

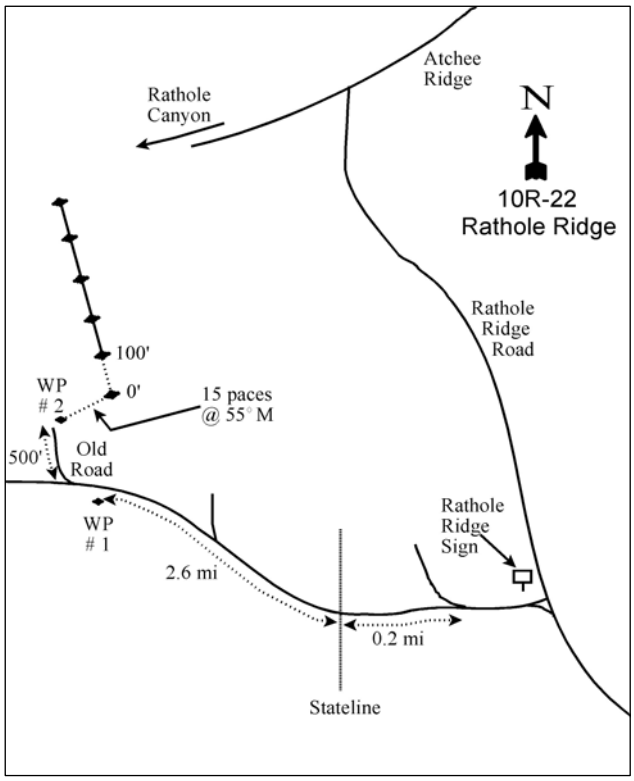
Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Mountain Stony Loam (Browse), R048AY451UT
Land Ownership: BLM
Elevation: 8190 ft. (2497 m)
Aspect: Northwest
Slope: 6%
Transect bearing: 336° magnetic
Belt placement: line 1(11ft), line 2(34 ft), line 3(59 ft), line 4(71 ft) line 5 (95 ft).

Directions:
From the Junction of Atchee Ridge Road, Rathole Canyon and Rathole Ridge Road follow Rathole Ridge Road up to the a sign pointing to Rathole Ridge. Take this road to the first fork. Take a left at the fork and continue down the canyon 0.2 miles to the state line. Continue 2.6 miles down (staying left) to a witness post on the left side of the road. Just past the witness post an old road breaks off to the right follow it about 500' to another witness post on the right side of the road. From this second witness post the 0-foot stake is 15 paces at 55°M and is marked with browse tag #111.

Map Name: Rat Hole Ridge



Diagrammatic Sketch:



Township: 14S Range: 25E Section: 35

GPS: NAD 83, UTM 12S 664191 E 4380011 N

RATHOLE RIDGE - TREND STUDY NO. 10R-22

Site Information

Site Description: The study is located in the North Book Cliffs in a sagebrush flat on top of a ridge that was burned in a prescribed fire in the fall of 1998 to reduce sagebrush cover and increase herbaceous vegetation. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Atchee Ridge allotment. Pellet group transect data estimated moderate use by elk from 1998 to 2005, with light use in 2010. Estimated deer use was light from 1998 to 2005, but increased to moderate use in 2010. Estimated cattle use has been light since 1998 (Table - Pellet Group Data).

Browse: Prior to the fire, browse was prevalent on the site with the dominant species in cover being mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). The fire removed much of the browse component and mountain big sagebrush cover decreased substantially in 2000 (Table - Browse Trends). However on summer range, browse is not the key vegetation component and the dense stand of mountain big sagebrush needed to be reduced to improve the understory and possibly other preferred browse species such as antelope bitterbrush (*Purshia tridentata*) and Utah serviceberry (*Amelanchier utahensis*). The sagebrush population is comprised of a mixture of mature and young plants with low decadence, good vigor and mostly light use. There is also a small population of mostly young serviceberry plants that has had light to moderate use over the course of the study (Table - Browse Characteristics). Many large serviceberry plants surround the transect on the ridge.

Herbaceous Understory: The herbaceous vegetation is the dominant and key component of this study. Grasses are diverse and abundant on the site. Needle-and-thread (*Stipa comata*), Kentucky bluegrass (*Poa pratensis*) and thickspike wheatgrass (*Agropyron dasystachyum*) are the most abundant, but other moderately abundant species include sedge (*Carex sp.*), subalpine needlegrass (*Stipa columbiana*), mutton bluegrass (*Poa fendleriana*) and prairie junegrass (*Koeleria cristata*). After the fire, perennial grass frequency and cover have increased. Forbs are very diverse with a good composition. Increasers are present but not dominant, with many abundant preferred forage species. The forb component is key on this site as they provide important forage for deer and elk in the spring and summer. Perennial forbs increased in 2000, following the fire, but have steadily decreased since 2000 (Table - Herbaceous Trends).

Soil: Soils are loamy in texture and the soil reaction is slightly acidic (pH 6.3) (Table - Soil Analysis Data). Bare ground cover has been low with large amounts of vegetation and litter provided by herbaceous cover protecting the soil from erosion (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1998 to 2000 - down (-2):** The fire reduced browse species on the site. However, the decrease in mountain big sagebrush cover has provided room for preferred browse such as serviceberry and bitterbrush to resprout.
- **2000 to 2005 - stable (0):** There was little change in the browse component on the site.
- **2005 to 2010 - stable (0):** Mountain big sagebrush increased slightly in density and cover, but serviceberry decreased slightly.

Grass:

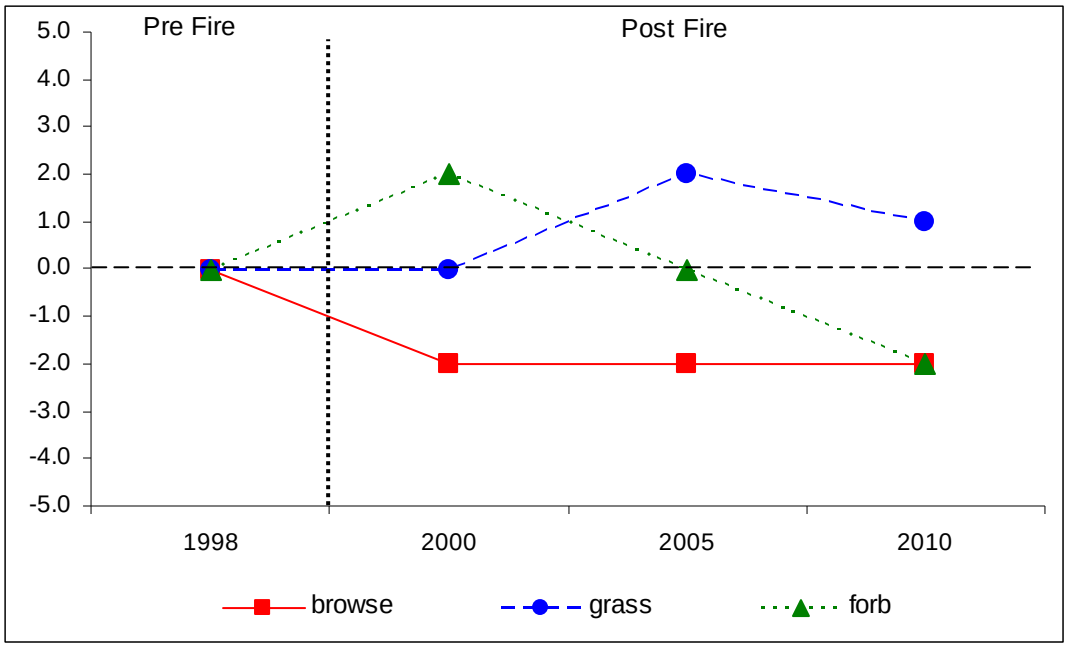
- **1998 to 2000 - stable (0):** There was a slight increase in the sum of nested frequency of perennial grasses, but cover decreased from 18% to 16%.
- **2000 to 2005 - up (+2):** The sum of nested frequency of perennial grasses increased by 20% and cover increased to 38%.
- **2005 to 2010 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 9% and cover decreased to 23%.

Forb:

- **1998 to 2000 - up (+2):** The sum of nested frequency of perennial forbs increased by 22%, though there was little change in cover.
- **2000 to 2005 - down (-2):** The perennial forb sum of nested frequency decreased by 32% and cover decreased from 22% to 15%.
- **2005 to 2010 - down (-2):** There was a 20% decrease in the sum of nested frequency and cover decreased to 12%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 22



HERBACEOUS TRENDS--
Management unit 10R, Study no: 22

Type	Species	Nested Frequency				Average Cover %			
		'98	'00	'05	'10	'98	'00	'05	'10
G	Agropyron dasystachyum	184	222	225	228	1.97	3.22	5.95	3.94
G	Bouteloua gracilis	-	1	-	-	-	.03	-	-
G	Bromus carinatus	b29	a5	a-	a-	.35	.06	-	-
G	Bromus tectorum (a)	2	-	-	-	.03	-	-	-
G	Carex sp.	a3	b54	b56	c139	.03	.73	.62	2.72
G	Koeleria cristata	b42	b36	a13	ab22	.52	.37	.51	.25
G	Poa fendleriana	b69	ab43	a29	ab44	1.45	.95	.72	1.04
G	Poa nevadensis	a-	b14	d115	c60	-	.19	2.38	2.69
G	Poa pratensis	a156	a162	ab202	b235	6.88	3.09	10.69	9.30
G	Sitanion hystrix	13	-	1	-	.10	-	.00	-
G	Stipa columbiana	a15	b76	b64	a13	.30	1.12	3.84	.71
G	Stipa comata	ab183	b137	b193	a81	6.68	5.70	12.82	2.56
Total for Annual Grasses		2	0	0	0	0.03	0	0	0

Type	Species	Nested Frequency				Average Cover %			
		'98	'00	'05	'10	'98	'00	'05	'10
Total for Perennial Grasses		694	750	898	822	18.30	15.47	37.55	23.23
Total for Grasses		696	750	898	822	18.34	15.47	37.55	23.23
F	Achillea millefolium	18	25	10	14	.19	.55	.24	.27
F	Agoseris glauca	$_{a}$-	$_{b}$41	$_{b}$57	$_{c}$159	-	.22	1.15	3.08
F	Alyssum alyssoides (a)	-	1	-	-	-	.00	-	-
F	Androsace septentrionalis (a)	$_{a}$11	$_{a}$-	$_{b}$32	$_{a}$9	.07	-	.25	.21
F	Antennaria rosea	27	21	13	16	.73	.55	.71	.34
F	Arabis sp.	8	-	-	-	.04	-	-	-
F	Arenaria congesta	$_{c}$227	$_{ab}$209	$_{b}$173	$_{a}$-	3.19	4.18	2.84	-
F	Aster sp.	$_{a}$-	$_{c}$45	$_{b}$17	$_{c}$44	-	.59	.25	1.22
F	Astragalus convallarius	$_{ab}$13	$_{b}$33	$_{a}$4	$_{a}$10	.22	.27	.04	.12
F	Astragalus miser	$_{c}$155	$_{c}$168	$_{b}$79	$_{a}$52	6.25	5.81	1.19	.86
F	Calochortus nuttallii	3	-	-	4	.03	-	.00	.01
F	Castilleja flava	$_{b}$97	$_{b}$82	$_{a}$3	$_{a}$-	2.02	1.60	.00	-
F	Chaenactis douglasii	-	-	-	6	-	-	-	.15
F	Chenopodium leptophyllum(a)	$_{a}$-	$_{a}$-	$_{ab}$6	$_{b}$15	-	-	.01	.25
F	Crepis acuminata	$_{bc}$100	$_{c}$125	$_{b}$75	$_{a}$19	1.42	1.70	1.41	.20
F	Delphinium nuttallianum	$_{a}$4	$_{a}$-	$_{b}$25	$_{ab}$12	.01	-	.14	.11
F	Draba sp. (a)	1	1	3	4	.03	.00	.00	.01
F	Erigeron eatonii	$_{a}$12	$_{b}$39	$_{a}$9	$_{a}$23	.05	.18	.04	.26
F	Erigeron pumilus	-	-	-	6	-	-	-	.03
F	Eriogonum sp.	2	-	-	-	.00	-	-	-
F	Eriogonum umbellatum	$_{c}$25	$_{ab}$8	$_{bc}$28	$_{a}$3	.55	.12	.56	.00
F	Gayophytum ramosissimum(a)	$_{a}$-	$_{a}$1	$_{b}$16	$_{a}$2	-	.00	.03	.00
F	Geranium richardsonii	$_{ab}$36	$_{b}$52	$_{a}$24	$_{a}$26	1.82	1.22	.76	.87
F	Hackelia patens	$_{a}$1	$_{b}$21	$_{ab}$8	$_{ab}$4	.00	.09	.07	.01
F	Lappula occidentalis (a)	-	-	-	5	-	-	-	.01
F	Lupinus argenteus	$_{b}$28	$_{b}$29	$_{a}$-	$_{a}$5	1.16	1.00	-	.00
F	Penstemon caespitosus	18	27	24	13	.37	.34	.90	.36
F	Penstemon watsonii	64	58	43	51	1.56	.98	1.36	1.35
F	Phlox longifolia	$_{a}$15	$_{b}$46	$_{b}$58	$_{b}$61	.05	.14	.26	.79
F	Polygonum douglasii (a)	$_{b}$44	$_{a}$2	$_{c}$77	$_{a}$4	.36	.00	.18	.00
F	Potentilla gracilis	$_{a}$-	$_{b}$14	$_{b}$24	$_{b}$28	-	.97	1.18	.82
F	Potentilla pennsylvanica	$_{b}$19	$_{b}$27	$_{b}$13	$_{a}$-	.87	.76	.65	-
F	Senecio integerrimus	$_{a}$5	$_{a}$-	$_{ab}$19	$_{b}$34	.04	-	.59	.38
F	Taraxacum officinale	15	29	22	16	.19	.21	.18	.30
F	Thalictrum fendleri	-	1	-	-	-	.00	-	-
F	Tragopogon dubius	2	3	-	-	.00	.00	-	-
F	Unknown forb-perennial	$_{a}$-	$_{a}$-	$_{b}$30	$_{a}$-	-	-	.08	-
F	Viguiera multiflora	9	-	-	-	.33	-	-	-
Total for Annual Forbs		56	5	134	39	0.46	0.01	0.48	0.49
Total for Perennial Forbs		903	1103	758	606	21.16	21.56	14.67	11.58
Total for Forbs		959	1108	892	645	21.62	21.58	15.15	12.08

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

BROWSE TRENDS--
Management unit 10R, Study no: 22

Type	Species	Strip Frequency				Average Cover %			
		'98	'00	'05	'10	'98	'00	'05	'10
B	Amelanchier utahensis	6	8	7	4	.78	.56	.81	.38
B	Artemisia tridentata vaseyana	88	10	31	41	21.83	2.33	2.38	3.03
B	Chrysothamnus depressus	0	0	1	5	-	-	.15	.09
B	Chrysothamnus viscidiflorus viscidiflorus	19	17	25	36	.70	.19	.95	1.31
B	Juniperus osteosperma	1	1	0	1	-	-	-	-
B	Mahonia repens	0	0	1	0	-	-	-	-
B	Purshia tridentata	2	3	2	2	.03	.06	.00	.15
B	Quercus gambelii	0	1	1	1	-	.15	.38	.15
B	Symphoricarpos oreophilus	23	23	21	19	1.93	2.03	2.09	1.60
B	Tetradymia canescens	4	5	5	6	.06	.03	.06	.06
Total for Browse		143	68	94	115	25.34	5.37	6.84	6.79

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 22

Species	Percent Cover	
	'05	'10
Amelanchier utahensis	.78	.75
Artemisia tridentata vaseyana	3.25	4.33
Chrysothamnus viscidiflorus viscidiflorus	2.29	1.31
Purshia tridentata	.15	.36
Quercus gambelii	.03	.03
Symphoricarpos oreophilus	2.88	1.63
Tetradymia canescens	.05	.13

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 22

Species	Average leader growth (in)	
	'05	'10
Amelanchier utahensis	5.1	2.5
Artemisia tridentata vaseyana	2.4	1.9
Purshia tridentata	3.9	3.5

BASIC COVER--
Management unit 10R, Study no: 22

Cover Type	Average Cover %			
	'98	'00	'05	'10
Vegetation	62.92	46.29	56.63	52.56
Rock	.14	.24	.45	.04
Pavement	.33	.34	.14	.00
Litter	58.79	50.99	34.81	45.27
Cryptogams	.98	.07	0	0
Bare Ground	14.93	28.55	20.71	17.96

SOIL ANALYSIS DATA --

Management unit 10R, Study no: 22, Study Name: Rathole Ridge

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.4	6.3	40.0	37.4	22.6	3.6	12.0	124.8	0.9

PELLET GROUP DATA--

Management unit 10R, Study no: 22

Type	Quadrat Frequency			
	'98	'00	'05	'10
Rabbit	-	2	14	1
Elk	14	34	58	45
Deer	-	8	15	1
Cattle	8	-	8	9

Days use per acre (ha)			
'98	'00	'05	'10
-	-	-	-
27 (68)	33 (81)	56 (137)	15 (36)
1 (3)	2 (5)	16 (40)	49 (121)
8 (20)	1 (2)	14 (34)	16 (39)

BROWSE CHARACTERISTICS--

Management unit 10R, Study no: 22

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
98	**180**	44	56	0	-	56	0	0	66/50
00	**240**	67	25	8	-	8	0	0	63/55
05	**200**	60	40	0	-	20	0	0	27/29
10	**100**	80	20	0	-	0	20	0	35/34
Artemisia tridentata vaseyana									
98	**4060**	20	69	11	520	1	2	6	35/45
00	**540**	30	48	22	80	11	0	0	27/27
05	**1100**	47	45	7	1020	20	7	5	16/20
10	**2560**	38	55	6	-	30	5	0	15/20
Chrysothamnus depressus									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	2/10
05	**60**	0	100	-	-	0	0	0	3/9
10	**1480**	74	26	-	-	0	0	0	2/7
Chrysothamnus nauseosus hololeucus									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	21/27
10	**0**	0	0	-	-	0	0	0	23/26
Chrysothamnus viscidiflorus viscidiflorus									
98	**920**	24	76	0	-	0	0	0	13/16
00	**820**	32	68	0	-	0	5	0	9/10
05	**940**	13	85	2	520	11	4	2	10/16
10	**2120**	28	72	0	-	0	3	0	10/17

		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									
98	**20**	0	0	100	-	0	0	100	-/-
00	**20**	0	0	100	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**20**	0	100	0	-	100	0	0	-/-
Mahonia repens									
98	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	4/5
10	**0**	0	0	-	-	0	0	0	-/-
Purshia tridentata									
98	**60**	67	33	-	-	33	0	0	22/62
00	**140**	86	14	-	-	0	0	0	14/26
05	**40**	0	100	-	-	50	50	0	11/21
10	**40**	0	100	-	-	100	0	0	13/27
Quercus gambelii									
98	**0**	0	0	-	-	0	0	0	-/-
00	**60**	100	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	25/10
10	**40**	0	100	-	-	0	0	0	20/11
Symphoricarpos oreophilus									
98	**1200**	52	48	-	100	20	0	0	19/32
00	**1640**	85	15	-	-	0	0	0	13/18
05	**1120**	27	73	-	-	2	43	0	9/15
10	**1480**	8	92	-	-	57	16	0	16/23
Tetradymia canescens									
98	**100**	100	0	-	-	0	0	0	-/-
00	**160**	100	0	-	-	0	0	0	-/-
05	**140**	0	100	-	20	0	0	0	6/9
10	**160**	75	25	-	60	0	0	0	6/8

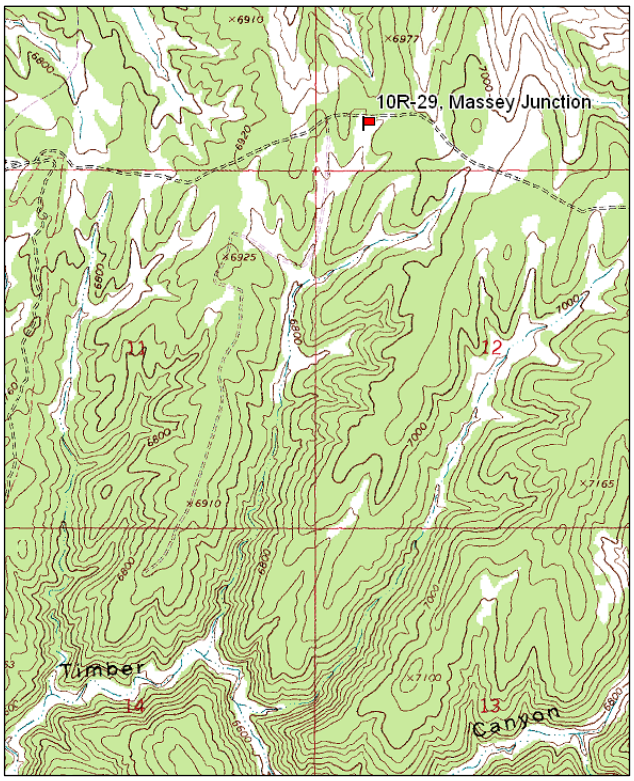
MASSEY JUNCTION - TREND STUDY NO. 10R-29-10

Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper), R034XY322UT
Land Ownership: BLM
Elevation: 6950 ft. (2119 m)
Aspect: South
Slope: 5%
Transect bearing: 175° magnetic
Belt placement: line 1(11ft), line 2(34 ft), line 3(59 ft), line 4(71 ft) line 5 (95 ft).

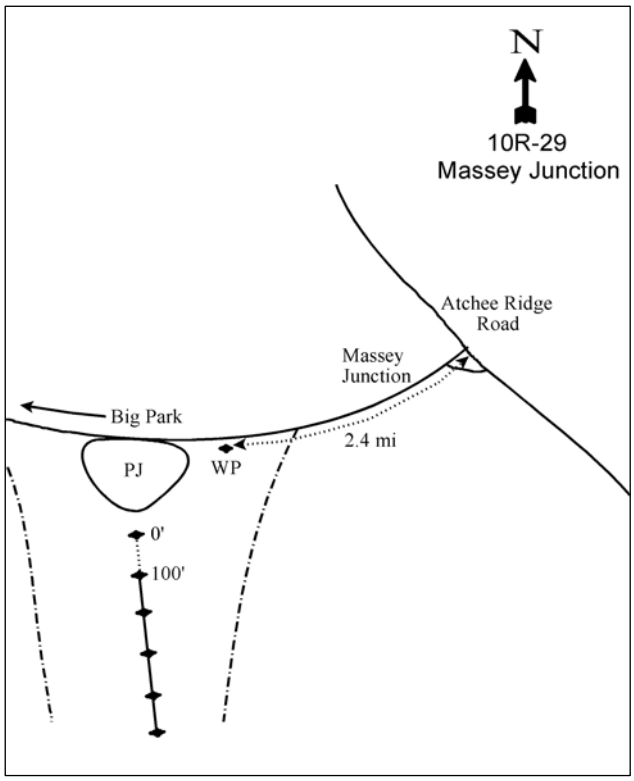
Directions:
From the Seep Ridge Road, about 10 miles north of Pine Spring, turn onto the Bitter Creek Road near McCoy Reservoir. Drive easterly on this road for 10.9 miles to where the road tops out and turn right off the main road. Go 7.65 miles staying on the main road to a fork. Turn right (east) and drive 0.2 miles to a fork, stay left and drive 1.0 miles to the witness post on the right (south) side of the road. From the witness post the 0-foot stake is located down the canyon near the tip of the P-J island separating the two drainages. The baseline continues down the draw.

Alternate Route: From Massey Junction off Atchee Ridge Road, follow the road east towards Big Park 2.4 miles to a witness post on the left side of the road. From the witness post the 0-foot stake is located down the canyon near the tip of the P-J island separating the two drainages. The baseline continues down the draw.

Map Name: Burnt Timber Canyon



Diagrammatic Sketch:



Township: 13S Range: 24E Section: 1

GPS: NAD 83, UTM 12S 655510 E 4397165 N

MASSEY JUNCTION - TREND STUDY NO. 10R-29

Site Information

Site Description: The study samples a narrow draw surrounded by a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands. The draw was burned probably sometime during the 1980's and now supports a salt desert shrub community This area is used as winter range for deer and elk and grazed by cattle in the fall and spring. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Atchee Ridge allotment. Pellet group transect data estimated light use by deer in 1999 and 2005, with more moderate us in 2010. Estimated elk use was heavy in 1999, but was more moderate in 2005 and 2010 (Table- Pellet Group Data).

Browse: The site supports two preferred browse species: fourwing saltbush (*Atriplex canescens*) and winterfat (*Ceratoides lanata*). The fourwing saltbush population is mostly mature with heavy utilization. Decadence of fourwing saltbush was high in 2005, but more moderate in the other sample years. Recruitment of young fourwing saltbush plants has been marginal. Winterfat is the most abundant shrub with high density, but there was a large decrease in the density of winterfat in 2010. The population was mostly mature from 1999 to 2005, but in 2010 the population consisted of a mixture of mature and young plants. Utilization of winterfat has been very heavy since 2005. Fringed sagebrush (*Artemisia frigida*) is abundant, but has decreased in density since 1999, and utilization is mostly light (Table - Browse Characteristics).

Herbaceous Understory: At the outset of the study grasses were dominated by thickspike wheatgrass (*Agropyron dasystachyum*), but thickspike wheatgrass decreased significantly in nested frequency in 2005 and cheatgrass (*Bromus tectorum*) increased significantly becoming the dominant species on the site. Perennial forbs are rare, though scarlet globemallow (*Sphaeralcea coccinea*) has increased steadily in frequency and cover since 1999. The annual species tansy mustard (*Descurainia pinnata*) and annual stickseed (*Lappula occidentalis*) are the only other common forbs (Table - Herbaceous Trends).

Soil: The soil texture is a clay loam with a soil reaction that is slightly alkaline (pH 7.5). Organic matter is relatively high at 5.4% (Table - Soil Analysis Data). Bare ground cover has increased since 1999 as vegetation and litter cover has become more variable being provided primarily by cheatgrass. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1999 to 2005 - slightly down (-1):** Density of fourwing saltbush increased slightly, but cover decreased from 9% to 2%. Decadence of fourwing saltbush increased from 22% to 63% and poor vigor increased from 7% to 28%. Fringed sagebrush had a large decrease in density and cover.
- **2005 to 2010 - slightly down (-1):** Density of fourwing saltbush decreased slightly, but cover increased slightly to 4%. Decadence of fourwing saltbush decreased to 12% and poor vigor decreased to 11%. Winterfat had a 52% decrease in density from 11,640 plants/acre to 5,600 plants/acre and cover decreased from 5% to 1%.

Grass:

- **1999 to 2005 - down (-2):** The sum of nested frequency of perennial grasses decreased by 61% and cover decreased from 27% to 2%. There was a significant decrease in the nested frequency of thickspike wheatgrass. Cheatgrass increased significantly in nested frequency and cover increased from 7% to 29%. Cheatgrass became the dominant species on the site.
- **2005 to 2010 - up (+2):** There was a 50% increase in the sum of nested frequency of perennial grasses and cover increased to 5%, but the perennial grass component is still well below 1999 levels. There was a significant increase in the nested frequency of thickspike wheatgrass, but it remains significantly

lower than in 1999. Cheatgrass decreased significantly in nested frequency and cover decreased to 11%.

Forb:

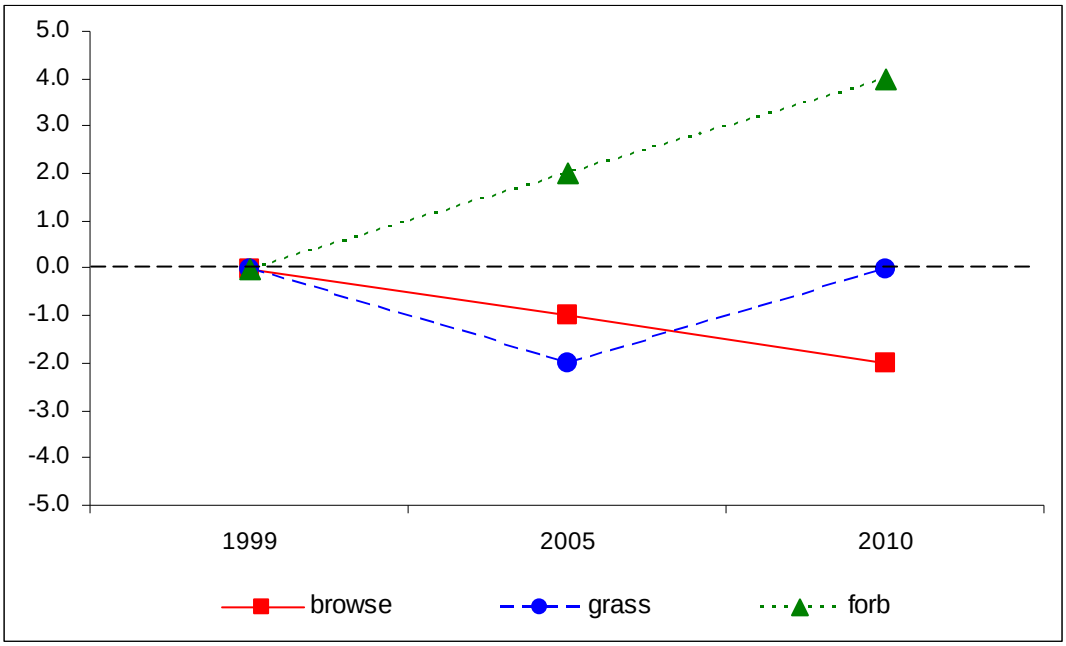
- **1999 to 2005 - up (+2):** The sum of nested frequency of perennial forbs increased by 61% and cover increased from 1% to 3%. There was a significant increase in the nested frequency of scarlet globemallow. Annual species also increased substantially.
- **2005 to 2010 - up (+2):** The perennial forb sum of nested frequency increased 83% due to a significant increase in the nested frequency of scarlet globemallow. There was a subsequent increase in the cover of perennial forbs to 5%. Annual forbs decreased in frequency and cover, but were still prevalent on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 10R, study no: 29

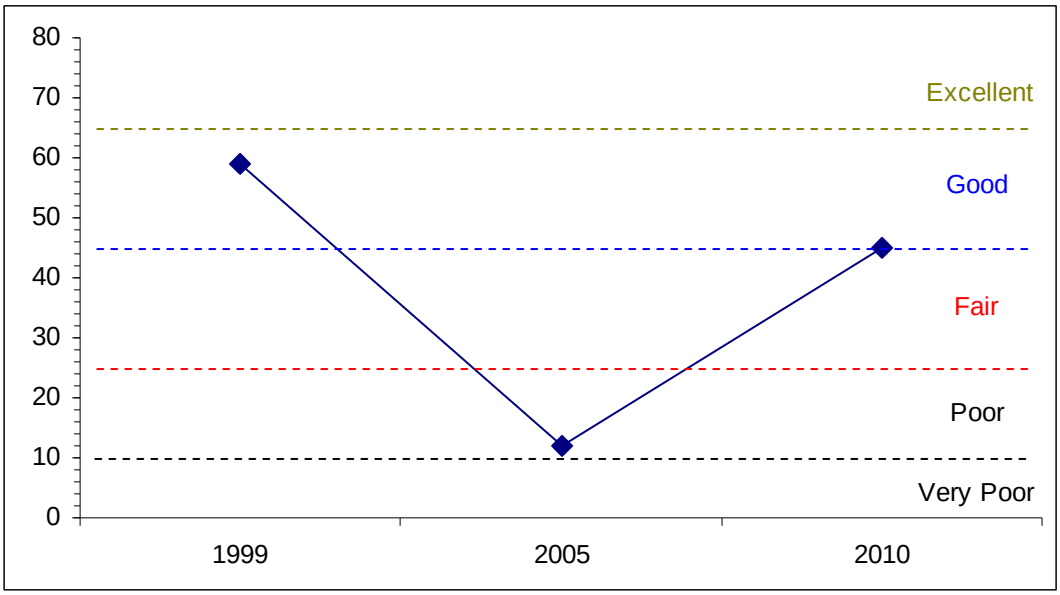
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
99	18.2	11.1	3.2	30.0	-5.4	1.9	0.0	**59.0**	Good
05	9.2	8.8	4.1	4.7	-20.0	5.2	0.0	**12.0**	Very Poor-Poor
10	7.3	12.6	13.6	9.7	-8.2	10.0	0.0	**45.0**	Fair-Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 29



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 10R, Study no: 29



HERBACEOUS TRENDS--
Management unit 10R, Study no: 29

Type	Species	Nested Frequency			Average Cover %		
		'99	'05	'10	'99	'05	'10
G	Agropyron dasystachyum	$_{c}$428	$_{a}$125	$_{b}$203	26.81	1.51	4.34
G	Bouteloua gracilis	15	27	29	.36	.44	.37
G	Bromus tectorum (a)	$_{a}$335	$_{b}$425	$_{a}$330	7.25	29.22	10.89
G	Poa secunda	$_{a}$-	$_{b}$20	$_{b}$26	-	.41	.14
G	Sitanion hystrix	1	-	-	.03	-	-
Total for Annual Grasses		335	425	330	7.25	29.22	10.89
Total for Perennial Grasses		444	172	258	27.20	2.36	4.85
Total for Grasses		779	597	588	34.46	31.59	15.75
F	Camelina microcarpa (a)	-	7	5	-	.07	.01
F	Chenopodium fremontii (a)	-	3	3	-	.00	.03
F	Chorispora tenella (a)	-	2	-	-	.15	-
F	Descurainia pinnata (a)	$_{a}$12	$_{c}$92	$_{b}$40	.03	3.16	.25
F	Lappula occidentalis (a)	$_{a}$-	$_{c}$263	$_{b}$212	-	7.08	2.65
F	Phlox longifolia	-	-	2	-	-	.00
F	Sisymbrium altissimum (a)	-	3	8	-	.15	.18
F	Sphaeralcea coccinea	$_{a}$85	$_{b}$133	$_{c}$234	.97	2.57	4.96
F	Taraxacum officinale	$_{a}$-	$_{ab}$3	$_{b}$14	-	.00	.28
F	Tragopogon dubius	-	1	-	-	.00	.00
Total for Annual Forbs		12	370	268	0.03	10.62	3.13
Total for Perennial Forbs		85	137	250	0.97	2.58	5.25
Total for Forbs		97	507	518	1.00	13.21	8.39

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

BROWSE TRENDS--
Management unit 10R, Study no: 29

Type	Species	Strip Frequency			Average Cover %		
		'99	'05	'10	'99	'05	'10
B	Artemisia frigida	50	47	42	2.03	.28	.65
B	Artemisia tridentata tridentata	1	1	1	-	-	-
B	Atriplex canescens	63	68	65	8.95	2.43	3.92
B	Ceratoides lanata	95	93	79	4.01	4.69	1.37
B	Gutierrezia sarothrae	3	3	3	-	.15	.18
Total for Browse		212	212	190	15.00	7.55	6.13

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 29

Species	Percent Cover	
	'05	'10
Artemisia frigida	1.08	.21
Artemisia tridentata tridentata	-	.35
Atriplex canescens	3.13	7.21
Ceratoides lanata	4.06	.83
Gutierrezia sarothrae	.15	.15

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 29

Species	Average leader growth (in)	
	'05	'10
Artriplex canescens	4.1	3.3
Ceratoides lanata	6.5	2

BASIC COVER--
Management unit 10R, Study no: 29

Cover Type	Average Cover %		
	'99	'05	'10
Vegetation	52.90	50.59	32.95
Rock	.11	.20	0
Pavement	3.76	2.99	2.22
Litter	49.88	28.83	43.97
Cryptogams	.03	.34	.00
Bare Ground	12.93	28.52	32.77

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 29, Study Name: Massey Junction

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.9	7.5	28.9	34.6	36.6	5.4	17.1	336.0	0.8

PELLET GROUP DATA--
Management unit 10R, Study no: 29

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'05	'10	'99	'05	'10
Rabbit	16	63	4	-	-	-
Elk	25	38	17	90 (222)	42 (104)	30 (74)
Deer	19	24	22	16 (40)	12 (30)	30 (74)
Cattle	6	6	20	26 (64)	16 (39)	36 (90)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 29

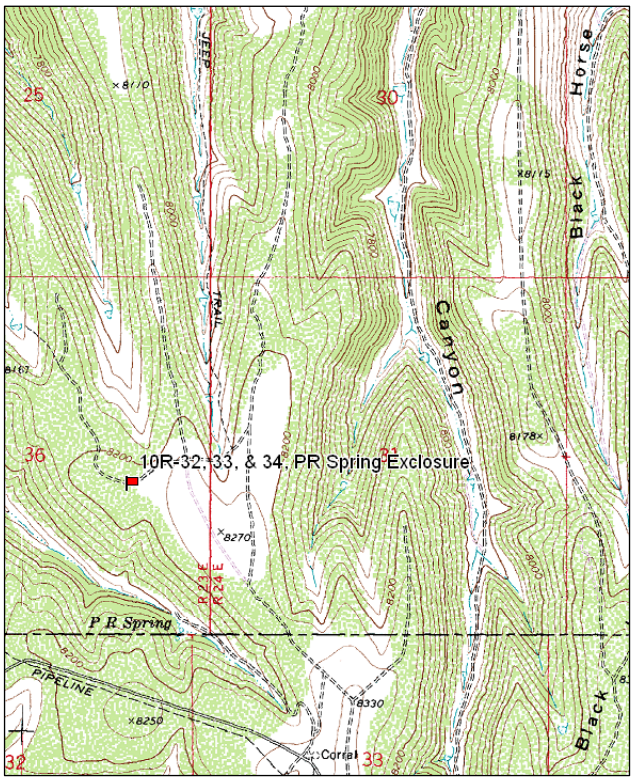
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia frigida									
99	**7000**	4	96	-	20	24	13	0	7/7
05	**2420**	6	94	-	140	29	18	0	7/8
10	**1960**	55	45	-	380	21	3	6	5/8
Artemisia tridentata tridentata									
99	**20**	0	100	-	-	0	0	0	34/31
05	**20**	0	100	-	-	0	100	0	34/36
10	**20**	0	100	-	-	0	0	0	36/42
Atriplex canescens									
99	**2100**	7	71	22	-	43	29	7	33/41
05	**2320**	9	28	63	40	31	57	28	27/34
10	**2060**	15	74	12	520	38	28	11	26/33
Ceratoides lanata									
99	**10780**	6	93	0	-	6	3	.18	10/8
05	**11640**	8	92	0	40	5	88	0	7/8
10	**5600**	49	51	0	140	29	58	0	5/6
Chrysothamnus nauseosus									
99	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	12/15
10	**0**	0	0	-	-	0	0	0	37/58
Gutierrezia sarothrae									
99	**100**	20	80	-	-	0	0	0	6/6
05	**100**	0	100	-	-	0	0	0	7/8
10	**740**	16	84	-	-	0	0	0	5/6
Symphoricarpos oreophilus									
99	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	34/47

PR SPRING TOTAL EXCLOSURE - TREND STUDY NO. 10R-32-10

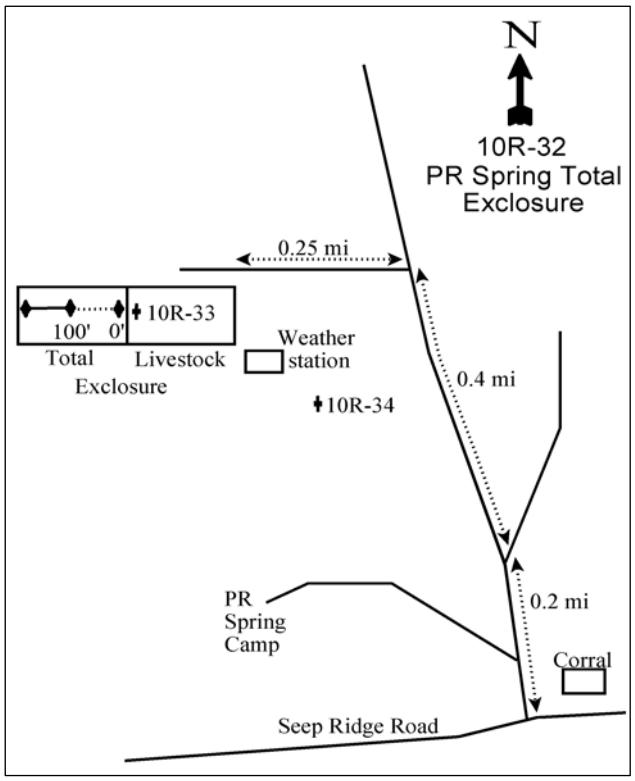
Vegetation Type: Mountain Brush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Mountain Stony Loam (Browse), R048AY451UT
Land Ownership: SITLA
Elevation: 8200 ft. (2500 m)
Aspect: Southeast
Slope: 2-3%
Transect bearing: 260° magnetic
Belt placement: line 1 (34, 59, & 95ft), line 2 (11, & 71ft).

Directions:
On 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 exclosure. The 0-foot stake in the total exclosure is located near the fence separating the total and livestock exclosures. The 0-foot stake is five fence posts from the north fence. The first baseline is 100 feet long and the second baseline is 86 feet long. The 0-foot stake is marked by browse tag #435.

Map Name: PR Spring



Diagrammatic Sketch:



Township: 15S Range: 23E Section: 36

GPS: NAD 83, UTM 12S 647370 E 4370119 N

PR SPRING TOTAL EXCLOSURE - TREND STUDY NO. 10R-32

Site Information

Site Description: This study was established in 2002 to gather baseline data for a three-way exclosure that was built in 2001 by the Bureau of Land Management (BLM) near PR Spring on the North Book Cliffs. The transect samples a mountain brush community within the total exclosure which is now inaccessible to big game or livestock. Due to the dimensions of the exclosure, the sampling baseline is only 200 feet in length. The area represents summer range for wildlife. Grazing in the area is managed by the BLM as part of the Sweetwater allotment. In 2002, a pellet group transect was read to estimate use from before the exclosure was constructed. Estimated elk and deer use was moderate, and cattle use was estimated to be light (Table - Pellet Group Data).

Browse: The browse component dominates the vegetation community providing the majority of the vegetation cover on the site. Several preferred species are present including Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), true mountain mahogany (*Cercocarpus montanus*) and antelope bitterbrush (*Purshia tridentata*) provide a large proportion of the browse cover on the site. Snowberry (*Symphoricarpos oreophilus*), although less preferred, provides the highest average cover (Table - Browse Trends) and has the highest density of any single species in the total exclosure. Prior to the exclosure, use on serviceberry and mahogany was moderate to heavy, while use on mountain big sagebrush was light (Table - Browse Characteristics). Less preferred browse sampled include stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), Gambel oak (*Quercus gambelii*) and grey horsebrush (*Tetradymia canescens*).

Herbaceous Understory: Grasses are comprised entirely of perennial species including sedge (*Carex sp.*), thickspike wheatgrass (*Agropyron dasystachyum*), mutton bluegrass (*Poa fendleriana*) and Kentucky bluegrass (*P. pratensis*). Most of the grasses are found underneath, or in close proximity to, shrubs and it was noted that interspaces were relatively bare in 2002. The forb component is diverse, but has only fair production. Two species, weedy milkvetch (*Astragalus miser*) and mat penstemon (*Penstemon caespitosus*), have provide the majority of the forb cover. Composition is fairly good with desirable species such as pale agoseris (*Agoseris glauca*), yellow Indian paintbrush (*Castilleja flava*), redroot eriogonum (*Eriogonum racemosum*), sulfur eriogonum (*E. umbellatum*) and Lewis flax (*Linum lewisii*) present (Table - Herbaceous Trends).

Soil: Soils on the site are clay loam in texture and neutral in reactivity (pH 6.7). Percent organic matter is moderate at 3.6% (Table - Soil Analysis Data). Bare ground cover is minimal due to the abundance of 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 - slightly down (-1):** The density and cover of the four preferred browse species, mountain big sagebrush, Utah serviceberry, true mountain mahogany and antelope bitterbrush, decreased slightly. Decadence also increased slightly in sagebrush, serviceberry and mahogany, but was not considered high.
- **2005 to 2010 - stable (0):** Density decreased slightly in serviceberry and sagebrush, but increased in bitterbrush and mahogany. Decadence decreased in sagebrush, serviceberry and mahogany.

Grass:

- **2002 to 2005 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses.

- **2005 to 2010 - stable (0):** The sum of nested frequency of perennial grasses decreased by 11%, but cover increased from 13% to 18%.

Forb:

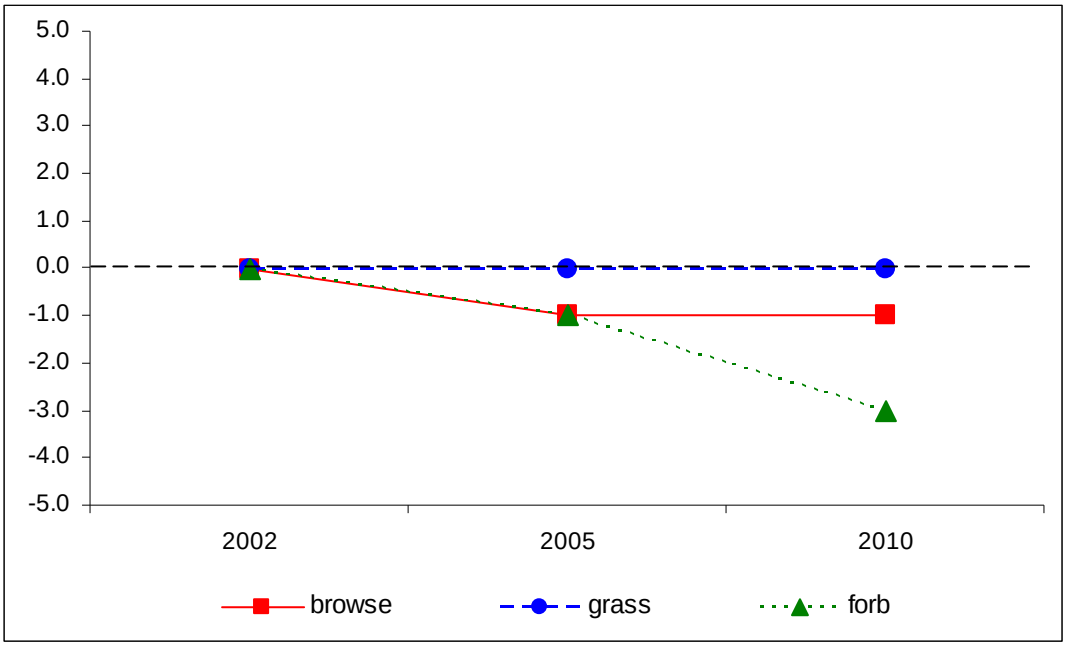
- **2002 to 2005 - slightly down (-1):** There was a 14% decrease in the sum of nested frequency of perennial forbs, though cover increased slightly.
- **2005 to 2010 - down (-2):** The sum of nested frequency of perennial grasses decreased by 31% with a slight decrease in cover.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 10R, study no: 32

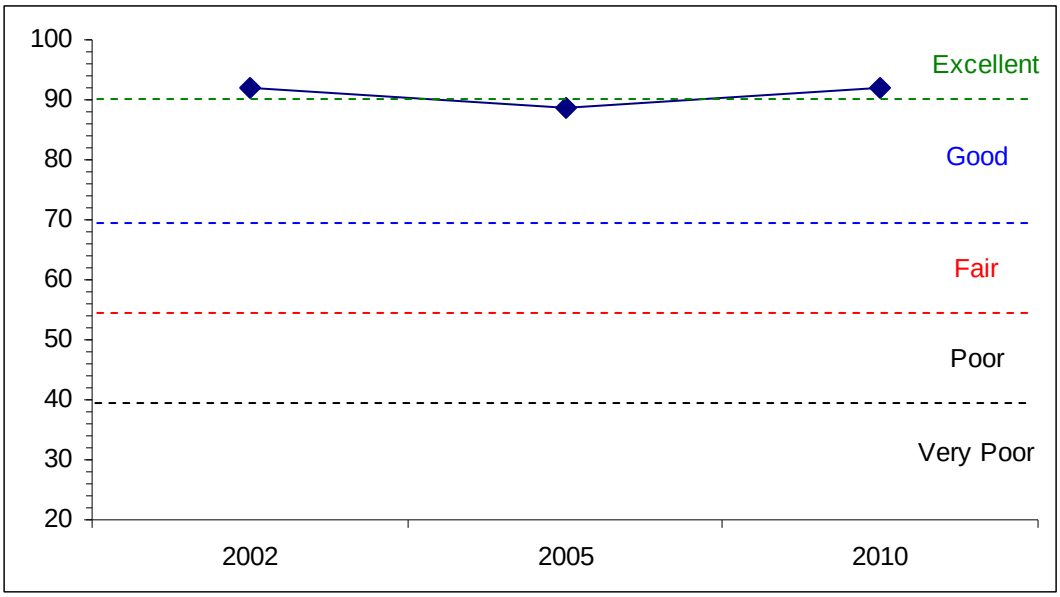
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
02	30.0	12.2	14.8	25.1	0.0	10.0	0.0	**92.1**	Excellent
05	30.0	9.1	13.3	26.3	0.0	10.0	0.0	**88.7**	Good-Excellent
10	30.0	13.6	8.5	30.0	0.0	10.0	0.0	**92.0**	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 32



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL--
Management unit 10R, Study no: 32



HERBACEOUS TRENDS--
Management unit 10R, Study no: 32

Type	Species	Nested Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
G	Agropyron dasystachyum	193	189	148	3.82	2.81	2.83
G	Agropyron spicatum	5	4	4	.06	.03	.15
G	Carex sp.	148	92	103	5.37	3.12	4.81
G	Koeleria cristata	6	-	3	.18	-	.03
G	Poa fendleriana	74	113	95	2.85	4.34	6.54
G	Poa pratensis	$_{a}$16	$_{b}$68	$_{b}$64	.25	2.83	3.84
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		442	466	417	12.55	13.14	18.21
Total for Grasses		442	466	417	12.55	13.14	18.21
F	Agoseris glauca	4	-	2	.01	-	.09
F	Androsace septentrionalis (a)	$_{a}$-	$_{b}$12	$_{a}$-	-	.07	-
F	Antennaria rosea	4	3	-	.01	.03	-
F	Arenaria sp.	$_{ab}$5	$_{b}$11	$_{a}$-	.03	.05	-
F	Aster sp.	$_{a}$-	$_{ab}$1	$_{b}$10	-	.00	.10
F	Astragalus miser	91	77	76	2.77	3.04	3.62
F	Astragalus utahensis	6	1	1	.15	.00	.03
F	Balsamorhiza sagittata	1	-	-	.00	-	-
F	Castilleja flava	$_{b}$31	$_{ab}$16	$_{a}$10	.49	.11	.21
F	Cirsium sp.	19	14	20	.15	.70	1.21
F	Collinsia parviflora (a)	2	9	-	.00	.04	-
F	Crepis acuminata	5	-	6	.03	.00	.03
F	Delphinium nuttallianum	-	3	-	-	.03	-
F	Erigeron eatonii	$_{b}$75	$_{b}$80	$_{a}$44	.54	.99	.43
F	Eriogonum racemosum	$_{b}$18	$_{a}$4	$_{a}$-	.13	.03	-

Type	Species	Nested Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
F	Eriogonum umbellatum	20	14	13	.37	.68	.10
F	Ipomopsis aggregata	4	2	-	.03	.00	-
F	Lepidium sp. (a)	$_{ab}$3	$_{b}$11	$_{a}$1	.01	.03	.00
F	Linum lewisii	11	9	12	.08	.20	.19
F	Machaeranthera canescens	4	4	4	.03	.03	.16
F	Penstemon caespitosus	$_{b}$129	$_{b}$104	$_{a}$40	1.56	1.81	.43
F	Phlox longifolia	7	18	9	.02	.11	.05
F	Polygonum douglasii (a)	$_{a}$-	$_{b}$54	$_{a}$5	-	.16	.00
F	Potentilla gracilis	-	-	5	-	-	.01
F	Senecio integerrimus	$_{a}$-	$_{ab}$2	$_{b}$9	-	.00	.07
F	Streptanthus cordatus	-	-	1	-	-	.03
F	Taraxacum officinale	$_{a}$14	$_{b}$24	$_{a}$5	.03	.26	.04
F	Tragopogon dubius	4	1	-	.01	.00	-
Total for Annual Forbs		5	86	6	0.01	0.31	0.00
Total for Perennial Forbs		452	388	267	6.51	8.17	6.83
Total for Forbs		457	474	273	6.52	8.48	6.84

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

BROWSE TRENDS--
Management unit 10R, Study no: 32

Type	Species	Strip Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
B	Amelanchier utahensis	55	47	38	11.43	10.35	10.63
B	Artemisia tridentata vaseyana	77	77	67	14.28	12.20	14.10
B	Cercocarpus montanus	66	64	65	7.50	6.93	6.37
B	Chrysothamnus viscidiflorus viscidiflorus	60	52	55	3.65	3.75	5.19
B	Gutierrezia sarothrae	0	1	0	-	-	-
B	Purshia tridentata	11	7	9	.33	.06	1.92
B	Quercus gambelii	20	18	9	.95	.39	1.11
B	Symphoricarpos oreophilus	93	97	93	17.60	15.85	19.67
B	Tetradymia canescens	3	2	3	.04	.00	-
Total for Browse		385	365	339	55.81	49.56	59.02

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 32

Species	Percent Cover		
	'02	'05	'10
Amelanchier utahensis	13.61	11.44	12.71
Artemisia tridentata vaseyana	20.08	15.36	18.64
Cercocarpus montanus	5.36	7.15	6.73
Chrysothamnus viscidiflorus viscidiflorus	.96	2.54	3.04
Gutierrezia sarothrae	.88	-	-
Purshia tridentata	.20	.06	.41
Quercus gambelii	.21	.61	1.56
Symphoricarpos oreophilus	20.31	19.25	20.46

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 32

Species	Average leader growth (in)		
	'02	'05	'10
Amelanchier utahensis	3.1	3.3	2.5
Artemisia tridentata vaseyana	2.1	2.2	1.5
Cercocarpus montanus	1.9	2.3	4.9

BASIC COVER--
Management unit 10R, Study no: 32

Cover Type	Average Cover %		
	'02	'05	'10
Vegetation	58.40	59.05	75.02
Rock	.23	.04	.00
Pavement	7.22	8.35	5.97
Litter	58.92	50.58	58.12
Cryptogams	.25	.10	.18
Bare Ground	9.25	3.23	4.73

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 32, Study Name: PR Spring Total Exclosure

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
9.7	6.8	35.3	32.7	32.0	3.6	14.9	291.2	0.8

PELLET GROUP DATA--
Management unit 10R, Study no: 32

Type	Quadrat Frequency		
	'02	'05	'10
Rabbit	12	42	4
Elk	9	-	-
Deer	15	3	-
Cattle	1	1	-

Days use per acre (ha)		
'02	'05	'10
-	-	-
23 (56)	-	-
39 (96)	-	-
7 (18)	-	-

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 32

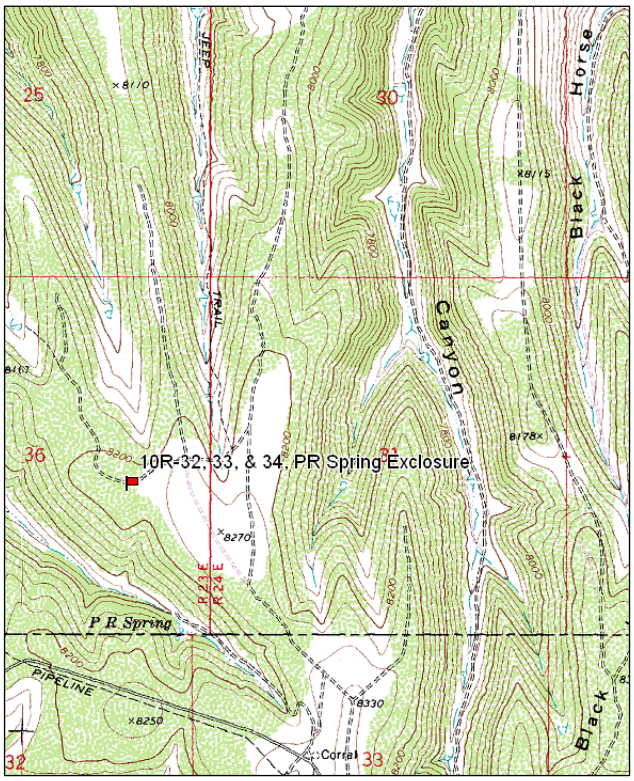
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
02	**1800**	42	49	9	20	16	27	4	52/51
05	**1300**	38	43	18	20	0	0	14	46/50
10	**1080**	17	81	2	200	0	0	4	52/52
Artemisia tridentata vaseyana									
02	**3560**	21	64	15	100	10	4	4	30/38
05	**3180**	13	60	27	320	0	0	25	23/31
10	**3000**	9	83	9	-	3	0	6	27/36
Cercocarpus montanus									
02	**2920**	26	73	1	80	14	52	.68	43/35
05	**2600**	30	59	11	220	0	0	12	46/37
10	**2760**	30	68	2	140	0	0	2	50/39
Chrysothamnus viscidiflorus viscidiflorus									
02	**2980**	9	90	1	40	0	0	0	13/14
05	**2680**	7	91	1	-	4	.74	.74	10/13
10	**2660**	11	89	1	60	0	0	.75	15/16
Gutierrezia sarothrae									
02	**0**	0	0	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Mahonia repens									
02	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	4/7
10	**0**	0	0	-	-	0	0	0	-/-
Purshia tridentata									
02	**260**	0	92	8	-	31	46	0	12/18
05	**160**	13	88	0	-	0	0	0	12/18
10	**180**	22	78	0	20	0	0	0	22/28
Quercus gambelii									
02	**560**	50	50	-	20	4	0	0	-/-
05	**920**	93	7	-	40	0	0	0	12/9
10	**300**	33	67	-	800	0	0	7	21/15
Symphoricarpos oreophilus									
02	**5320**	18	82	0	140	0	0	0	17/31
05	**8220**	19	81	0	-	0	0	0	15/21
10	**8000**	22	78	0	-	.25	0	0	18/28
Tetradymia canescens									
02	**100**	40	60	0	-	0	0	0	7/8
05	**80**	0	100	0	-	0	0	0	6/7
10	**80**	0	75	25	-	0	0	25	-/-

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

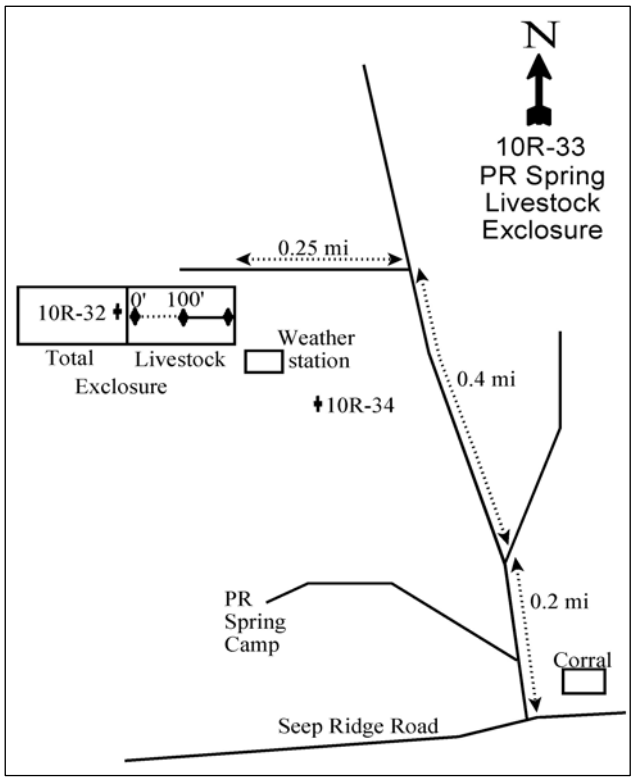
Vegetation Type: Mountain Brush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Mountain Stony Loam (Browse), R048AY451UT
Land Ownership: SITLA
Elevation: 8221 ft. (2506 m)
Aspect: South/Southeast
Slope: 3%
Transect bearing: 80° 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 exclosure. The 0-foot stake in the livestock exclosure is located near the fence separating the total and livestock exclosures. The 0-foot stake is marked by browse tag #423.

Map Name: PR Spring



Diagrammatic Sketch:



Township: 15S Range: 23E Section: 36

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

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

Site Information

Site Description: The study samples the livestock exclosure 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 exclosure baseline. The sampling baseline within the livestock exclosure is also only 200 feet in length. The browse component within the livestock exclosure is not as thick compared to the total exclosure. Use inside the livestock exclosure prior to exclosure 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 exclosure, but it is more likely that pats were from prior to construction of the exclosure (Table - Pellet Group Data).

Browse: Although diverse and abundant, the browse component in the livestock exclosure is not as dense as that in the nearby total exclosure. 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 exclosure, snowberry (*Symphoricarpos oreophilus*) has the highest density of all the browse species within the livestock exclosure. Bitterbrush (*Purshia tridentata*), while highly preferred and displaying heavy use, occurs in low density. Other browse sampled within the livestock exclosure 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:

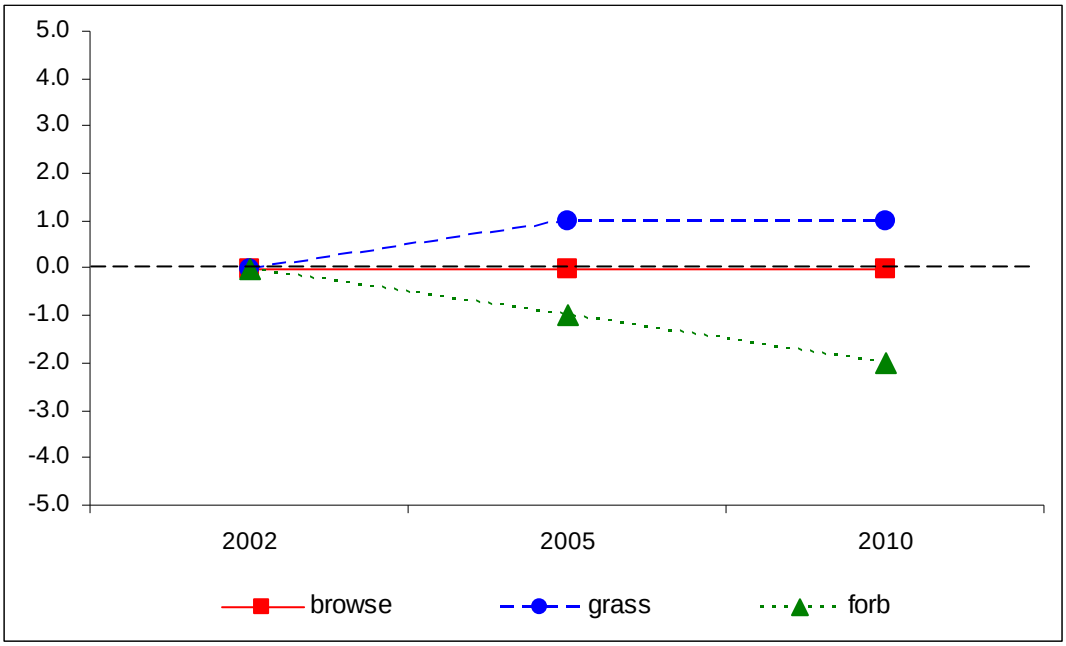
- **2002 to 2005 - slightly down (-1):** The perennial forb sum of nested frequency decreased by 12%, though cover increased from 9% to 12%.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 11% and cover decreased to 8%.

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

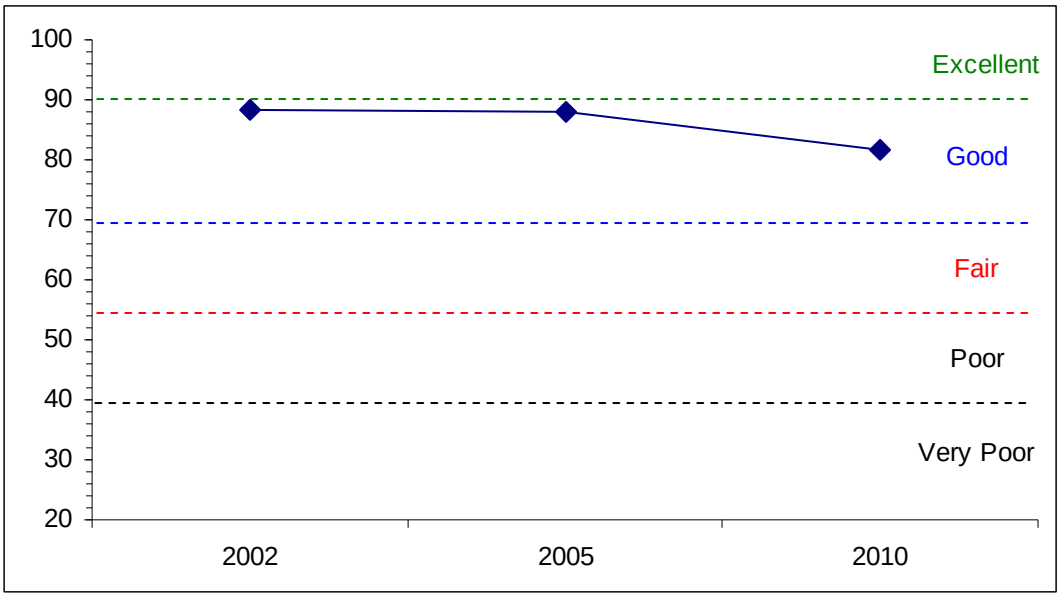
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
02	30.0	7.7	12.6	28.2	0.0	10.0	0.0	**88.4**	Good-Excellent
05	30.0	7.8	10.1	30.0	0.0	10.0	0.0	**87.9**	Good
10	24.0	10.7	6.9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

Type	Species	Nested Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
F	Gilia sp. (a)	-	-	4	-	-	.03
F	Lepidium sp. (a)	5	8	6	.02	.04	.01
F	Linum lewisii	9	16	11	.02	.14	.07
F	Lupinus argenteus	2	2	4	.15	.00	.01
F	Machaeranthera canescens	13	6	9	.11	.05	.07
F	Penstemon caespitosus	$_{b}$217	$_{a}$166	$_{a}$136	1.85	3.08	1.68
F	Phlox longifolia	90	87	84	.32	.55	.44
F	Polygonum douglasii (a)	$_{a}$5	$_{b}$60	$_{a}$5	.01	.17	.01
F	Potentilla gracilis	1	-	1	.00	.00	.03
F	Senecio integerrimus	$_{a}$-	$_{ab}$1	$_{b}$10	-	.18	.15
F	Senecio multilobatus	3	-	-	.00	.00	-
F	Sphaeralcea coccinea	11	7	1	.06	.18	.00
F	Streptanthus cordatus	-	-	2	-	-	.00
F	Taraxacum officinale	$_{a}$4	$_{b}$25	$_{a}$10	.02	.31	.08
F	Tragopogon dubius	-	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

Type	Species	Strip Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
B	Amelanchier utahensis	53	51	47	5.44	4.23	2.59
B	Artemisia tridentata vaseyana	79	72	74	15.19	13.78	13.07
B	Cercocarpus montanus	31	36	36	3.41	3.48	2.26
B	Chrysothamnus depressus	4	3	1	.04	.03	-
B	Chrysothamnus viscidiflorus viscidiflorus	48	39	44	1.00	1.26	1.26
B	Gutierrezia sarothrae	4	7	3	.03	.33	.09
B	Mahonia repens	1	2	0	-	.03	-
B	Purshia tridentata	14	11	12	.48	.86	.24
B	Quercus gambelii	4	3	3	.01	.03	-
B	Symphoricarpos oreophilus	80	82	82	9.72	11.39	9.35
B	Tetradymia canescens	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
Amelanchier utahensis	9.10	8.08	6.36
Artemisia tridentata vaseyana	17.66	17.48	20.83
Cercocarpus montanus	5.05	5.56	4.61
Chrysothamnus depressus	-	.06	.06
Chrysothamnus viscidiflorus viscidiflorus	1.14	1.88	1.35
Gutierrezia sarothrae	.03	.10	-
Mahonia repens	-	.18	-
Purshia tridentata	1.28	.53	.36
Quercus gambelii	.15	.15	.11
Symphoricarpos oreophilus	10.63	13.96	12.50
Tetradymia canescens	.16	.01	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 33

Species	Average leader growth (in)		
	'02	'05	'10
Amelanchier utahensis	2.0	2.6	2.6
Artemisia tridentata vaseyana	2.2	2.1	1.6
Cercocarpus montanus	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 Exclosure

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		
	'02	'05	'10
Rabbit	11	37	5
Elk	7	14	3
Deer	14	22	14
Cattle	3	1	-

Days use per acre (ha)		
'02	'05	'10
-	-	-
19 (46)	21 (53)	11 (26)
48 (117)	63 (155)	25 (61)
14 (34)	14 (34)	-

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

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
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
Artemisia tridentata vaseyana									
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
Cercocarpus montanus									
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
Chrysothamnus depressus									
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
Chrysothamnus viscidiflorus viscidiflorus									
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
Gutierrezia sarothrae									
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	-/-
Mahonia repens									
02	**120**	0	100	-	-	0	0	0	-/-
05	**60**	33	67	-	-	0	33	0	3/7
10	**0**	0	0	-	-	0	0	0	-/-
Purshia tridentata									
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
Quercus gambelii									
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
Symphoricarpos oreophilus									
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

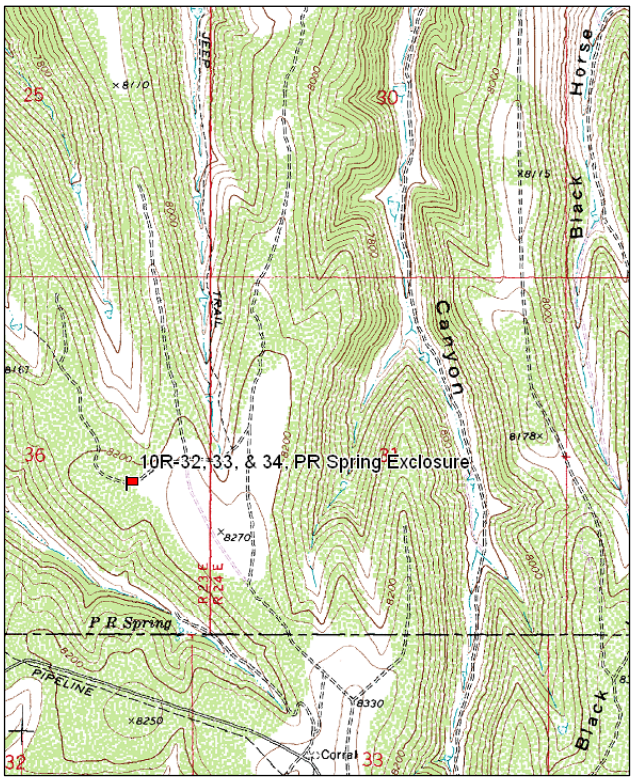
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Tetradymia canescens									
02	**720**	17	75	8	-	6	11	0	4/5
05	**740**	22	78	0	-	43	35	0	5/6
10	**240**	17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

PR SPRING EXCLOSURE OUTSIDE - TREND STUDY NO. 10R-34-10

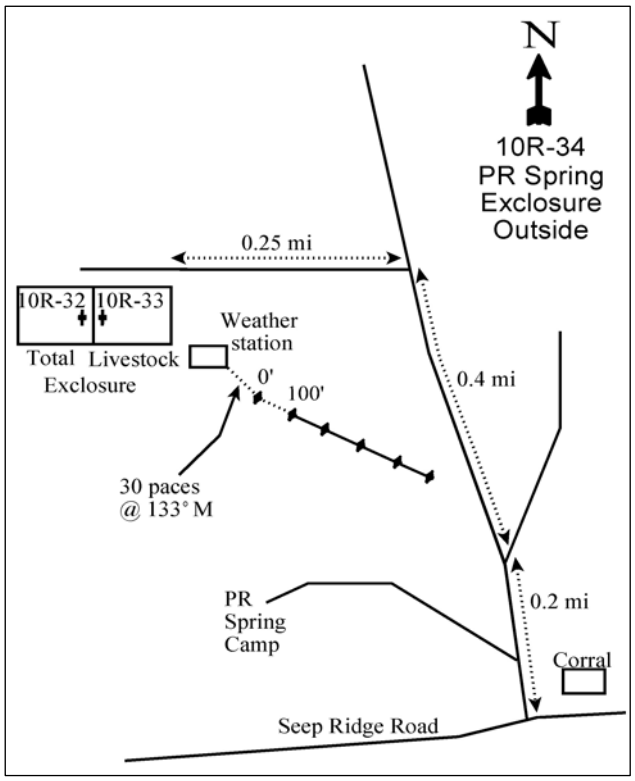
Vegetation Type: Mountain Brush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer (Calving habitat)
NRCS Ecological Site Description: Mountain Stony Loam (Browse), R048AY451UT
Land Ownership: SITLA
Elevation: 8200 ft. (2500 m)
Aspect: Southwest
Slope: 5-10%
Transect bearing: 0° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (95ft), line 5 (71ft). Rebar: belt 1 on 1ft.

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 exclosure. From the southeast corner of the weather station the 0-foot stake is 150 feet at 133°M and is marked by browse tag #424.

Map Name: PR Spring



Diagrammatic Sketch:



Township: 15S Range: 23E Section: 36

GPS: NAD 83, UTM 12S 647498 E 4370094 N

PR SPRING EXCLOSURE OUTSIDE - TREND STUDY NO. 10R-34

Site Information

Site Description: The study samples the mountain brush community outside of and surrounding the exclosure complex at PR Spring. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Sweetwater allotment. This site is accessible by all classes of animals as it lies outside the exclosure. Because this transect lies outside of the exclosure complex, it is a full 500 feet in length. Pellet group transect data has estimated elk use to be moderate in 2002 and 2010, with lighter use in 2005. Estimated deer use was heavy in 2002, but was more moderate in 2005 and 2010. A fawn was found on the site in 2010. Estimated cattle use has been light since 2002 (Table - Pellet Group Data).

Browse: The key browse component outside the exclosure complex contains the same species as those within both the total and livestock exclosures, but dominance levels of these species differ. These differences are not due to the effects of excluding grazing, but rather placement of the study site and exclosure. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) remains abundant, but bitterbrush (*Purshia tridentata*) is more abundant outside the exclosure while serviceberry (*Amelanchier utahensis*) and true mountain mahogany (*Cercocarpus montanus*) are minor components. It was noted in 2010 that many young serviceberry plants were growing in the shelter of mature mountain big sagebrush. Utilization was heavy on serviceberry, true mountain mahogany and bitterbrush, but was mostly light on mountain big sagebrush. Snowberry (*Symphoricarpos oreophilus*) is also abundant outside the exclosure (Table - Browse Characteristics).

Herbaceous Understory: Grasses are diverse and abundant with three perennial grasses particularly abundant outside the exclosure, sedge (*Carex sp.*), mutton bluegrass (*Poa fendleriana*) and Kentucky bluegrass (*P. pratensis*). Thickspike wheatgrass (*Agropyron dasystachyum*) is also moderately abundant. The majority of the grass plants occur underneath shrub crowns. Forbs are diverse and well distributed throughout the site. The most abundant species include mat penstemon (*Penstemon caespitosus*), longleaf phlox (*Phlox longifolia*), rose pussytoes (*Antennaria rosea*), Eaton fleabane (*Erigeron eatonii*), silvery lupine (*Lupinus argenteus*) and weedy milkvetch (*Astragalus miser*). As this is summer range for wildlife, forbs are of particular importance (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 most bare ground found on the many game and livestock trails transecting the site. Vegetation and litter cover are abundant and erosion appears to be minimized, except along the trails (Table - Basic Cover). The soil surface outside the exclosure has moderately high pedestaling around shrubs leaving the interspaces with a pitted appearance. The soil erosion condition was classified on the border of stable and slight in 2002, was slight in 2005, but was stable in 2010. It was noted in 2005 that slight erosion was occurring where trails had been created.

Trend Assessments

Browse:

- **2002 to 2005 - stable (0):** There was little change in the preferred browse components on the site, though decadence of true mountain mahogany increased slightly.
- **2005 to 2010 - stable (0):** There was little change in the preferred browse components.

Grass:

- **2002 to 2005 - stable (0):** The sum of nested frequency of perennial grasses decreased by 6%, but cover increased from 16% to 18%.
- **2005 to 2010 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial grasses, but cover increased to 25%.

Forb:

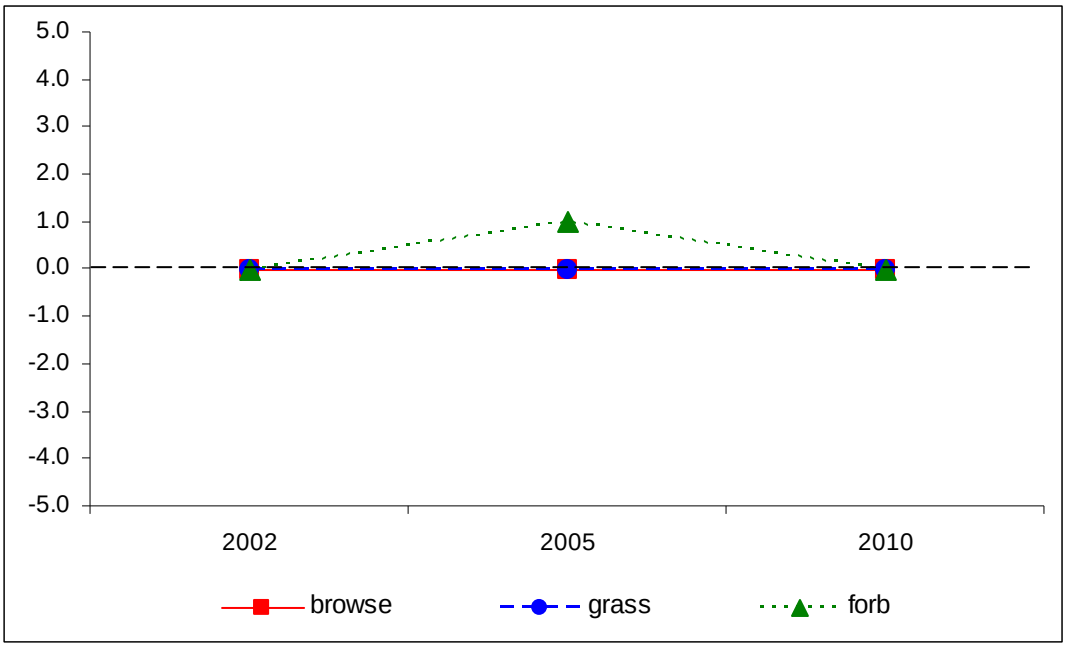
- **2002 to 2005 - slightly up (+1):** The perennial forb sum of nested frequency increased by 13% and cover increased from 6% to 13%.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 14% and cover decreased to 9%.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 10R, study no: 34

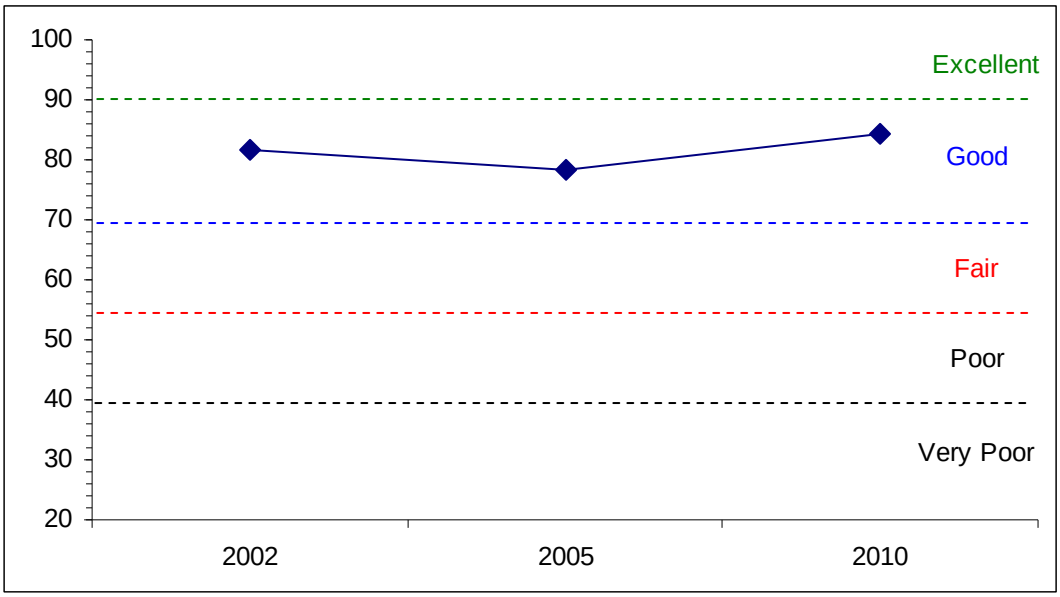
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
02	30.0	6.5	5.3	30.0	0.0	10.0	0.0	**81.7**	Good
05	30.0	4.9	3.6	30.0	0.0	10.0	0.0	**78.5**	Good
10	30.0	10.7	3.6	30.0	0.0	10.0	0.0	**84.3**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 34



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL--
Management unit 10R, Study no: 34



HERBACEOUS TRENDS--
Management unit 10R, Study no: 34

Type	Species	Nested Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
G	Agropyron dasystachyum	$_{a}$144	$_{b}$206	$_{ab}$167	1.09	2.59	1.41
G	Agropyron spicatum	4	7	-	.06	.21	.03
G	Carex sp.	$_{b}$147	$_{ab}$115	$_{a}$103	5.56	5.61	6.32
G	Festuca ovina	4	-	2	.00	-	.00
G	Poa fendleriana	189	169	178	4.75	3.93	7.76
G	Poa pratensis	$_{b}$178	$_{ab}$127	$_{a}$144	4.47	5.00	8.10
G	Poa secunda	$_{ab}$10	$_{a}$2	$_{b}$22	.02	.03	1.29
G	Stipa columbiana	3	10	3	.38	.1	.06
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		679	636	619	16.36	17.50	25.00
Total for Grasses		679	636	619	16.36	17.50	25.00
F	Agoseris glauca	28	25	26	.11	.31	.38
F	Alyssum alyssoides (a)	9	-	5	.02	-	.00
F	Androsace septentrionalis (a)	$_{a}$8	$_{b}$43	$_{a}$7	.05	.17	.02
F	Antennaria rosea	$_{a}$26	$_{ab}$37	$_{b}$46	.93	1.54	1.90
F	Arenaria sp.	21	36	20	.25	.59	.22
F	Astragalus miser	30	31	30	.49	.87	.91
F	Astragalus utahensis	$_{ab}$13	$_{b}$36	$_{a}$7	.06	.15	.04
F	Castilleja flava	$_{b}$13	$_{ab}$9	$_{a}$-	.05	.07	-
F	Cirsium sp.	2	4	7	.00	.06	.07
F	Collinsia parviflora (a)	$_{a}$-	$_{b}$53	$_{b}$45	-	.11	.09
F	Crepis acuminata	9	12	6	.05	.10	.01
F	Delphinium nuttallianum	$_{a}$-	$_{b}$9	$_{a}$-	-	.02	-
F	Erigeron eatonii	92	75	89	.65	.76	.59

Type	Species	Nested Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
F	Eriogonum alatum	-	3	2	-	.18	.00
F	Eriogonum umbellatum	23	22	25	.13	.23	.18
F	Hackelia patens	1	-	-	.03	-	-
F	Lepidium sp. (a)	$_{a}$4	$_{b}$12	$_{a}$-	.01	.03	-
F	Linum lewisii	1	-	-	.00	.00	-
F	Lomatium sp.	-	1	-	-	.00	-
F	Lupinus argenteus	43	52	61	.54	1.79	1.49
F	Lychnis drummondii	-	-	5	-	-	.01
F	Microsteris gracilis (a)	7	4	-	.01	.00	-
F	Penstemon caespitosus	$_{b}$129	$_{a}$71	$_{a}$68	1.33	1.56	.88
F	Phlox hoodii	2	-	-	.00	-	-
F	Phlox longifolia	$_{ab}$129	$_{b}$144	$_{a}$97	.98	1.12	.73
F	Polygonum douglasii (a)	$_{a}$4	$_{b}$73	$_{a}$-	.01	.30	-
F	Potentilla gracilis	2	-	-	.03	-	-
F	Schoencrambe linifolia	$_{a}$-	$_{a}$-	$_{b}$13	-	-	.05
F	Senecio integerrimus	$_{a}$6	$_{b}$27	$_{b}$36	.03	1.07	.35
F	Sphaeralcea coccinea	-	1	-	-	.00	-
F	Taraxacum officinale	$_{a}$54	$_{b}$106	$_{ab}$76	.30	1.98	.95
F	Tragopogon dubius	2	-	-	.00	-	-
F	Unknown forb-perennial	-	4	-	-	.01	-
F	Viola sp.	2	1	-	.03	.03	-
F	Zigadenus paniculatus	-	4	-	-	.00	-
Total for Annual Forbs		32	185	57	0.10	0.62	0.12
Total for Perennial Forbs		628	710	614	6.05	12.53	8.81
Total for Forbs		660	895	671	6.16	13.16	8.93

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

BROWSE TRENDS--
Management unit 10R, Study no: 34

Type	Species	Strip Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
B	Amelanchier utahensis	41	32	21	.39	.54	.11
B	Artemisia tridentata vaseyana	91	87	85	22.69	21.13	21.61
B	Cercocarpus montanus	15	14	14	.76	.39	.43
B	Chrysothamnus depressus	1	3	2	.00	.00	.03
B	Chrysothamnus viscidiflorus viscidiflorus	35	15	9	.78	.67	.39
B	Gutierrezia sarothrae	0	1	0	-	-	-
B	Purshia tridentata	63	54	55	2.77	2.87	1.83
B	Quercus gambelii	1	0	0	-	-	-
B	Sclerocactus sp.	-	-	-	-	.15	-
B	Symphoricarpos oreophilus	77	78	80	8.12	6.76	5.87
B	Tetradymia canescens	3	2	1	-	.01	.00
Total for Browse		327	286	267	35.54	32.54	30.30

CANOPY COVER, LINE INTERCEPT--
Management unit 10R, Study no: 34

Species	Percent Cover		
	'02	'05	'10
Amelanchier utahensis	1.08	.41	.21
Artemisia tridentata vaseyana	26.10	24.14	30.36
Cercocarpus montanus	1.11	.91	1.23
Chrysothamnus viscidiflorus viscidiflorus	.63	.38	.81
Purshia tridentata	5.00	3.15	4.25
Symphoricarpos oreophilus	8.53	7.65	9.63
Tetradymia canescens	.06	.05	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10R, Study no: 34

Species	Average leader growth (in)		
	'02	'05	'10
Amelanchier utahensis	1.1	2.5	2.4
Artemisia tridentata vaseyana	0.8	2.0	1.7
Cercocarpus montanus	0.9	1.3	3.1
Purshia tridentata	-	1.4	1.6

BASIC COVER--
Management unit 10R, Study no: 34

Cover Type	Average Cover %		
	'02	'05	'10
Vegetation	52.77	53.62	60.09
Rock	.16	1.01	1.07
Pavement	2.59	3.01	.65
Litter	53.15	47.06	59.84
Cryptogams	.03	.10	.18
Bare Ground	13.12	14.86	11.58

SOIL ANALYSIS DATA --
Management unit 10R, Study no: 34, Study Name: PR Spring Outside Exclosure

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.9	6.8	35.3	32.7	32.0	3.6	14.9	291.2	0.8

PELLET GROUP DATA--
Management unit 10R, Study no: 34

Type	Quadrat Frequency		
	'02	'05	'10
Rabbit	12	41	2
Grouse	1	-	-
Elk	24	17	8
Deer	19	18	25
Cattle	2	4	2

Days use per acre (ha)		
'02	'05	'10
-	-	-
-	-	-
31 (78)	7 (17)	23 (58)
73 (180)	23 (56)	42 (104)
14 (34)	10 (25)	13 (33)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 34

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
02	**1220**	66	20	15	20	16	28	3	43/33
05	**1220**	44	49	7	20	11	34	3	27/21
10	**780**	72	26	3	100	8	5	3	31/26
Artemisia tridentata vaseyana									
02	**4180**	7	61	32	240	14	2	8	31/38
05	**3940**	7	56	38	40	17	3	22	30/38
10	**3900**	6	78	16	-	23	11	10	32/43
Cercocarpus montanus									
02	**480**	46	46	8	20	33	38	8	49/36
05	**480**	8	67	25	-	17	71	21	45/43
10	**500**	48	48	4	80	16	40	0	38/28
Chrysothamnus depressus									
02	**40**	0	100	0	-	0	0	0	2/3
05	**80**	0	75	25	-	25	25	0	-/-
10	**40**	0	100	0	-	50	0	0	4/8
Chrysothamnus viscidiflorus viscidiflorus									
02	**1300**	11	75	14	-	5	0	5	14/17
05	**580**	7	93	0	-	3	0	0	15/18
10	**260**	8	92	0	-	8	0	0	14/17
Gutierrezia sarothrae									
02	**0**	0	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Purshia tridentata									
02	**1840**	22	72	7	-	14	70	1	14/25
05	**1820**	2	89	9	-	7	56	2	9/19
10	**1760**	8	92	0	-	5	88	0	11/20
Quercus gambelii									
02	**20**	100	0	-	-	0	0	0	76/36
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Symphoricarpos oreophilus									
02	**3340**	15	83	2	-	5	8	1	16/25
05	**5920**	26	73	1	20	8	.67	1	15/22
10	**4220**	46	54	0	260	6	4	0	15/22
Tetradymia canescens									
02	**60**	33	67	0	-	33	0	0	8/8
05	**40**	50	0	50	-	50	0	50	4/6
10	**20**	0	100	0	-	0	0	0	9/5

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 exclosure 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 exclosure complex was not built in a totally homogeneous area. The total and livestock exclosures 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 exclosures is much more open where mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the dominant species. Due to the dimensions of the exclosure, the transects established inside the total (10R-32) and livestock (10R-33) exclosures 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 exclosure 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 exclosure and outside the exlcosure, with higher use by deer and elk in 2002 and 2010 outside the exclosure, but higher use inside the livestock exclosure 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 exclosure 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 exlosure, but mountain big sagebrush is the predominant species. Outside of the exclosure, 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 exclosure. Utilization of sagebrush has been mostly light to moderate outside the exclosure and in the livestock exclosure. Use of sagebrush was moderate in the livestock exclosure in 2010. The total and livestock exclosures have displayed decreasing recruitment of young mountain big sagebrush plants over the course of the study, while recruitment has remained similar outside the exclosure. 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 exclosure 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 exclosure and in the livestock exclosure than in the total exclosure. 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 exclosures since 2002, but has remained similar outside of the exclosure (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 exclosure.

Exclosure Complex Summary

Study Name	Year	Deer *days use/acre (ha)*	Elk *days use/acre (ha)*	Cattle *days use/acre (ha)*
Total Exclosure	2002	39 (96)	23 (56)	7 (18)
(10R-32)	2005	- -	- -	- -
	2010	- -	- -	- -
Livestock Exclosure	2002	48 (117)	19 (46)	14 (34)
(10R-33)	2005	63 (155)	21 (53)	14 (34)
	2010	25 (61)	11 (26)	- -
Outside Exclosure	2002	73 (180)	31 (78)	14 (34)
(10R-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	2002	20.08	3560	21	64	15	30/38
(10R-32)	2005	15.36	3180	13	60	27	23/31
	2010	18.64	3000	9	83	9	27/36
Livestock Exclosure	2002	17.66	3240	14	50	36	29/37
(10R-33)	2005	17.48	2940	10	61	29	29/37
	2010	20.83	2980	6	76	18	28/40
Outside Exclosure	2002	26.10	4180	7	61	32	31/38
(10R-34)	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		
		n	*Sum of Nested Frequency*	*Percent Cover*	*n*	*Sum of Nested Frequency*	*Percent Cover*
Total Exlcosure	2002	6	442	12.55	19	452	6.51
(10R-32)	2005	5	466	13.14	19	388	8.17
	2010	6	417	18.21	17	267	6.83
Livestock Exclosure	2002	6	455	14.08	19	724	9.31
(10R-33)	2005	8	538	17.38	18	640	11.69
	2010	7	498	17.06	19	569	7.91
Outside Exclosure	2002	8	679	16.36	21	628	6.05
(10R-34)	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.

SUMMARY
WILDLIFE MANAGEMENT UNIT 10 - BOOK CLIFFS

Unit 10 is divided into two subunits, the North Book Cliffs and South Book Cliffs. The North Book Cliffs are managed as part of the Utah Division of Wildlife Resources (UDWR) Northeastern Region, while the South Book Cliffs are managed as part of the UDWR Southeastern Region. These two subunits are summarized separately in this report.

Community Types

Deer winter range within a unit is summarized into three categories based on ecological potentials which inlude low potential, mid-level potential and high potential. Low potential sites include desert shrub, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and cliffrose (*Cowania mexicana* ssp. *stansburiana*) communities. Mid-level potential sites include mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) communities. High potential sites include mountain brush communities. Black sagebrush (*A. nova*) and basin big sagebrush (*A. tridentata* ssp. *tridentata*) communities are placed within the low potential or mid-level potential scales based on precipitation and elevation. Deer summer range is summarized separately from winter range as a fourth category and typically includes aspen (*Populus tremuloides*) and high elevation mountain brush communities.

North Book Cliffs

Twenty four interagency range trend studies were sampled in the North Book Cliffs subunit of Unit 10 during the summer of 2010. Five of the range trend studies in the area [Black Horse (10-8), Saddle Horse (10R-15), PR Spring Total Exclosure (10R-32), PR Spring Livestock Exclosure (10R-33) and PR Spring Exclosure Outside (10R-34)] are categorized as high potential sites for deer winter range and sample mountain brush communities. All of these high potential sites are also classified as crucial summer range for deer and elk, and are generally only used by deer in mild winters. Eight of the studies [McCook Ridge Chaining (10-3), Wirefence Point (10-4), Willow Flat (10-5), Cherry Mesa (10-7), Lower Tom Patterson Point (10R-5), Monument Ridge (10R-7), Winter Ridge Exclosure Out (10R-9) and Railroad Canyon (10R-17)] are categorized as mid-level potential sites for deer winter range and sample mountain big sagebrush communities. Though categorized as deer winter range in this summary, many of the studies are also considered to be crucial deer summer range and fawning habitat. Also, all of these studies are considered to be elk winter or summer range, with use by elk occurring during both seasons on many of the sites. Nine of the studies [Indian Ridge (10-1), McCook Ridge Exclosure (10-2), Agency Draw (10-9), Sunday School (10-10), Wolf Den (10-12), Two Water WMA (10R-4), McCook Ridge Livestock Exclosure (10R-13), McCook Ridge Total Exclosure (10R-14) and Massey Junction (10R-29)] are classified as low potential deer winter range sites and sample Wyoming big sagebrush communities. All of these studies are also considered to be elk winter range. There was only one study [Rathole Ridge (10R-22)] in this area that is considered to be strictly summer range. One study [Wild Horse Bench (10-28)] was established in 2010 to monitor year-long bison range. These two studies were not included in this summary. For further information on these sites, refer to the discussion section.

South Book Cliffs

Seven interagency range trend studies were sampled in the South Book Cliffs subunit of Unit 10 during the summer of 2010. All seven of the studies [East Floy Bench (10-14), East Thompson Bench (10-15), West Horse Pasture (10-16), East Calf Canyon (10-17), East Horse Pasture (10-18), Bitter Creek (10-26) and Long Canyon (10-27)] are classified as low potential deer winter range sites and sample Wyoming big sagebrush communities. Only two of the studies, Bitter Creek and Long Canyon, are also considered to be elk winter range.

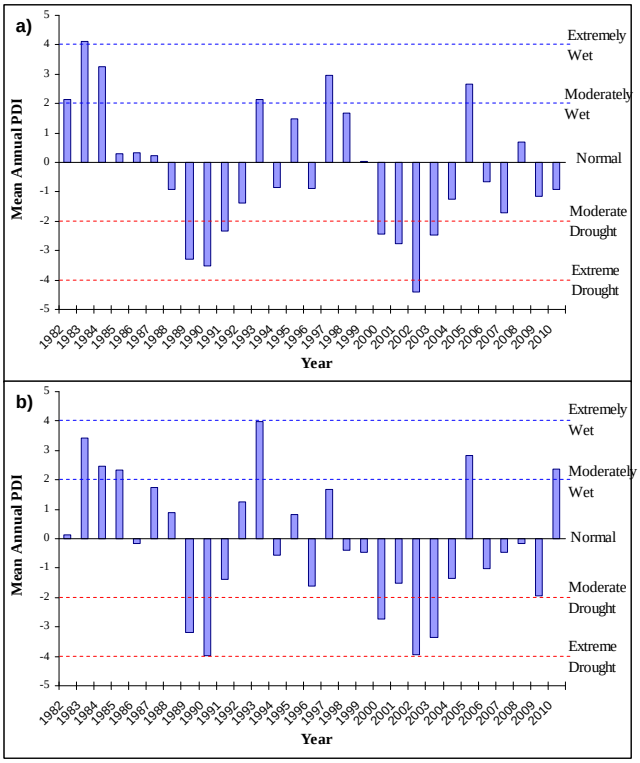


Figure 1. a) The 29 year mean annual Palmer Drought Severity Index (PDSI) for the Uinta Basin (Division 6). **b)** The 29 year mean annual PDSI for the Southeast Division (Division 7). The PDSI is based on climate data gathered from 1895 to 2010. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is ≥4.0 = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and ≤-4.0 = Extreme Drought (Time Series Data 2011).

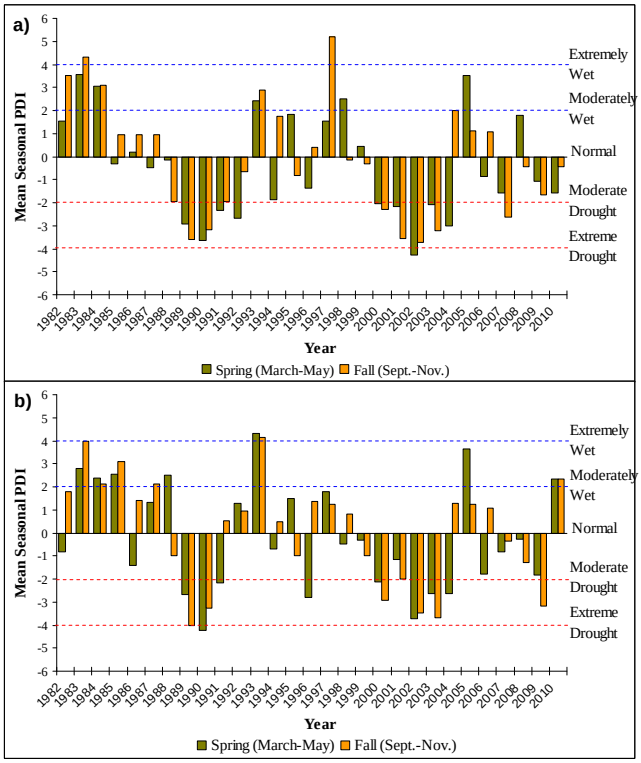


Figure 2. a) The 29 year mean spring (March-May) and fall (Sept.-Nov.) Palmer Drought Severity Index (PDSI) for the Uinta Basin (Division 6). **b)** The 29 year mean spring (March-May) and fall (Sept.-Nov.) PDSI for the Southeast Division (Division 7). The PDSI is based on climate data gathered from 1895 to 2010. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is ≥4.0 = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and ≤-4.0 = Extreme Drought (Time Series Data 2011).

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation and Palmer Drought Severity Index (PDSI) data for the unit were compiled from the National Oceanic and Atmospheric Administration (NOAA) Physical Sciences Division (PSD) as part of the Uintah Basin (Division 6) and the Southeast (Division 7) Divisions. All of the studies in the South Book Cliffs subunit of Unit 10 fall within the Southeast Division, while the studies in the North Book Cliffs subunit are within both the Uintah Basin and Southeast Divisions. The Uintah Basin and Southeast Divisions had historic annual mean precipitation of 7.99 inches and 9.07 inches, respectively, from 1895 to 2010. Over the course of the study years in Unit 10, the mean annual PDSI of both of the Divisions display several periods of prolonged drought. Moderate to extreme wet years in the Uintah Basin included 1982-1984, 1993, 1997 and 2005, and moderate to extreme drought years included 1989-1991 and 2000-2003 (Figure 1a and Figure 2a). Moderate to extreme wet years in the Southeast Division included 1983-1985, 1993, 2005 and 2010, and moderate to extreme drought years included 1989-1990, 2000, 2002-2003 and 2009 (Figure 1b and Figure 2b) (Time Series Data 2011).

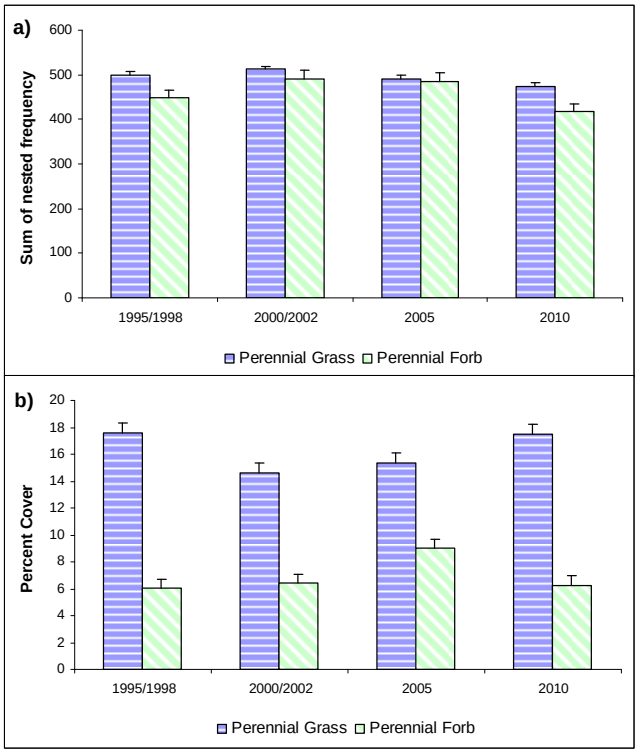


Figure 3. a) High potential sites mean perennial grass and perennial forb sum of nested frequency (n=5) by year for WMU 10, Book Cliffs. **b)** High potential sites mean perennial grass and perennial forb cover (n=5) by year for WMU 10.

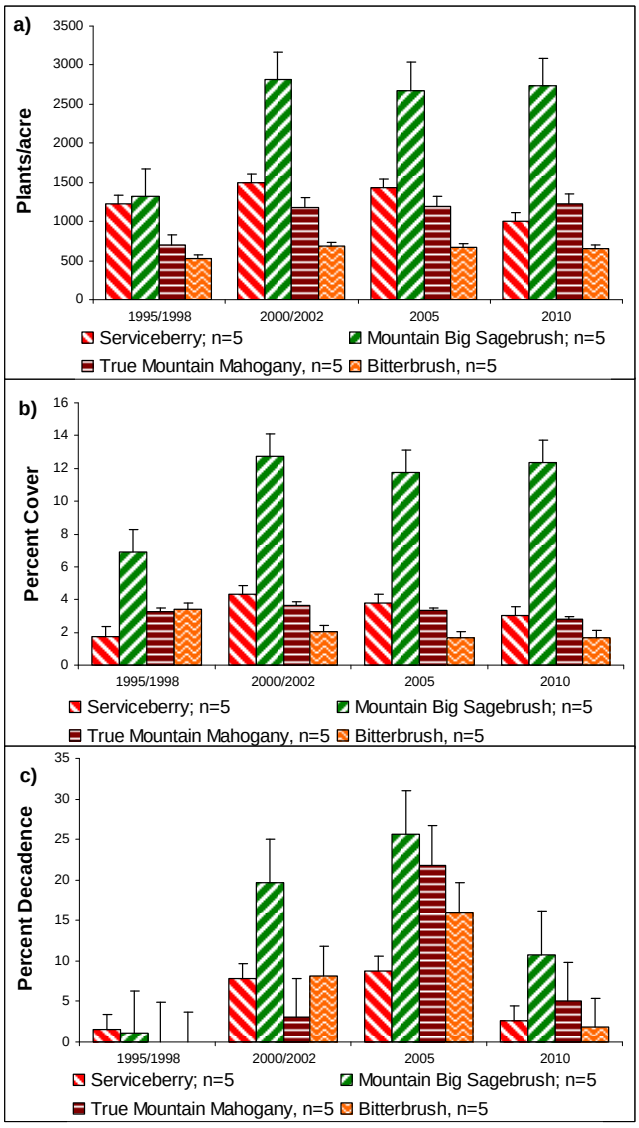


Figure 4. a) High potential sites mean density of mountain brush by year for WMU 10, Book Cliffs. **b)** High potential sites mean cover of mountain brush by year for WMU 10. **c)** High potential sites mean population decadence of mountain brush by year for WMU 10.

Mountain Brush Communities (High Potential Winter Range)

Browse: High potential studies were located only in the North Book Cliffs subunit for Unit 10. The high potential cumulative median browse trend has remained relatively stable throughout the study years (Figure 12a). The browse composition in the mountain brush studies tends to be a mixture of four predominant species; serviceberry (*Amelanchier utahensis*), mountain big sagebrush, true mountain mahogany (*Cercocarpus montanus*) and bitterbrush (*Purshia tridentata*). Mountain big sagebrush is typically dominant in cover across the studies for these four species. Snowberry (*Symphoricarpos oreophilus*) is also prevalent on most of the studies. Bitterbrush is prevalent on the Saddle Horse and PR Spring Exclosure Out studies, but is less common on the other three studies. Serviceberry is less prevalent on the Saddle Horse and PR Spring Exclosure Out studies, and true mountain mahogany is less prevalent on the PR Spring Exclosure Out study. The three studies at the PR Spring Exclosure were not sampled until 2002, which influenced some of the changes in means between the 1995/1998 sample years and the 2000/2002 samples. The density of serviceberry was significantly lower in 2010 than the other sample years. There was a significant increase in the density of mountain big sagebrush and true mountain mahogany in 2000/2002, but this is an artifact of adding the three PR Spring Exclosure studies which have high densities of mountain big sagebrush. The mean density of mountain big sagebrush remained similar through the remaining sample years. The density of bitterbrush remained similar throughout the study years (Figure 4a). The mean cover of serviceberry, mountain big sagebrush and true mountain mahogany displayed similar trends as the mean density of the three species. Mean cover of bitterbrush decreased significantly in 2000/2002, and then remained similar throughout the remaining sample years (Figure 4b). The decrease in mean cover of bitterbrush was due to the addition of the PR Spring Exclosure Total and PR Spring Exclosure Livestock studies which have lower cover

of bitterbrush than the other high potential studies within the unit. The mean decadence increased significantly for serviceberry, mountain big sagebrush and bitterbrush in 2000/2002. Mean decadence increased significantly again in bitterbrush and true mountain mahogany in 2005 with a substantial, but not significant, increase in the decadence of mountain big sagebrush. This increase in decadence followed several drought years (Figure 1 and Figure 2). The mean decadence of all four species was significantly lower in 2010 (Figure 4c).

Herbaceous Understory: The high potential median cumulative grass trend increased slightly from 1995/1998 to 2000/2002, then remained stable in subsequent sample years (Figure 12a). Grasses within these communities are diverse and abundant. The annual species cheatgrass (*Bromus tectorum*) has been sampled on the Black Horse and Saddle Horse studies, but is rare on the sites. The mean sum of nested frequency of perennial grasses has remained high throughout the sample years with slight, but significant, decreases in 2005 and 2010 (Figure 3a). Mean cover of perennial grasses was significantly lower in 2000/2002 and 2005 than in 1995/1998 and 2010 (Figure 3b).

The high potential median cumulative forb trend decreased slightly in 2000/2002, then decreased slightly again in 2010 (Figure 12a). Perennial forbs are also diverse within the sampled communities with similar sums of nested frequency as perennial grasses, but perennial forbs are typically not nearly as abundant in cover as perennial grasses. The mean sum of nested frequency of perennial forbs was significantly higher in 2000/2002 and 2005 than in 1995/1998 and 2010 (Figure 3a). Cover of perennial forbs was significantly higher in 2005 than any other sample year (Figure 3b).

Utilization: Pellet group transect data indicates that deer predominantly use the area, though use by elk is also prevalent. The PR Spring Total Exclosure study was not included in this summary because wildlife and livestock are excluded from the study. The mean deer days use/acre on the studies has been moderately heavy to heavy over the course of the study years, but decreased somewhat in 2010. The mean elk days use/acre on the studies was moderate in 2000/2002 and 2005, but was lighter in 2010 (Figure 13a). Cattle use is minimal on these studies and was not included in this summary. Cattle use is excluded from the PR Spring Livestock Exclosure.

Deer Desirable Components Index (DCI): The high potential deer DCI has remained relatively similar, though with a slight general trend downward from 1995/1998 to 2005. The ranking of the DCI has been good to good-excellent throughout the sample years (Table 1 and Figure 11a).

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95/98	23.0	14.8	14.6	30.0	-0.1	6.7	0.0	**89.1**	Good-Excellent
00/02	27.1	10.4	11.4	28.2	0.0	8.3	0.0	**85.4**	Good
05	26.0	7.8	10.0	27.7	-0.1	8.4	0.0	**79.8**	Good
10	23.9	12.5	7.6	28.8	-0.1	8.5	0.0	**81.2**	Good

Table 1. High potential scale mean deer DCI scores (n=5) by year for WMU 10, Book Cliffs. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

Mountain Big Sagebrush Communities
(Mid-Level Potential Winter Range)

Browse: Mid-level potential studies were located only in the North Book Cliffs subunit for Unit 10. The mid-level potential studies cumulative median browse trend was up from 1982 to 1988, and then remained relatively stable through the subsequent sample years (Figure 12b). The dominant browse species on all of the mid-level potential studies is mountain big sagebrush. The Lower Tom Patterson Point and Monument Ridge study sites were burned by wild fire in the 1980's, removing most of the browse species before sampling

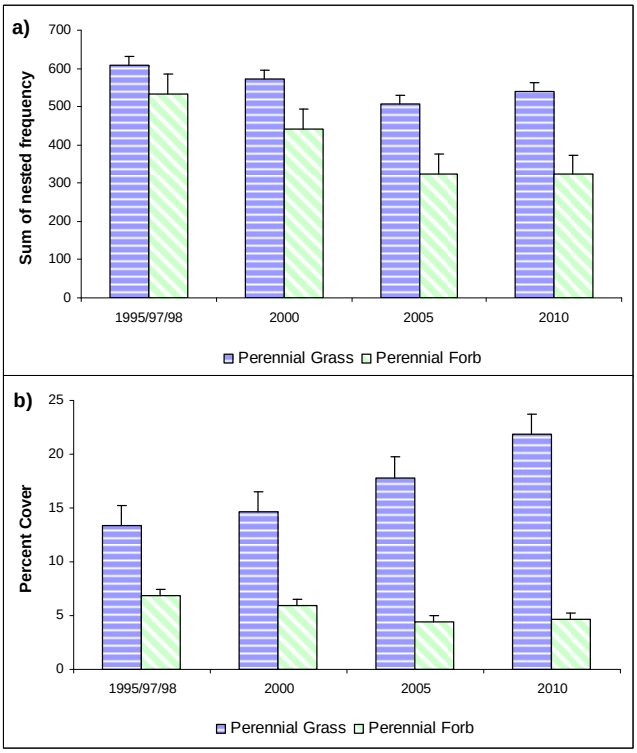


Figure 5. a) Mid-level potential sites mean perennial grass, perennial forb and cheatgrass sum of nested frequency (n=8) by year for WMU 10, Book Cliffs. **b)** Mid-level potential sites mean perennial grass, perennial forb and cheatgrass cover (n=8) by year for WMU 10.

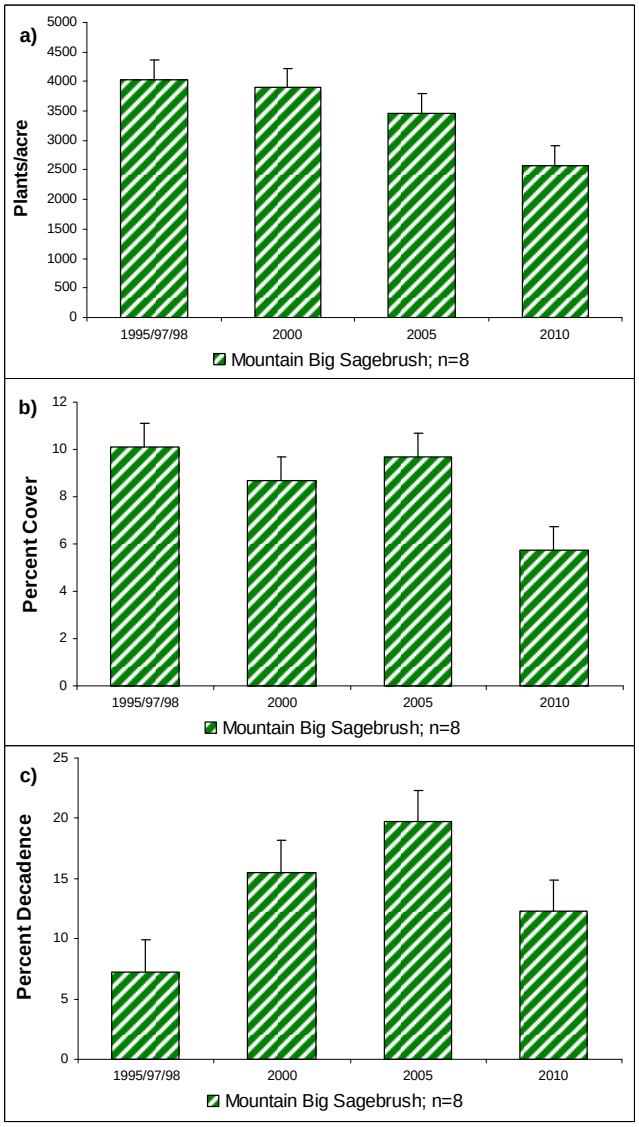


Figure 6. a) Mid-level potential sites mean density of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) by year for WMU 10, Book Cliffs. **b)** Mid-level potential sites mean cover of mountain big sagebrush by year for WMU 10. **c)** Mid-level potential sites mean population decadence of mountain big sagebrush by year for WMU 10.

began. The Railroad Canyon study site was burned by a prescribed fire in 1998 and the Willow Flat study site was treated by a tebuthiuron (Spike) herbicide treatment in 2005, reducing the browse species on both sites. The Railroad Canyon study was not sampled in the 2005 sample year. Mean density and mean cover of mountain big sagebrush was significantly lower in 2010 than the other sample years (Figure 6a and Figure 6b). The decrease in density and cover is largely due to the herbicide treatment on the Willow Flat study site that removed much of the mountain big sagebrush from that site. The mean decadence of mountain big sagebrush has been moderate on the studies, but was high in 2005 (Figure 6c).

Herbaceous Understory: The mid-level potential median cumulative grass trend decreased in 1995/1997/1998, then remained stable throughout the subsequent sample years (Figure 12b). Grasses within these communities are diverse and very abundant, though several study sites are dominated by seeded species such as crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*A. intermedium*). The annual species cheatgrass (*Bromus tectorum*) was sampled on several of the studies, but tends not to be a prevalent component on the sites and was not included in this summary. The mean sum of nested frequency of perennial grasses steadily decreased from 1995/1997/1998 to 2005, with a significant decrease in the mean sum of nested frequency in 2005. The mean sum of nested frequency increased again in 2010, though the increase was not significant (Figure 5a). Despite the decrease in frequency the cover of perennial grasses has steadily increased over the sample years and was significantly higher in 2010 than in any other sample year (Figure 5b). This increase in cover while frequency decreased is explained by general changes in composition across the studies. In general, low cover producing species such as Sandberg bluegrass (*Poa secunda*) and blue

grama (*Bouteloua gracilis*) have decreased in nested frequency while high cover producing species such as crested wheatgrass and needle-and-thread (*Stipa comata*) have increased in cover and nested frequency.

The mid-level potential median cumulative forb trend has fluctuated over the sample years with an increase in 1995/1997/1998 and then a steady decrease through 2005. Overall, the trend is down since 1988 (Figure 12b). Perennial forbs are also diverse and fairly abundant within most of the sampled communities. The mean sum of nested frequency of perennial forbs had a steady decrease from 1995/1997/1998 to 2005, but remained similar in 2010. The decrease in the sum of nested frequency was significant in 2005 (Figure 5a). The trend of the mean cover of perennial forbs was less drastic, but nearly identical to the trend of the sum of nested frequency (Figure 5b).

Utilization: Pellet group transect data indicates that elk predominantly used these study areas, but use by elk decreased slightly in 2010. The mean elk days use/acre on the unit moderate in 2000, but decreased markedly to moderately light use in 2010. The mean days use/acre of deer has increased from light use in 2000 to moderately light use in 2010. Cattle use was mostly light over the course of the study with the heaviest use noted in 2010 (Figure 13b).

Deer Desirable Components Index (DCI): The mid-level potential deer DCI remained stable over the sample years with a ranking of fair throughout the course of the study (Table 2 and Figure 11a).

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95/97/98	14.8	9.2	8.1	21.6	0.0	8.3	0.0	**62.1**	Fair
00	12.6	5.0	5.3	24.2	0.0	7.5	0.0	**54.7**	Fair
05	14.0	5.6	2.6	25.4	0.0	6.2	0.0	**54.0**	Fair
10	9.7	6.4	6.2	26.0	-0.4	6.6	0.0	**54.6**	Fair

Table 2. Mid-level potential scale mean deer DCI scores (n=8) by year for WMU 10, Book Cliffs. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

Wyoming Big Sagebrush Communities
(Low Potential Winter Range)

North Book Cliffs

Browse: The low potential site cumulative median browse trend for the North Book Cliffs increased in 1988, remained stable through 1999/2000, and then steadily decreased through 2010. Overall, the browse trend has been relatively stable for the studies (Figure 12c). The dominant browse on these low potential studies is typically comprised of five species, black sagebrush (*Artemisia nova*), Wyoming and basin big sagebrush, fourwing saltbush (*Atriplex canescens*) and winterfat (*Ceratoides lanata*). Basin big sagebrush is the dominant browse species on the three studies at the McCook Ridge Exclosure complex and was sampled on the Indian Ridge and Sunday School studies. For the purpose of this summary basin big sagebrush and Wyoming big sagebrush data will be combined and referred to simply as big sagebrush. Composition of these browse species varies over the studies with different species dominating different study sites. Black sagebrush is the dominant species only on the Two Water WMA study and the trend for black sagebrush is almost entirely dictated by this study. Therefore, black sagebrush is not included in this summary. For further information on the trends for black sagebrush refer to the discussion section.

Big sagebrush mean density decreased steadily from 1995/1997 to 2005 and was significantly lower in 2005 than in 1995/1997. Mean density of big sagebrush increased significantly in 2010 (Figure 8a) primarily due to a large increase in recruitment of young plants on just one study, Sunday School. The mean cover of big sagebrush has decreased steadily since 1999/2000. Despite the large increase in density in 2010, the young

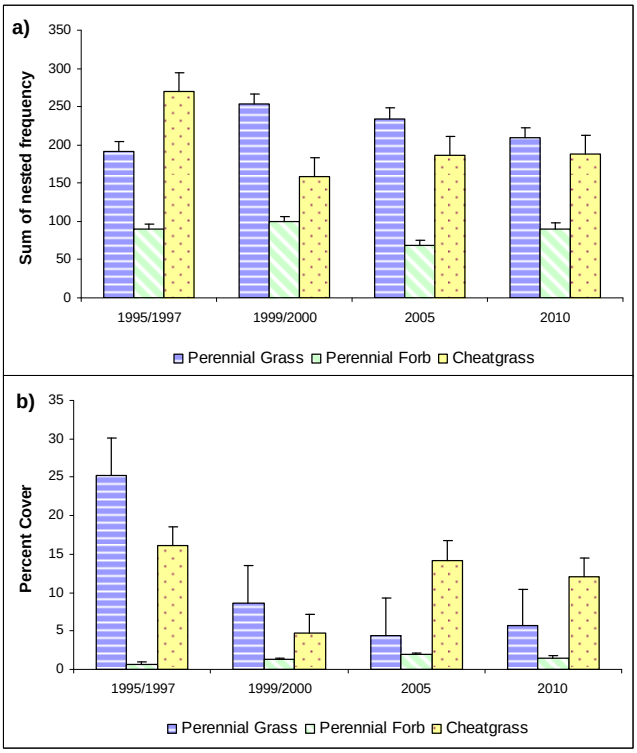


Figure 7. a) Low potential sites mean perennial grass, perennial forb and cheatgrass sum of nested frequency (n=9) by year for WMU 10, Book Cliffs, North Book Cliffs. **b)** Low potential sites mean perennial grass, perennial forb and cheatgrass cover (n=9) by year for WMU 10, North Book Cliffs.

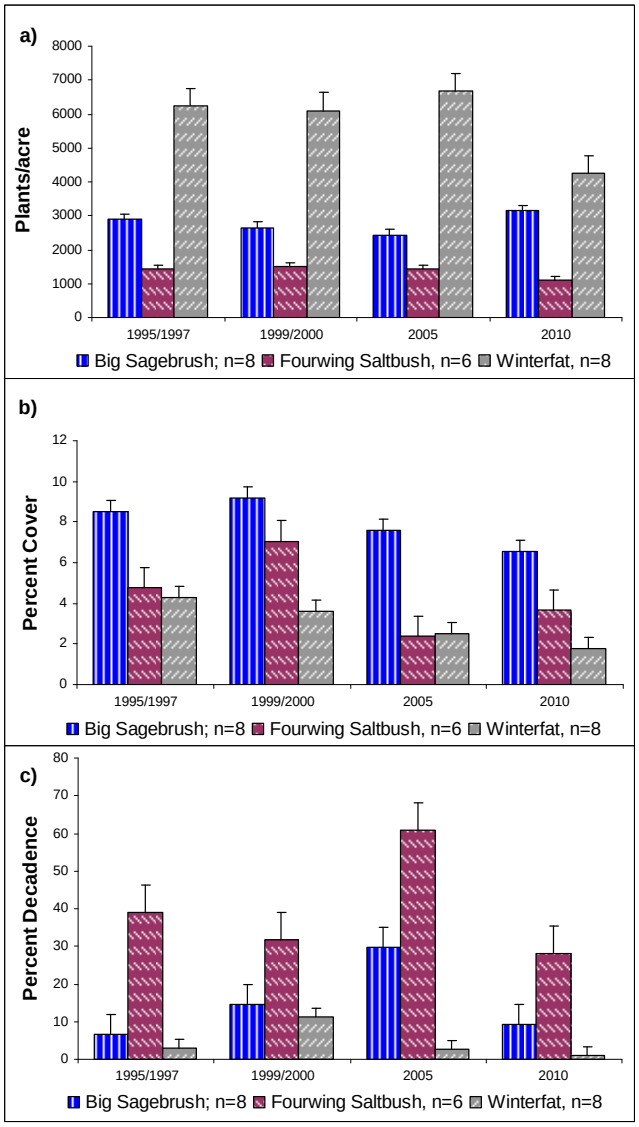


Figure 8. a) Low potential sites mean density of big sagebrush (*Artemisia tridentata spp.*), fourwing saltbush (*Atriplex canescens*) and winterfat (*Ceratoides lanata*) by year for WMU 10, Book Cliffs, North Book Cliffs. **b)** Low potential sites mean cover of big sagebrush, fourwing saltbush and winterfat by year for WMU 10, North Book Cliffs. **c)** Low potential sites mean population decadence of big sagebrush, fourwing saltbush and winterfat by year for WMU 10, North Book Cliffs.

plants provided little cover and mean cover continued to decrease and was significantly lower than in 1999/2000 (Figure 8b). The mean density of fourwing saltbush has been less variable than the other dominant browse species, but was significantly lower in 2010 (Figure 8a). The mean cover of fourwing saltbush has been variable and was significantly higher in 1999/2000 than all the other sample years (Figure 8b). Because of its growth form, the mean density of winterfat is typically much higher than the other browse species, but mean cover of winterfat is typically lower compared with the other dominant browse species on the studies. Density of winterfat was significantly lower in 2010 than the other sample years and cover has steadily decreased over the course of the study (Figure 8a and Figure 8b). The mean decadence of big sagebrush has been low to moderate in most sample years, though decadence increased significantly from moderate levels to high levels in 2005. The mean decadence of fourwing saltbush has been high throughout the course of the study, but was also significantly higher in 2005. Winterfat mean decadence has been mostly low, but was significantly higher in 1999/2000 (Figure 8c).

Herbaceous Understory: The low potential median cumulative grass trend for the North Book Cliffs increased substantially in 1999/2000 and remained up throughout the remaining sample years (Figure 12c). Grasses within these communities are typically dominated by just a few species that provide varying amounts of cover. The annual species cheatgrass (*Bromus tectorum*) is common on the studies and has been the dominant grass species in many sample years on most of the studies. The cheatgrass mean nested frequency was significantly higher in 1995/1997 than the other sample years (Figure 7a). The mean cover of cheatgrass was significantly

lower in 1999/2000 than the other sample years (Figure 7b). Mean sum of nested frequency of perennial grasses increased significantly in 1999/2000, but then steadily decreased and was significantly lower in 2010 than in 1999/2000 (Figure 7a). The mean cover of perennial grasses decreased significantly in 1999/2000 and remained lower throughout the remaining sample years (Figure 7b).

The low potential median cumulative forb trend for the North Book Cliffs decreased slightly in 2005, but has remained relatively stable throughout the study years (Figure 12c). Perennial forbs are neither diverse nor abundant within the sampled communities. Most of the studies forb component is dominated more by annual species than perennial species. The mean sum of nested frequency of perennial forbs was significantly lower in 2005 than the other sample years (Figure 7a). However, the mean cover of perennial forbs was higher in 2005 than the other sample years (Figure 7b).

Utilization: Pellet group transect data indicates that deer predominantly use these study areas, though elk use was moderate in 1999/2000. The mean deer days use/acre on the unit has been mostly heavy over the course of the study years, and was substantially higher in 2005. The mean elk days use/acre has had a general decrease throughout the study years. Cattle use has been mostly light on the study sites (Figure 13c). Cattle are excluded from the two studies within the McCook Ridge Exclosure complex and wildlife is excluded from the McCook Ridge Total Exclosure Study. Light use by wild horses has also been sampled on the Agency Draw and Sunday School study sites in several sample years.

Deer Desirable Components Index (DCI): The low potential deer DCI has fluctuated over the sample years, but was substantially lower in 2005 than the other years. The decrease is due to a multiple of variables including decreases in the cover of preferred browse, an increase in decadence of browse, decreased recruitment of young browse, decreased perennial grass and perennial forb cover and increases in annual grass cover. The ranking ranged from fair to good (Table 3 and Figure 11a).

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95/97	23.5	11.2	10.3	5.7	-9.5	1.3	0.0	**42.4**	Fair
99/00	24.1	8.4	6.2	14.7	-3.5	2.5	0.0	**52.4**	Good
05	18.4	5.9	3.5	8.9	-8.6	1.8	0.0	**29.9**	Fair
10	19.3	11.5	12.0	11.2	-7.6	2.9	0.0	**49.4**	Good

Table 3. Low potential scale mean deer DCI scores (n=9) by year for WMU 10, Book Cliffs, North Book Cliffs. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

South Book Cliffs

Browse: The low potential site cumulative median browse trend for the South Book Cliffs decreased slightly in 2000 and decreased even more drastically in 2005. Overall, the browse trend has is down for the studies over the sample years (Figure 12d). The dominant browse on these low potential studies is typically comprised of moderate to very dense stands of Wyoming big sagebrush. A small fire burned the West Horse Pasture study between the 2005 and 2010 sample years and construction of a oil well during the same period required that the transect be moved slightly in 2010 as well. Wyoming big sagebrush mean density was significantly lower in 2005 than the other sample years (Figure 10a). The mean cover of Wyoming big sagebrush was significantly higher in 2000 than the other sample years (Figure 10b). The mean decadence of Wyoming big sagebrush has been moderate to high in most sample years with a significant increase in decadence in 2005 (Figure 10c).

Herbaceous Understory: The low potential median cumulative grass trend for the South Book Cliffs increased substantially from 1986 to 2000, then decreased throughout the remaining sample years (Figure 12d). Grasses within these communities are lacking and typically dominated by just a few species that provide varying

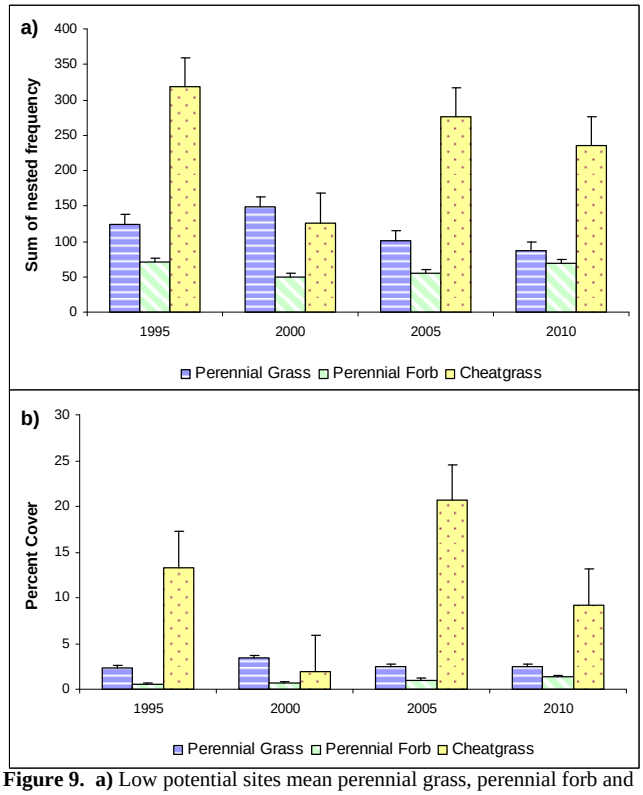


Figure 9. a) Low potential sites mean perennial grass, perennial forb and cheatgrass sum of nested frequency (n=7) by year for WMU 10, Book Cliffs, South Book Cliffs. **b)** Low potential sites mean perennial grass, perennial forb and cheatgrass cover (n=7) by year for WMU 10, South Book Cliffs.

amounts of cover. The annual species cheatgrass (*Bromus tectorum*) is common on the studies and has been the dominant grass species in many sample years on most of the studies. The cheatgrass mean nested frequency was significantly lower in 2000 than the other sample years (Figure 9a). The mean cover of cheatgrass was lowest in 2000 and highest in 2005 (Figure 9b). Mean sum of nested frequency of perennial grasses increased in 2000, but then decreased significantly in 2005 and remained lower in 2010 (Figure 9a). The mean cover of perennial grasses displayed a similar trend as frequency (Figure 9b).

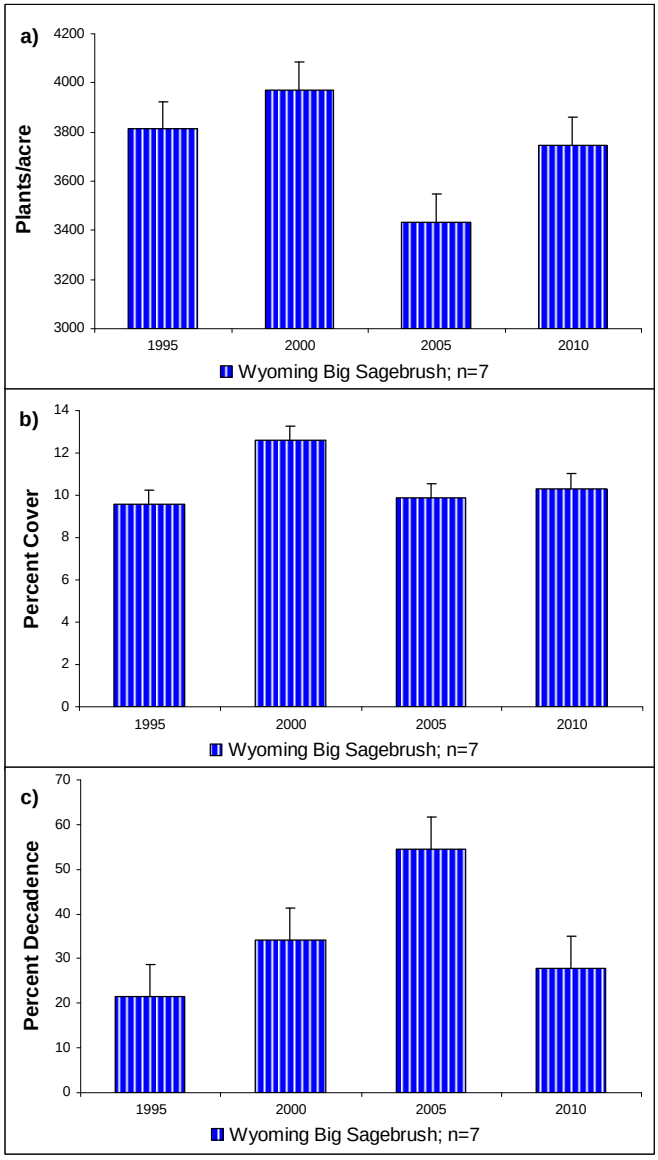


Figure 10. a) Low potential sites mean density of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) by year for WMU 10, Book Cliffs, South Book Cliffs. **b)** Low potential sites mean cover of Wyoming big sagebrush by year for WMU 10, South Book Cliffs. **c)** Low potential sites mean population decadence of Wyoming big sagebrush by year for WMU 10, South Book Cliffs.

The low potential median cumulative forb trend for the South Book Cliffs increased slightly in 1995, but has remained relatively stable throughout the remaining study years (Figure 12d). Perennial forbs are neither diverse nor abundant within the sampled communities. The mean sum of nested frequency of perennial forbs was significantly lower in 2000 and 2005 than the other sample years (Figure 9a). However, the mean cover of perennial forbs has steadily increased over the course of the study and was significantly higher in 2005 and 2010 than in 1995 and 2000 (Figure 9b). Mean cover of perennial forbs remained low.

Utilization: Pellet group transect data indicates that deer predominantly use these study areas. The mean deer days use/acre on the unit has been mostly moderate over the course of the study years, but increased to heavier levels in 2010. The mean elk days use/acre has been generally light throughout the study years. Cattle use has been mostly light on the study sites with a slight increase in 2010 (Figure 13d). Light sheep use has also been sampled on several of the study sites.

Deer Desirable Components Index (DCI): The South Book Cliffs low potential deer DCI has fluctuated over the sample years, but was substantially lower in 2005 than the other years. The decrease was primarily due to an increase in decadence of browse and increases in annual grass cover. The ranking ranged from poor to fair (Table 4 and Figure 11b). The DCI for these studies generally ranked lower than similar communities in the North Book Cliffs, but the trends were similar.

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	12.2	8.6	5.0	4.6	-9.7	1.0	0.0	**21.8**	Poor
00	16.4	4.6	5.8	6.9	-1.5	1.3	0.0	**33.5**	Fair
05	12.9	1.4	4.3	4.9	-12.7	2.0	0.0	**12.9**	Poor
10	14.1	6.6	5.4	4.9	-6.9	2.6	0.0	**26.7**	Poor-Fair

Table 4. Low potential scale mean deer DCI scores (n=7) by year for WMU 10, Book Cliffs, South Book Cliffs. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

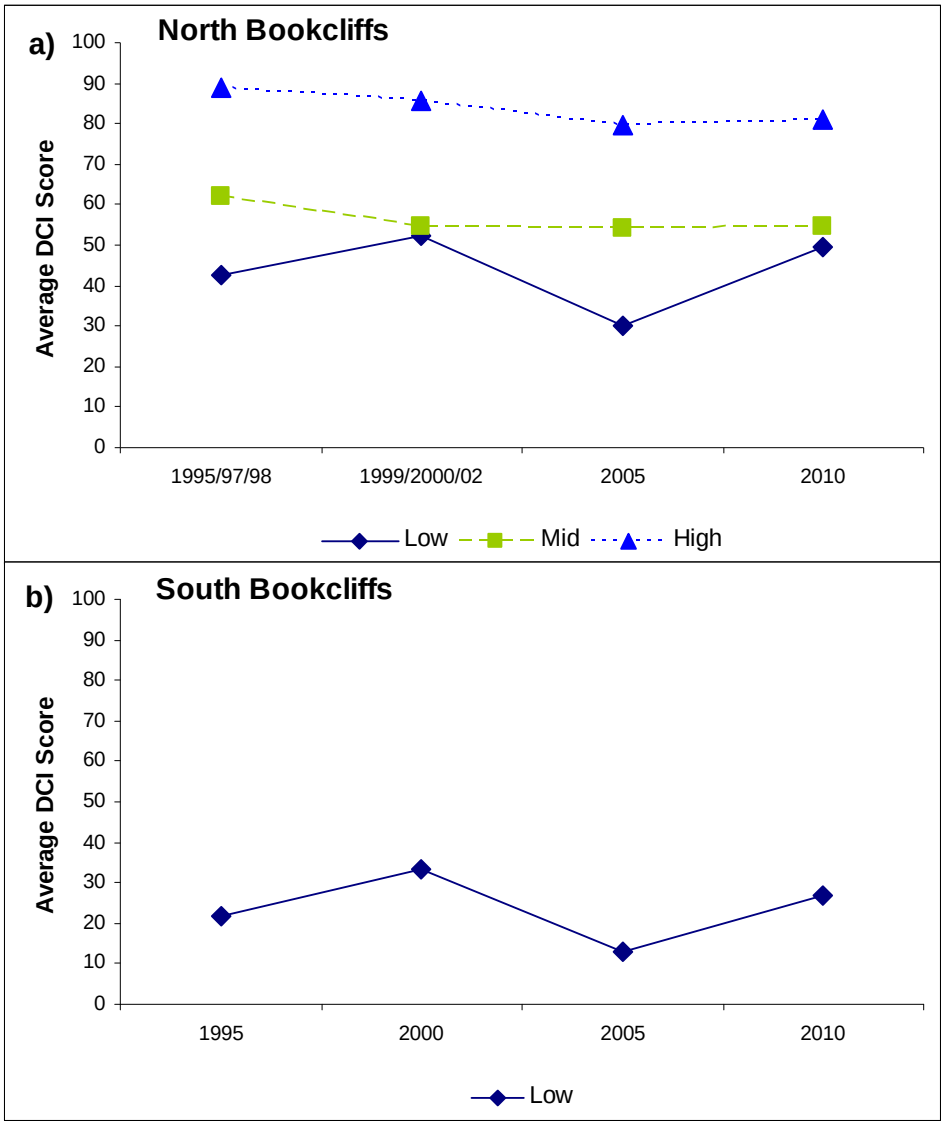


Figure 11. **a)** Mean low (n=9), mid-level (n=8) and high (n=5) potential scale deer DCI scores by year for WMU 10, Book Cliffs, North Book Cliffs. **b)** Mean low (n=7) potential scale deer DCI scores by year for WMU 10, Book Cliffs, South Book Cliffs. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

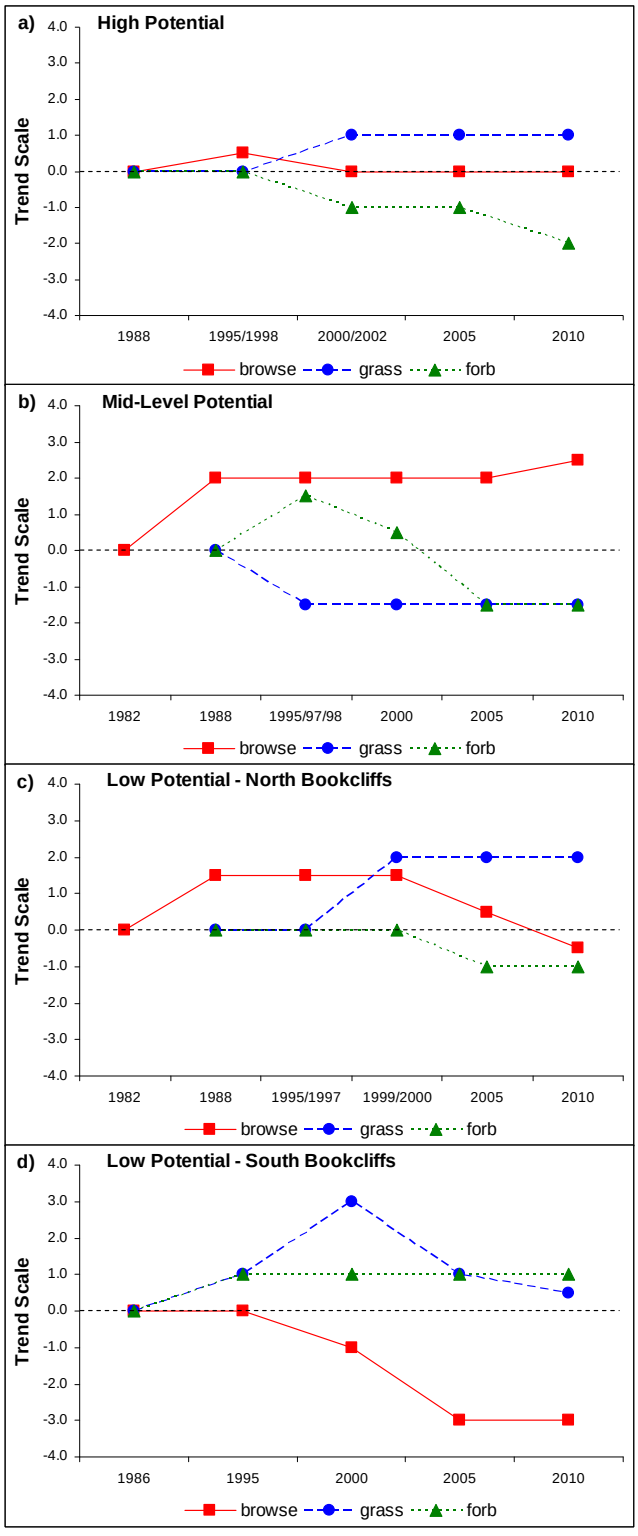


Figure 12. a) High potential sites (n=5) cumulative median browse, grass and forb trends by year for WMU 10, Book Cliffs, North Book Cliffs. **b)** Mid-level potential sites (n=8) cumulative median browse, grass and forb trends by year for WMU 10, North Book Cliffs. **c)** Low potential sites (n=9) cumulative median browse, grass and forb trends by year for WMU 10, North Book Cliffs. **d)** Low potential sites (n=7) cumulative median browse, grass and forb trends by year for WMU 10, Book Cliffs, South Book Cliffs

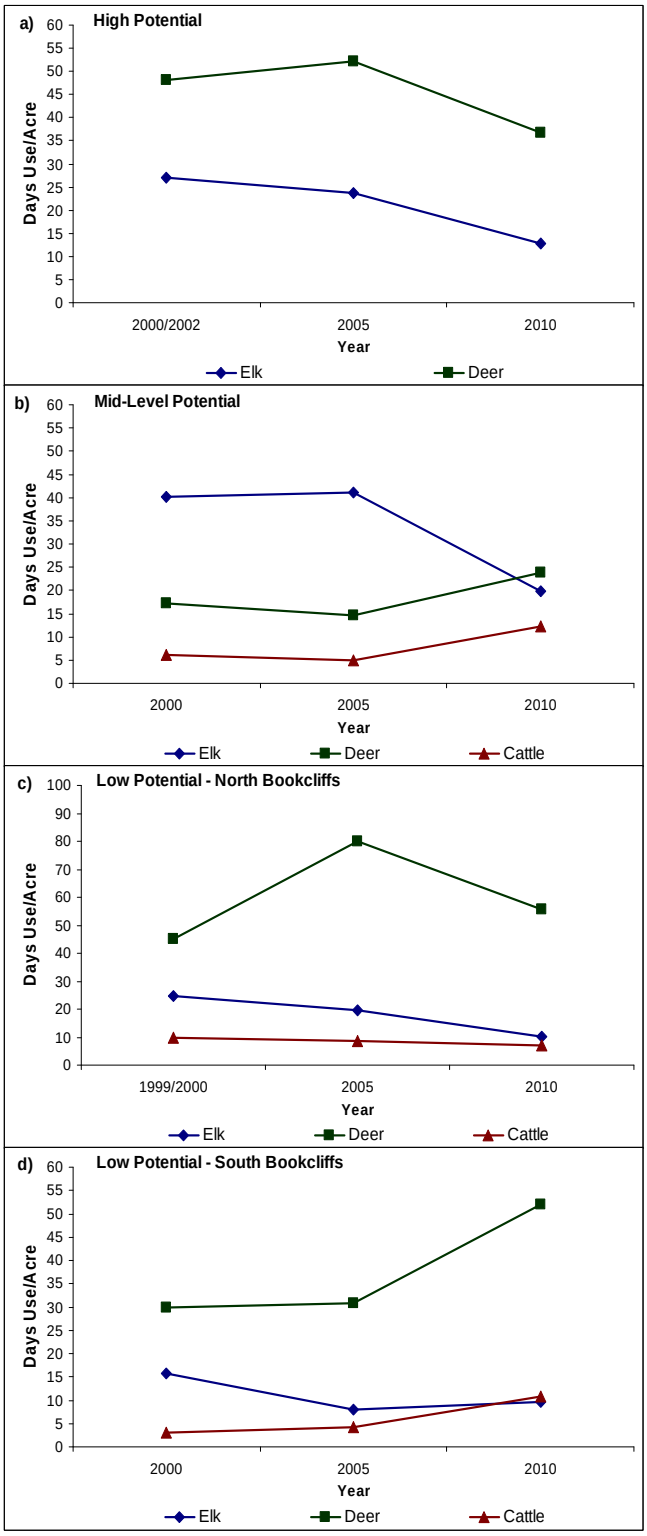
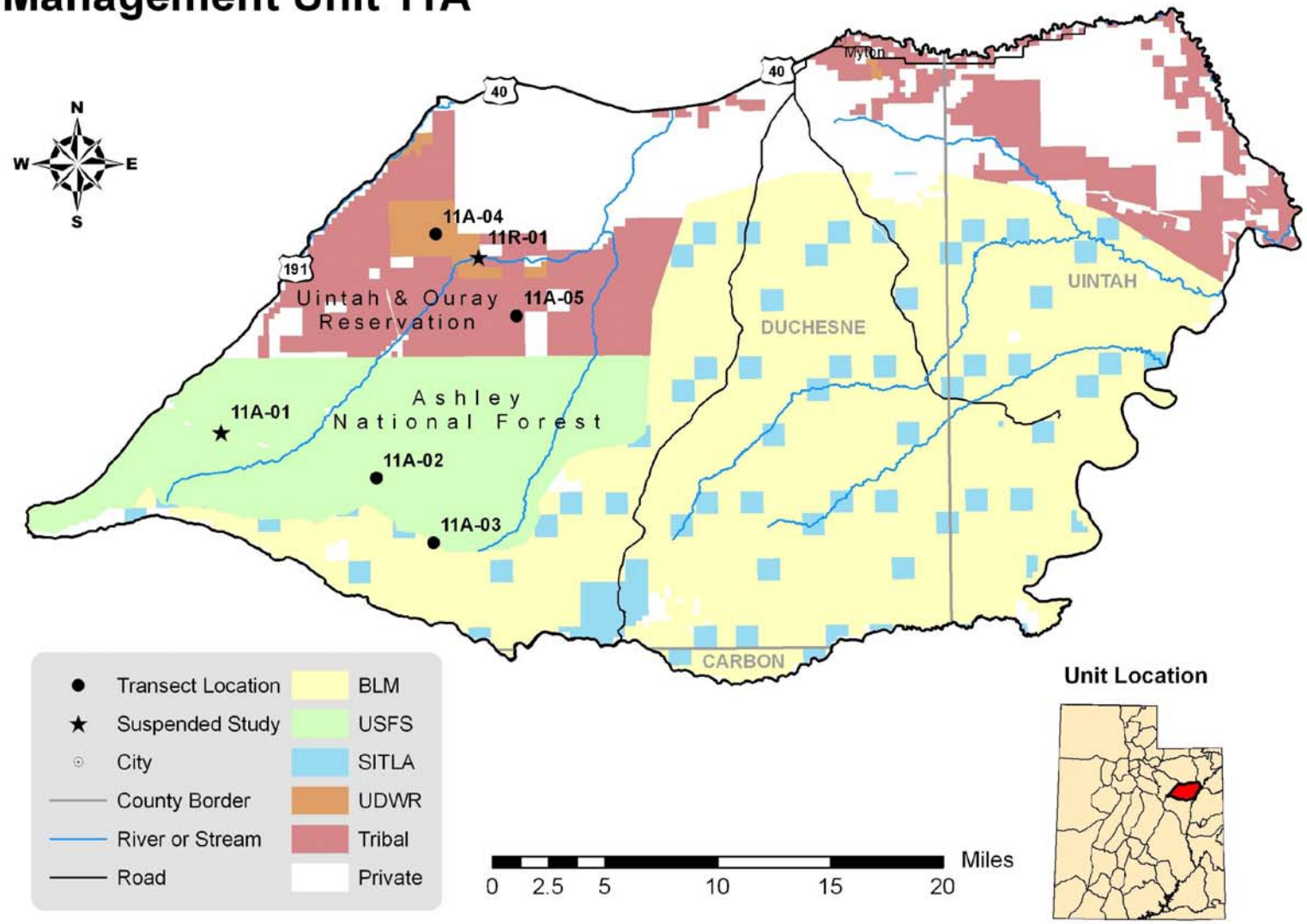


Figure 13. a) High potential sites (n=4) mean animals days use/acre by year for WMU 10, Book Cliffs, North Book Cliffs. **b)** Mid-level potential sites (n=8) mean animal days use/acre by year for WMU 10, North Book Cliffs. **c)** Low potential sites (n=8) mean animal days use/acre by year for WMU 10, North Book Cliffs. **d)** Low potential sites (n=7) mean animal days use/acre by year for WMU 10, Book Cliffs, South Book Cliffs.

Management Unit 11A



MANAGEMENT UNIT 11A - NINE MILE, ANTHRO

Boundary Description

Duchesne and Uintah counties - Boundary begins at Duchesne and Highway US-191; then southwest on US-191 to the Argyle Canyon Road; southeast on this road to the Nine Mile Canyon Road; east along this road, to it's end near Bulls Canyon; south from the end of the road to Nine Mile Creek; east along this creek to the Green River; north along this river to the Duchesne River; northwest along this river to Highway US-40; west on US-40 to Duchesne and beginning point (excludes all Ute Indian Tribal lands within this boundary).

Management Unit Description

The Nine Mile, Anthro Management Unit is located south of Duchesne and Highway 40, extending south into the Anthro Mountains. Elevation ranges from about 9,200 feet along Upper Cottonwood Ridge to about 4,600 feet at the Green River. There is an estimated 367,000 acres classified as deer range on Unit 11A with 72% classified as winter range, 9% classified as summer range and 19% classified as year-long range. The Bureau of Land Management (BLM) managed lands comprise 29% of the range, U.S. Forest Service lands comprise 27%, Utah State Institutional Trust Lands (SITLA) comprise 5%, Native American Trust Lands comprise 18%, private lands comprise 19% and the Division of Wildlife Resources (DWR) administers 2% of the range. There is approximately 376,000 acres that are classified as elk range on Unit 11A with 42% classified as winter range, 16% as summer range and 42% classified as year-long range. Of the elk range, 38% is on BLM managed land, 27% is on Forest Service lands, 6% is on SITLA lands, 15% is on Native American Trust Lands, 13% is on private lands and 2% is on DWR lands.

There is a long and gradual northerly slope to the Anthro Mountain terrain, which lends itself to an abundance of winter range. The long slopes are covered by pinyon-juniper woodland with natural openings of sagebrush. Grassy openings are often found in the drainages. Some ridge tops are covered with black sagebrush. Summer range is limited with most of the high country being comprised of open sagebrush slopes and scattered patches of aspen. Most of the winter range in the unit is available even in severe winters. The upper limits for winter range are generally considered between 8,000 and 8,500 feet. The desert country below 5,000 feet is seldom used by migrating deer.

Cattle grazing is the major activity occurring on Forest Service managed lands within management unit 11A. Oil and gas exploration, and drilling, with their associated roads and year-round activity, are the prominent activities taking place on the lower ends of the ridges. These lands are administered by the BLM and Ute Tribe. Firewood cutting is also an important use on the Ute Tribal lands.

Range Trend Studies

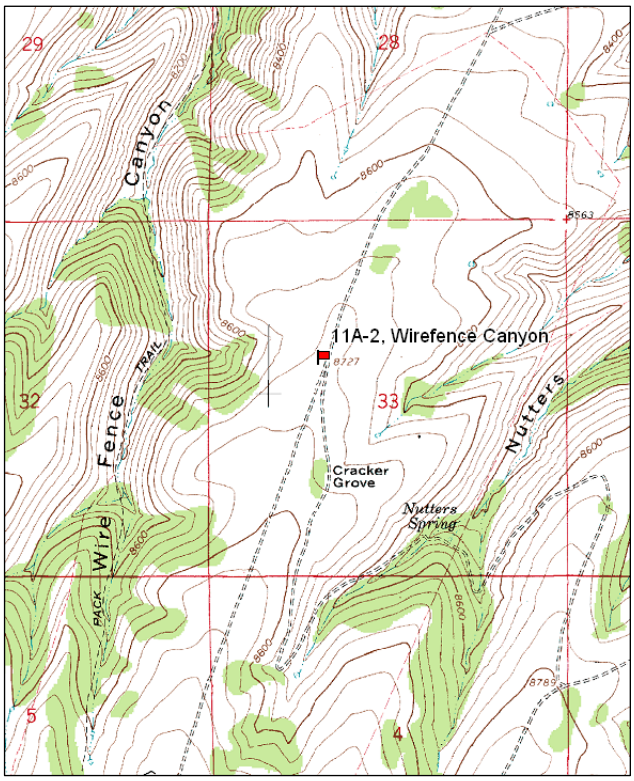
Four interagency range trend studies were sampled in Unit 11A in the summer of 2010. Two of the studies [Wirefence (11A-2) and Chokecherry Canyon (11A-3)] were established in 1982. Both studies sample mountain big sagebrush communities near Anthro Mountain. Two further studies were established in the summer of 1988. One study [Cottonwood Canyon (11A-4)] samples a desert shrub community and one study [Nutters Canyon (11A-5)] samples a black sagebrush community. Two studies [Upper Cottonwood Ridge (11A-1) and Sowers (11R-1)] were suspended due to poor site locations and were not sampled in 2010. For further information on suspended studies, refer to past reports at http://wildlife.utah.gov/range/.

WIREFENCE CANYON - TREND STUDY NO. 11A-2-10

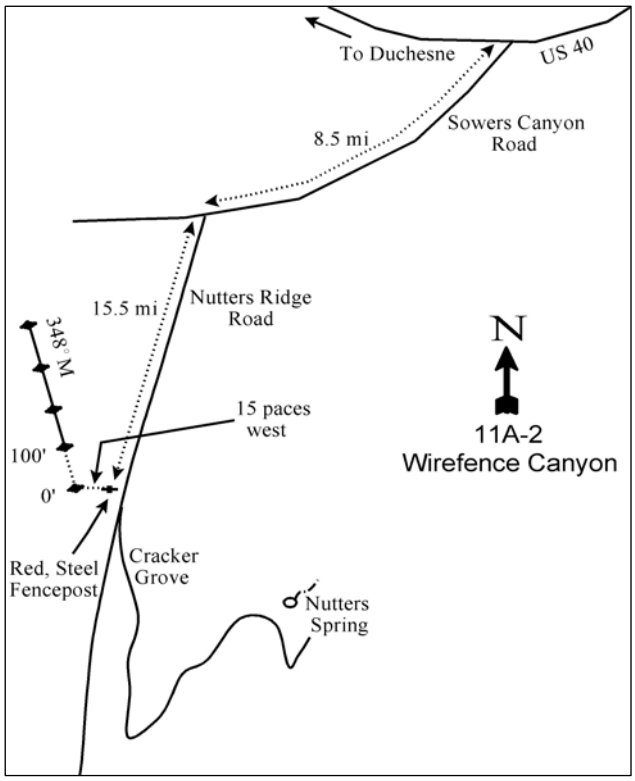
Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8738 ft. (2664 m)
Aspect: West
Slope: 3%
Transect bearing: 348° magnetic
Belt placement: line 1 (16 & 86ft), line 2 (33ft), line 3 (52ft), line 4 (66ft). Belt 3 and belt 5 rebar @ 2ft.

Directions:
From the junction of Highway U.S. 40 and the Sowers Canyon Road (near Bridgeland), drive south on the Sowers Canyon Road for 8.5 miles to the Nutters Ridge Road. Turn left here by an old ranch and proceed south along Nutters Ridge for 15.5 miles to a narrow "Y" in the road. Six paces west of the fork is a red steel fencepost. The 0-foot baseline stake is 15 paces west of the red fencepost and is marked by browse tag #9145.

Map Name: Anthro Mountain



Diagrammatic Sketch:



Township: 6S Range: 5W Section: 33

GPS: NAD 83, UTM 12S 546461 E 4418780 N

WIREFENCE CANYON - TREND STUDY NO. 11A-2

Site Information

Site Description: The study is located on summer range within a large mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass park occupying a flat ridge between the uppermost reaches of Wirefence and Nutters Canyons. This study is located immediately adjacent to an old permanent line-intercept study established in 1977 and is intended to replace it. After decades of season-long grazing by cattle and sheep from 1915 to 1944, a summer rest-rotation grazing system was established in 1972. Grazing in the area is managed by the U.S. Forest service as part of the Anthro Mountain allotment. Escape or thermal cover is lacking and the nearest cover is ½ mile away in Nutters Canyon or within an isolated, but badly depleted, aspen (*Populus tremuloides*) grove approximately the same distance to the southeast. Information provided by the Ashley National Forest indicates that numerous treatments have been done on the Anthro Mountain allotment, including plowing and seeding on this particular study site (a 2,363 acre treatment) in 1958 and 1959. In the fall of 2007 the area was treated with a prescribed fire (WRI Project #841), though the transect appears to have not been burned. Pellet group transect data estimated light use by deer in 2000 and 2010, with moderate use in 2005. Estimated elk use has been light and estimated cattle use has been moderate since 2000. Several sage grouse pellet groups were sampled in 2005 (Table - Pellet Group Data).

Browse: Mountain big sagebrush was the dominant browse species at the outset of the study, but has steadily decreased in cover (Table - Browse Trends) and density since 1995. The mountain big sagebrush population is a mixture of mature, young and decadent plants that has had mostly moderate use, though use was high in 2010. There was an increase in decadence and poor vigor of the big sagebrush population in 2000. Mountain low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *lanceolatus*) is found at a moderate density that has remained relatively constant over the sample years and has a mostly mature age structure with little use. Other browse species found on the site include broom snakeweed (*Gutierrezia sarothrae*), gray horsebrush (*Tetradymia canescens*), snowberry (*Symphoricarpos oreophilus*) and fringed sagebrush (*Artemisia frigida*).

Herbaceous Understory: The herbaceous understory is the key component on this summer range. Grasses are diverse and abundant on the site with the dominant species being smooth brome (*Bromus inermis*). Other prevalent species include mutton bluegrass (*Poa fendleriana*), prairie junegrass (*Koeleria cristata*) and crested wheatgrass (*Agropyron cristatum*). Perennial forbs are diverse and fairly abundant on the site. Looseflower milkvetch (*Astragalus tenellus*) is the most abundant forb. Annual forbs are present, but occur infrequently (Table - Herbaceous Trends).

Soil: The soil texture is loam with neutral reactivity (pH 7.2). Phosphorus may have limited availability for plant growth and development at 5.1 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately high, but good protective ground cover is provided by the herbaceous understory in vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2010, but was slight in 2005 because of small pedestals surrounding shrubs and perennial grasses, minor surface rock and litter movement, small rills, as well as minor gullies and flow patterns between perennial species.

Trend Assessments

Browse:

- **1982 to 1988 - up (+2):** The density of mountain big sagebrush increased by 38% from 3,132 plants/acre to 4,331 plants/acre, though much of the increase came through a large increase in the recruitment of young plants which now comprise nearly half of the population.
- **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. Decadence, vigor and recruitment of young plants remained good in the mountain big sagebrush population.

- **1995 to 2000 - down (-2):** Mountain big sagebrush density decreased by 17% from 4,080 plants/acre to 3,380 plants/acre and cover decreased from 8% to 6%. Decadence of big sagebrush increased from 6% to 19%, and poor vigor increased substantially from 4% to 41%.
- **2000 to 2005 - down (-2):** The density of mountain big sagebrush decreased by 21% to 2,680 plants/acre, and cover decreased to 4%. Poor vigor of sagebrush decreased to 13%, but decadence increased to 31%.
- **2005 to 2010 - down (-2):** There was a 19% decrease in the density of mountain big sagebrush to 2,180 plants/acre, and cover decreased to 3%. Decadence of sagebrush decreased to 14%, but poor vigor increased to 27%.

Grass:

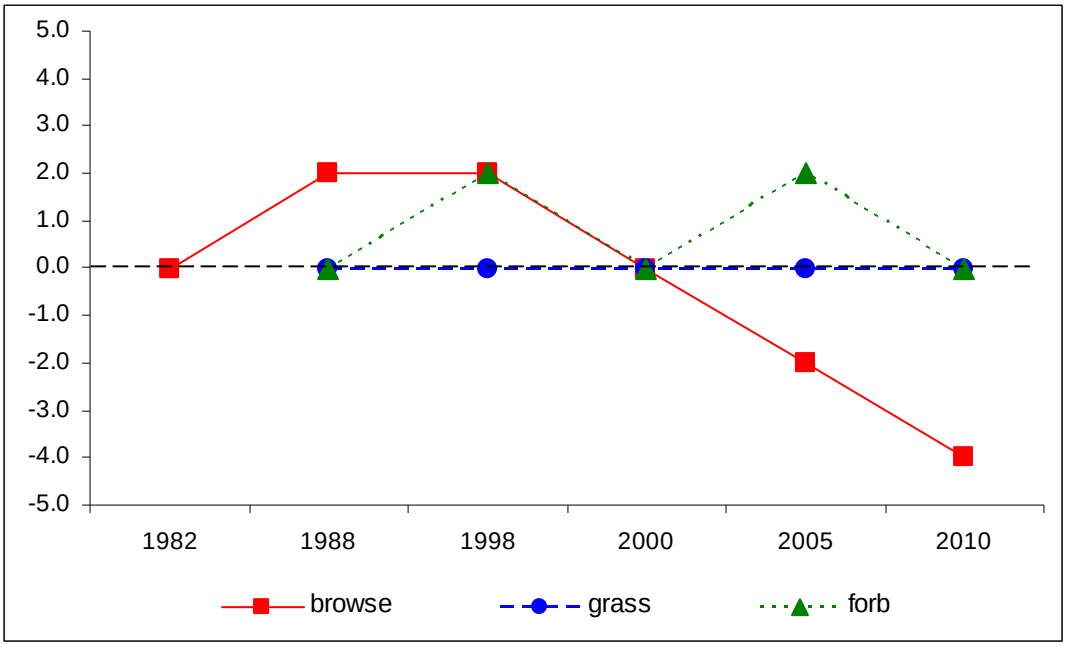
- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for grasses are available from 1982, so no trend was given.
- **1988 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1995 to 2000 - stable (0):** The perennial grass sum of nested frequency changed little, though cover increased from 15% to 24%.
- **2000 to 2005 - stable (0):** The sum of nested frequency of perennial grasses and cover changed little.
- **2005 to 2010 - stable (0):** The sum of nested frequency of perennial grasses decreased slightly to 1988 levels and cover decreased to 19%.

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 by 66%.
- **1995 to 2000 - down (-2):** The perennial forb sum of nested frequency decreased by 49% and cover decreased slightly from 10% to 9%.
- **2000 to 2005 - up (+2):** There was a 56% increase in the sum of nested frequency of perennial forbs and cover increased to 11%.
- **2005 to 2010 - down (-2):** The sum of nested frequency decreased by 42% and cover decreased to 6%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11A, Study no: 2



HERBACEOUS TRENDS--
Management unit 11A, Study no: 2

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	a16	ab33	ab22	b39	ab29	.97	1.05	1.66	1.13
G	Agropyron intermedium	b41	a3	a8	a8	a18	.01	.16	.09	.13
G	Agropyron spicatum	a-	a-	b13	b14	b14	-	.55	.78	.39
G	Bromus inermis	330	337	334	340	320	9.80	16.74	14.69	13.15
G	Elymus salina	a34	b56	a4	b66	a21	.68	.18	.77	.34
G	Festuca ovina	a-	c45	d72	bc37	ab10	.63	1.30	.43	.22
G	Koeleria cristata	b52	b51	a27	b66	ab50	.73	.73	2.04	1.22
G	Poa fendleriana	c123	a66	bc120	abc83	ab84	1.52	2.95	2.32	1.95
G	Poa secunda	a-	b40	b39	b22	b47	.60	.36	.45	.67
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		596	631	639	675	593	14.96	24.04	23.27	19.23
Total for Grasses		596	631	639	675	593	14.96	24.04	23.27	19.23
F	Agoseris glauca	-	2	-	-	-	.00	-	-	-
F	Allium sp.	-	3	-	2	-	.00	-	.01	-
F	Androsace septentrionalis (a)	-	b32	a7	a8	a5	.06	.01	.07	.01
F	Arabis drummondi	ab4	c20	ab1	bc9	a-	.07	.00	.03	-
F	Aster sp.	a-	b26	a-	a-	a-	.70	-	-	-
F	Astragalus argophyllus	a4	ab23	b33	ab12	ab20	.22	.46	.09	.28
F	Astragalus convallarius	a4	ab12	a4	b17	a2	.05	.03	.16	.00
F	Astragalus detritalis	-	6	-	-	-	.03	-	-	-

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	Astragalus tenellus	$_{ab}$132	$_{a}$99	$_{b}$167	$_{a}$132	$_{a}$102	4.39	6.58	4.72	3.67
F	Castilleja flava	$_{b}$19	$_{ab}$12	$_{a}$5	$_{a}$6	$_{a}$-	.14	.04	.09	-
F	Chaenactis douglasii	6	8	-	1	-	.16	-	.00	-
F	Cymopterus longipes	$_{a}$-	$_{d}$122	$_{b}$33	$_{c}$87	$_{b}$13	.77	.22	1.29	.10
F	Descurainia pinnata (a)	-	3	-	2	3	.00	-	.00	.00
F	Erigeron eatonii	$_{abc}$26	$_{bc}$30	$_{a}$7	$_{c}$42	$_{ab}$21	.17	.06	.49	.30
F	Eriogonum alatum	-	-	-	-	3	.00	-	-	.00
F	Eriogonum racemosum	-	-	-	-	3	-	-	-	.01
F	Eriogonum umbellatum	$_{a}$15	$_{b}$65	$_{a}$26	$_{ab}$46	$_{ab}$38	1.56	.78	1.15	.68
F	Gilia sp. (a)	-	-	-	2	-	-	-	.00	-
F	Hedysarum boreale	$_{a}$-	$_{b}$18	$_{a}$4	$_{ab}$15	$_{ab}$4	.25	.00	.22	.15
F	Hymenoxys acaulis	-	1	-	3	3	.00	-	.03	.00
F	Ipomopsis aggregata	8	-	1	2	-	-	.03	.00	-
F	Linum lewisii	$_{ab}$2	$_{a}$-	$_{ab}$3	$_{b}$8	$_{b}$10	.00	.01	.30	.07
F	Lupinus argenteus	6	10	6	1	1	.16	.33	.00	.00
F	Machaeranthera canescens	$_{a}$-	$_{b}$13	$_{ab}$1	$_{ab}$6	$_{b}$6	.27	.15	.19	.24
F	Oxytropis lambertii	$_{c}$40	$_{a}$2	$_{a}$-	$_{b}$7	$_{a}$-	.01	-	.31	-
F	Penstemon caespitosus	$_{c}$48	$_{bc}$48	$_{a}$5	$_{ab}$23	$_{a}$11	.66	.09	.29	.06
F	Penstemon comarrhenus	-	1	-	1	2	.15	-	.15	.00
F	Phlox longifolia	11	21	9	18	15	.09	.04	.15	.06
F	Physaria acutifolia	$_{a}$-	$_{b}$63	$_{a}$7	$_{a}$-	$_{a}$6	.23	.04	-	.01
F	Physaria sp.	$_{c}$40	$_{a}$-	$_{a}$-	$_{b}$26	$_{a}$-	-	-	.33	-
F	Potentilla sp.	3	-	-	-	-	-	-	-	-
F	Schoencrambe linifolia	$_{ab}$5	$_{ab}$7	$_{a}$-	$_{b}$12	$_{b}$12	.02	-	.09	.06
F	Senecio canus	$_{a}$-	$_{ab}$7	$_{a}$2	$_{b}$14	$_{ab}$10	.06	.00	.36	.12
F	Thlaspi arvense (a)	-	1	-	-	-	.00	-	-	-
Total for Annual Forbs		0	36	7	12	8	0.07	0.01	0.08	0.01
Total for Perennial Forbs		373	619	314	490	282	10.24	8.93	10.51	5.88
Total for Forbs		373	655	321	502	290	10.32	8.94	10.60	5.90

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

BROWSE TRENDS--
Management unit 11A, Study no: 2

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia frigida	2	1	4	2	.00	-	.15	-
B	Artemisia tridentata vaseyana	80	70	49	50	8.18	6.43	4.41	2.45
B	Chrysothamnus viscidiflorus lanceolatus	80	68	83	76	3.20	2.56	2.71	2.70
B	Gutierrezia sarothrae	33	23	45	51	.04	.27	1.04	1.53
B	Symphoricarpos oreophilus	1	0	1	0	-	-	-	-
B	Tetradymia canescens	9	15	16	15	.15	.03	.24	.03
Total for Browse		205	177	198	194	11.58	9.30	8.57	6.72

CANOPY COVER, LINE INTERCEPT--
Management unit 11A, Study no: 2

Species	Percent Cover	
	'05	'10
Artemisia frigida	.08	-
Artemisia tridentata vaseyana	4.66	3.83
Chrysothamnus viscidiflorus lanceolatus	4.11	4.26
Gutierrezia sarothrae	.06	1.00
Tetradymia canescens	.06	.11

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11A, Study no: 2

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	1.6	1.2

BASIC COVER--
Management unit 11A, Study no: 2

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	7.50	6.25	36.06	48.48	39.88	37.89
Rock	3.25	3.00	3.17	2.85	3.95	2.37
Pavement	18.00	15.50	3.07	5.52	5.61	5.86
Litter	46.25	51.25	34.34	40.47	23.03	40.18
Cryptogams	.50	0	.15	.15	.04	.38
Bare Ground	24.50	24.00	32.06	37.24	38.72	26.39

SOIL ANALYSIS DATA --
Management unit 11A, Study no: 2, Study Name: Wirefince Canyon

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.7	7.2	43.4	33.0	23.6	4.4	5.1	96.0	0.8

PELLET GROUP DATA--
Management unit 11A, Study no: 2

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	6	10	41	9
Grouse	-	-	1	-
Elk	15	10	22	8
Deer	1	6	19	6
Cattle	1	12	12	13

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	35/acre	-
18 (45)	7 (17)	14 (35)
4 (10)	34 (84)	14 (35)
52 (129)	41 (102)	43 (106)

BROWSE CHARACTERISTICS--
Management unit 11A, 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)
Artemisia frigida									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**40**	0	100	-	20	50	0	0	4/10
00	**20**	0	100	-	-	0	0	0	3/4
05	**120**	0	100	-	-	0	0	0	12/10
10	**40**	50	50	-	-	0	50	0	3/9
Artemisia tridentata vaseyana									
82	**3132**	21	79	0	-	2	0	4	15/18
88	**4331**	46	46	8	266	32	0	0	14/20
95	**4080**	42	52	6	120	41	9	4	14/26
00	**3380**	11	70	19	40	49	4	41	13/25
05	**2680**	14	54	31	520	43	11	13	10/20
10	**2180**	25	61	14	120	17	43	27	9/20
Chrysothamnus nauseosus									
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	27/36
Chrysothamnus viscidiflorus lanceolatus									
82	**3932**	12	88	0	-	3	0	0	8/13
88	**3798**	23	75	2	-	4	0	0	5/4
95	**4880**	11	89	0	20	0	0	0	8/11
00	**3920**	14	85	2	20	0	0	0	7/9
05	**4740**	8	90	2	-	8	0	.84	7/10
10	**4640**	0	98	1	20	0	0	0	8/10
Eriogonum microthecum									
82	**599**	0	100	-	-	0	0	0	2/4
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	-/-

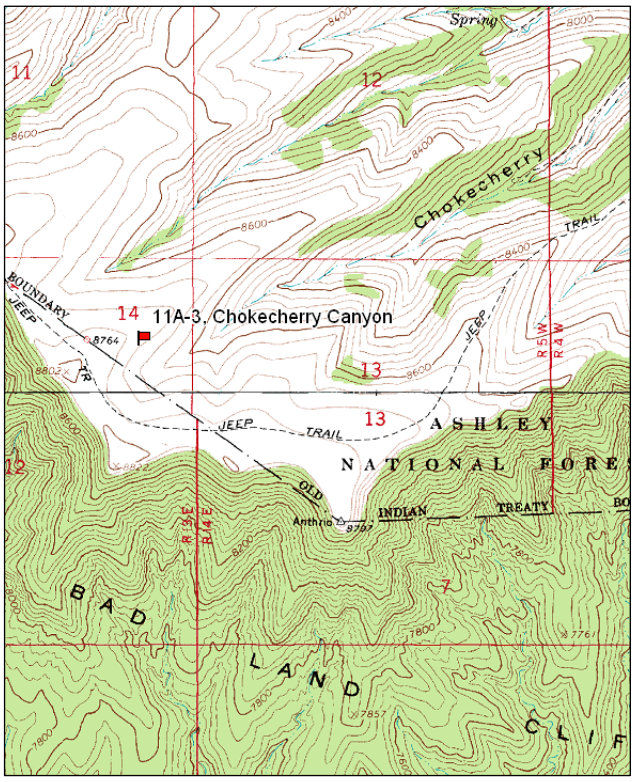
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
82	**0**	0	0	0	-	0	0	0	-/-
88	**1733**	0	100	0	-	0	0	0	4/4
95	**1580**	9	91	0	60	0	0	0	7/8
00	**760**	0	95	5	-	0	0	5	4/5
05	**2440**	24	76	0	20	0	0	0	5/6
10	**2940**	1	95	3	-	1	0	3	6/9
Symphoricarpos oreophilus									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	12/15
00	**0**	0	0	-	-	0	0	0	9/20
05	**20**	0	100	-	-	0	0	0	11/16
10	**0**	0	0	-	-	0	0	0	9/18
Tetradymia canescens									
82	**399**	83	17	0	-	83	0	0	10/11
88	**665**	50	10	40	-	0	0	0	9/12
95	**200**	30	70	0	-	30	0	0	7/10
00	**420**	14	86	0	-	10	10	0	6/9
05	**400**	0	100	0	-	50	10	0	7/11
10	**340**	6	94	0	20	12	6	0	7/10

CHOKECHERRY CANYON - TREND STUDY NO. 11A-3-10

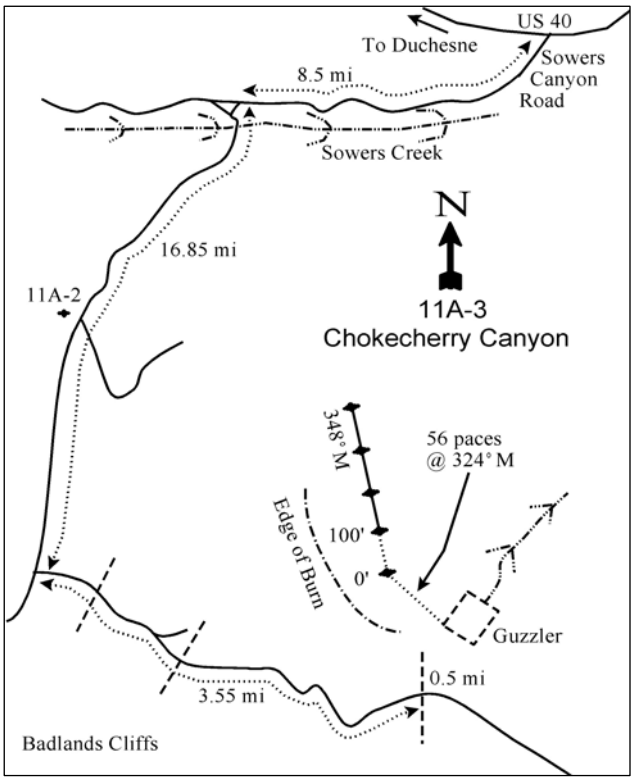
Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8743 ft. (2666 m)
Aspect: North
Slope: 10%-12%
Transect bearing: 348° magnetic
Belt placement: line 1 (6 & 95ft), line 2 (25ft), line 3 (46ft), line 4 (62ft).

Directions:
From the junction of Highway U.S. 40 and the Sowers Canyon Road (near Bridgeland), proceed south on the Sowers Canyon Road for 8.5 miles to the Nutters Ridge road. Turn left and drive south 16.85 miles up Nutters Ridge to a "T" intersection above the Badland Cliffs. Turn left and go 3.55 miles along the edge to a fence. Continue 0.5 miles and stop. Walk north over the ridge to a large, fenced guzzler. From the southwest fence corner, the 0-foot baseline stake is located 56 paces away at a bearing of 324º. The 0-foot baseline stake is marked by browse tag #9171.

Map Name: Anthro Mountain



Diagrammatic Sketch:



Township: 7S Range: 5W Section: 11

GPS: NAD 83, UTM 12S 550577 E 4414261 N

CHOKECHERRY CANYON - TREND STUDY NO. 11A-3

Site Information

Site Description: The study is located at the head of Chokecherry and Alkali Canyons and samples a prescribed burn treatment within a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass community. The burn was completed in 1977 and consumed approximately 500 acres. The burn was not seeded, however native species have readily reestablished on the burned area. The area treated by a prescribed fire again in the fall of 2007 (WRI Project #841). A wildlife guzzler is located adjacent to the site. Grazing in the area is managed by the U.S. Forest Service as part of the Antelope allotment. Pellet group transect data estimated heavy use by elk in 2000 and 2005, but light use in 2010. Estimated deer use was light in 2000 with more moderate use in 2005 and 2010. Cattle use has been minimal on the site since 2000 (Table - Pellet Group Data).

Browse: The two principle browse species are mountain big sagebrush and mountain low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *lanceolatus*). Mountain big sagebrush increased markedly in cover and density in 2000, but decreased to earlier sample levels in 2010 (Table - Browse Trends). The mountain big sagebrush population is comprised of a mixture of mature and young plants with mostly light use. The mountain low rabbitbrush population is mostly mature with little use. Other browse species found less frequently include dwarf rabbitbrush (*C. depressus*), snowberry (*Symphoricarpos oreophilus*) and gray horsebrush (*Tetradymia canescens*) (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are the dominant vegetation component, and are diverse and abundant on the site. The most prevalent species include thickspike wheatgrass (*Agropyron dasystachyum*), slender wheatgrass (*A. trachycaulum*), Letterman needlegrass (*Stipa lettermani*), needle-and-thread (*S. comata*), prairie junegrass (*Koeleria cristata*) and mutton bluegrass (*Poa fendleriana*). Identification of grasses has been difficult at times due to the lack of heads and common physical characteristics between the species. Bastard toadflax (*Comandra pallida*) provides the greatest amount of forb cover with sulfur eriogonum (*Eriogonum umbellatum*) and Watson penstemon (*Penstemon watsonii*) also being common (Table - Herbaceous Trends).

Soil: The soils are a moderately shallow clay loam texture with neutral reactivity (pH 6.9) (Table - Soil Analysis Data). Bare ground cover is low with a large amount of vegetation and litter cover provided by the vigorous herbaceous growth on the site. Rock and pavement also provide a good amount of protective cover on the site (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1982 to 1988 - slightly up (+1):** Browse species appeared to be increasing in abundance following the prescribed burn. The density of mountain big sagebrush and mountain low rabbitbrush both increased.
- **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 the decadence or vigor of any of the browse species. Recruitment of young sagebrush plants remained high.
- **1995 to 2000 - up (+2):** There was a four-fold increase in the density of mountain big sagebrush from 1,500 plants/acre to 6,000 plants/acre and cover increased from 2% to 7%. Decadence of sagebrush remained low, vigor was good and recruitment of young plants was high.
- **2000 to 2005 - stable (0):** The density of mountain big sagebrush decreased slightly to 5,320 plants/acre due to a large decrease in the recruitment of young plants. The density of mature sagebrush plants increased and cover increased to 14%.
- **2005 to 2010 - down (-2):** The density of mountain big sagebrush decreased by 50% to 2,640 plants/acre, and cover decreased to 3%. Decadence of sagebrush remained low and vigor was good.

The recruitment of young sagebrush plants increased and young plants comprised nearly half of the population again.

Grass:

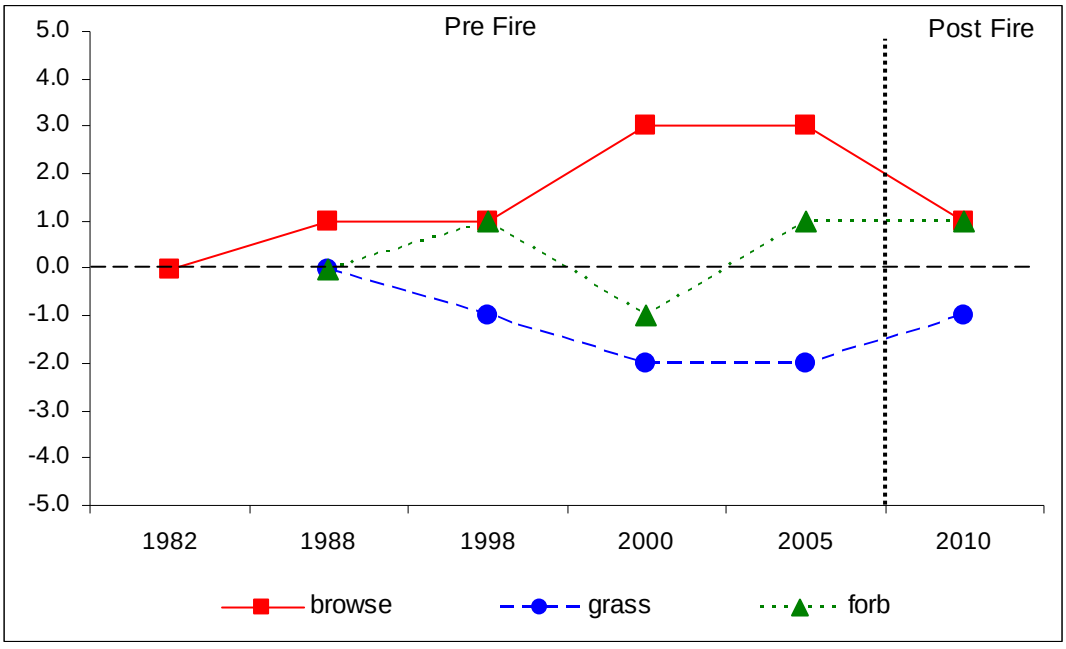
- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for grasses are available from 1982, so no trend was given.
- **1988 to 1995 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 9%.
- **1995 to 2000 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 10%, though cover increased from 22% to 27%.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses.
- **2005 to 2010 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 12%, but cover decreased from 24% to 21%.

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 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 17%.
- **1995 to 2000 - down (-2):** There was a 52% decrease in the sum of nested frequency of perennial forbs, and cover decreased from 11% to 6%.
- **2000 to 2005 - up (+2):** The perennial forb sum of nested frequency increased by 37%, though it is still well below 1995 levels. Cover of perennial forbs increased to 11%.
- **2005 to 2010 - stable (0):** There was little change in perennial forb sum of nested frequency or cover.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11A, Study no: 3



HERBACEOUS TRENDS--
Management unit 11A, Study no: 3

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	$_{d}$307	$_{c}$211	$_{a}$89	$_{b}$162	$_{b}$185	4.99	.77	2.69	4.07
G	Agropyron trachycaulum	$_{a}$16	$_{b}$115	$_{d}$234	$_{c}$175	$_{b}$112	3.54	13.17	9.15	3.22
G	Bromus anomalus	$_{b}$25	$_{a}$-	$_{a}$3	$_{a}$-	$_{a}$-	-	.03	-	-
G	Carex sp.	$_{b}$49	$_{a}$5	$_{a}$9	$_{a}$6	$_{a}$13	.03	.27	.15	.48
G	Festuca ovina	$_{a}$-	$_{ab}$11	$_{b}$10	$_{a}$-	$_{ab}$5	.04	.27	-	.07
G	Koeleria cristata	$_{a}$7	$_{bc}$49	$_{a}$12	$_{ab}$29	$_{c}$64	2.57	.21	1.62	1.97
G	Poa fendleriana	$_{b}$83	$_{a}$18	$_{a}$42	$_{a}$34	$_{a}$40	.25	.69	1.12	1.26
G	Stipa columbiana	-	4	-	5	2	.15	-	.01	.15
G	Stipa comata	$_{a}$17	$_{d}$122	$_{bc}$62	$_{ab}$37	$_{cd}$98	3.59	1.60	1.15	3.44
G	Stipa lettermani	$_{b}$252	$_{a}$154	$_{a}$160	$_{ab}$184	$_{ab}$189	6.78	9.46	8.29	5.84
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		756	689	621	632	708	21.98	26.50	24.22	20.52
Total for Grasses		756	689	621	632	708	21.98	26.50	24.22	20.52
F	Agoseris glauca	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$40	$_{a}$8	-	-	.49	.06
F	Androsace septentrionalis (a)	-	$_{b}$31	$_{a}$-	$_{a}$3	$_{a}$3	.27	-	.01	.00
F	Antennaria rosea	6	-	4	-	2	-	.30	-	.03
F	Arabis drummondi	$_{a}$1	$_{b}$16	$_{a}$-	$_{a}$-	$_{a}$-	.06	-	-	-
F	Astragalus convallarius	1	4	-	5	4	.00	-	.06	.07
F	Astragalus sp.	4	-	-	-	-	-	-	-	-
F	Calochortus nuttallii	$_{a}$-	$_{ab}$3	$_{a}$-	$_{b}$10	$_{ab}$2	.00	-	.02	.00
F	Calylophus lavandulifolius	$_{a}$-	$_{b}$22	$_{b}$9	$_{b}$14	$_{a}$-	.98	.05	.33	-
F	Castilleja flava	$_{a}$-	$_{b}$10	$_{a}$-	$_{bc}$19	$_{c}$35	.33	-	.41	.97
F	Chaenactis douglasii	$_{b}$34	$_{b}$20	$_{a}$6	$_{a}$4	$_{a}$2	.13	.03	.01	.00
F	Chenopodium album (a)	-	$_{b}$42	$_{a}$-	$_{b}$30	$_{b}$22	.15	-	.13	.05
F	Chenopodium leptophyllum(a)	-	$_{a}$-	$_{a}$-	$_{a}$11	$_{b}$26	-	-	.04	.08
F	Collinsia parviflora (a)	-	$_{a}$-	$_{c}$40	$_{a}$-	$_{b}$23	-	.77	-	.04
F	Comandra pallida	$_{a}$186	$_{b}$250	$_{a}$186	$_{a}$202	$_{ab}$217	3.52	3.40	4.84	5.05
F	Crepis acuminata	$_{a}$3	$_{c}$76	$_{a}$4	$_{a}$14	$_{b}$42	.37	.06	.54	.36
F	Cymopterus longipes	-	-	3	1	-	-	.00	.00	-
F	Delphinium nuttallianum	$_{a}$-	$_{a}$1	$_{a}$-	$_{b}$21	$_{a}$-	.00	-	.14	-
F	Erigeron eatonii	$_{b}$19	$_{ab}$8	$_{a}$-	$_{a}$2	$_{ab}$6	.07	-	.03	.04
F	Eriogonum alatum	$_{a}$-	$_{a}$2	$_{b}$14	$_{a}$1	$_{a}$4	.00	.21	.03	.01
F	Eriogonum umbellatum	$_{a}$35	$_{b}$70	$_{a}$34	$_{a}$29	$_{a}$14	1.72	.45	.63	.10
F	Geranium sp.	3	-	-	-	-	-	-	-	-
F	Hedysarum boreale	-	1	-	-	1	.00	-	-	.00
F	Heterotheca villosa	-	-	3	-	6	-	.03	-	.01
F	Hymenoxys acaulis	$_{a}$-	$_{b}$19	$_{ab}$12	$_{ab}$10	$_{a}$3	.32	.15	.05	.01
F	Ipomopsis aggregata	8	3	-	1	2	.03	-	.00	.03
F	Lepidium sp. (a)	-	-	-	-	1	-	-	-	.03
F	Linum lewisii	$_{a}$-	$_{b}$21	$_{ab}$10	$_{ab}$-	$_{a}$1	.27	.10	.00	.03
F	Lithospermum ruderale	$_{a}$-	$_{b}$8	$_{ab}$5	$_{a}$-	$_{a}$-	.19	.06	-	-
F	Lupinus argenteus	$_{c}$67	$_{b}$25	$_{ab}$8	$_{a}$4	$_{a}$6	.65	.55	.33	.57
F	Lychnis sp.	2	-	-	-	-	-	-	-	-

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	Machaeranthera canescens	$_{b}$31	$_{a}$4	$_{a}$-	$_{a}$-	$_{a}$-	.07	-	-	.03
F	Oenothera sp.	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$19	-	-	-	.66
F	Penstemon caespitosus	$_{a}$-	$_{b}$21	$_{a}$3	$_{ab}$5	$_{ab}$8	.58	.01	.09	.04
F	Penstemon comarrhenus	$_{c}$50	$_{b}$27	$_{ab}$18	$_{a}$3	$_{ab}$11	.36	.31	.01	.07
F	Penstemon watsonii	$_{b}$73	$_{b}$84	$_{a}$13	$_{b}$70	$_{b}$72	1.38	.27	2.86	2.97
F	Phlox longifolia	$_{b}$86	$_{a}$20	$_{a}$4	$_{a}$8	$_{a}$5	.10	.06	.07	.01
F	Physaria acutifolia	$_{a}$-	$_{b}$9	$_{ab}$4	$_{ab}$5	$_{a}$-	.08	.03	.03	-
F	Polygonum douglasii (a)	-	$_{b}$51	$_{a}$-	$_{c}$106	$_{b}$27	.22	-	.53	.08
F	Potentilla gracilis	-	8	9	4	2	.07	.02	.03	.06
F	Schoencrambe linifolia	-	-	1	3	-	-	.00	.01	-
F	Senecio canus	-	-	-	3	-	-	-	.03	.00
F	Tragopogon dubius	-	3	-	-	-	.03	-	-	-
F	Unknown forb-perennial	$_{b}$20	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
Total for Annual Forbs		0	124	40	150	102	0.64	0.76	0.71	0.28
Total for Perennial Forbs		629	735	350	478	472	11.41	6.15	11.11	11.25
Total for Forbs		629	859	390	628	574	12.06	6.92	11.82	11.54

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

BROWSE TRENDS--
Management unit 11A, Study no: 3

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia nova	2	0	0	0	-	-	-	-
B	Artemisia tridentata vaseyana	40	69	70	26	1.45	7.04	13.93	2.82
B	Chrysothamnus depressus	7	15	10	15	.16	.39	.07	.22
B	Chrysothamnus viscidiflorus lanceolatus	83	82	77	73	4.86	4.06	4.90	3.20
B	Gutierrezia sarothrae	2	1	3	1	.01	.00	-	-
B	Opuntia sp.	4	2	3	3	.03	-	-	-
B	Symphoricarpos oreophilus	24	9	7	7	2.28	.21	.03	.01
B	Tetradymia canescens	12	17	15	17	.83	.39	.62	.66
Total for Browse		174	195	185	142	9.63	12.10	19.56	6.92

CANOPY COVER, LINE INTERCEPT--
Management unit 11A, Study no: 3

Species	Percent Cover	
	'05	'10
Artemisia tridentata vaseyana	18.98	3.33
Chrysothamnus depressus	.18	.01
Chrysothamnus viscidiflorus lanceolatus	5.03	3.18
Gutierrezia sarothrae	-	.11
Symphoricarpos oreophilus	.35	.26
Tetradymia canescens	.41	.45

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11A, Study no: 3

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	1.8	1.3

BASIC COVER--
Management unit 11A, Study no: 3

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	12.50	23.00	45.31	50.65	50.59	47.32
Rock	2.00	5.50	8.19	5.89	7.51	7.98
Pavement	4.75	2.50	1.29	10.82	5.93	7.68
Litter	55.75	53.75	47.58	49.29	29.78	37.47
Cryptogams	0	0	.63	0	.03	0
Bare Ground	25.00	15.25	12.67	26.07	19.37	15.22

SOIL ANALYSIS DATA --
Management unit 11A, Study no: 3, Study Name: Chokecherry Canyon

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.5	6.9	32.9	33.8	33.2	4.3	11.8	217.6	0.9

PELLET GROUP DATA--
Management unit 11A, Study no: 3

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	4	3	3	1
Elk	27	46	55	11
Deer	3	9	11	10
Cattle	-	1	-	1

Days use per acre (ha)		
'00	'05	'10
-	-	-
84 (208)	77 (190)	18 (45)
11 (28)	39 (96)	23 (58)
1 (2)	-	-

BROWSE CHARACTERISTICS--
Management unit 11A, 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 nova									
82	**0**	0	0	0	-	0	0	0	-/-
88	**0**	0	0	0	-	0	0	0	-/-
95	**120**	17	50	33	-	0	17	0	5/7
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Artemisia tridentata vaseyana									
82	**0**	0	0	0	-	0	0	0	-/-
88	**798**	75	25	0	133	17	0	0	11/16
95	**1500**	55	43	3	960	28	1	1	16/23
00	**6000**	48	49	3	160	12	0	3	14/25
05	**5320**	9	85	6	12940	6	1	3	14/21
10	**2640**	49	42	8	480	26	5	5	15/21
Chrysothamnus depressus									
82	**0**	0	0	0	-	0	0	0	-/-
88	**0**	0	0	0	-	0	0	0	-/-
95	**360**	0	94	6	-	72	22	6	3/9
00	**960**	0	98	2	-	44	0	0	2/5
05	**300**	0	100	0	-	27	0	0	3/4
10	**1080**	6	94	0	-	0	0	0	6/6
Chrysothamnus viscidiflorus lanceolatus									
82	**3732**	14	86	0	-	0	0	0	12/18
88	**9198**	57	31	12	266	7	0	13	13/14
95	**9660**	17	83	0	-	22	0	0	9/13
00	**5800**	11	80	9	20	5	4	2	8/11
05	**5760**	4	94	1	-	3	0	.69	9/12
10	**6120**	5	94	1	-	0	0	0	9/11
Gutierrezia sarothrae									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**40**	50	50	-	-	0	0	0	3/5
00	**80**	0	100	-	-	0	0	0	4/4
05	**60**	0	100	-	-	0	0	0	5/6
10	**20**	0	100	-	-	0	0	0	6/6

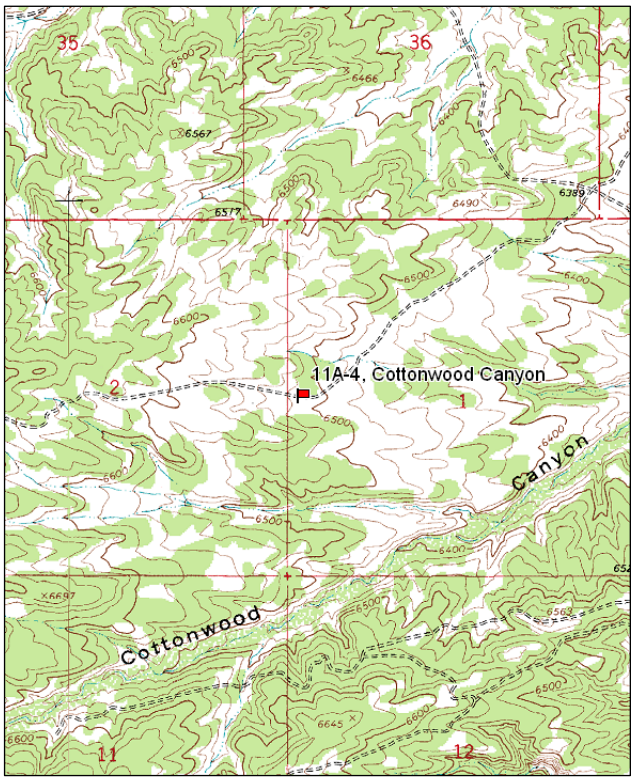
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**80**	0	100	-	-	0	0	0	4/15
00	**40**	0	100	-	-	0	0	0	3/10
05	**60**	0	100	-	-	0	0	0	3/11
10	**100**	20	80	-	-	0	0	0	2/5
Symphoricarpos oreophilus									
82	**266**	0	100	0	-	0	0	0	12/21
88	**1198**	67	28	6	-	61	11	0	15/26
95	**1180**	12	81	7	40	5	58	0	13/28
00	**200**	50	10	40	-	0	0	0	11/20
05	**180**	0	100	0	-	0	0	0	12/20
10	**180**	11	89	0	-	11	33	0	12/21
Tetradymia canescens									
82	**133**	0	100	0	-	0	0	0	7/11
88	**199**	33	67	0	-	33	0	0	11/12
95	**440**	9	86	5	-	77	5	0	9/13
00	**500**	12	76	12	-	52	36	0	7/12
05	**480**	4	83	13	20	38	8	0	7/10
10	**540**	4	96	0	-	48	11	0	6/10

COTTONWOOD CANYON - TREND STUDY NO. 11A-4-10

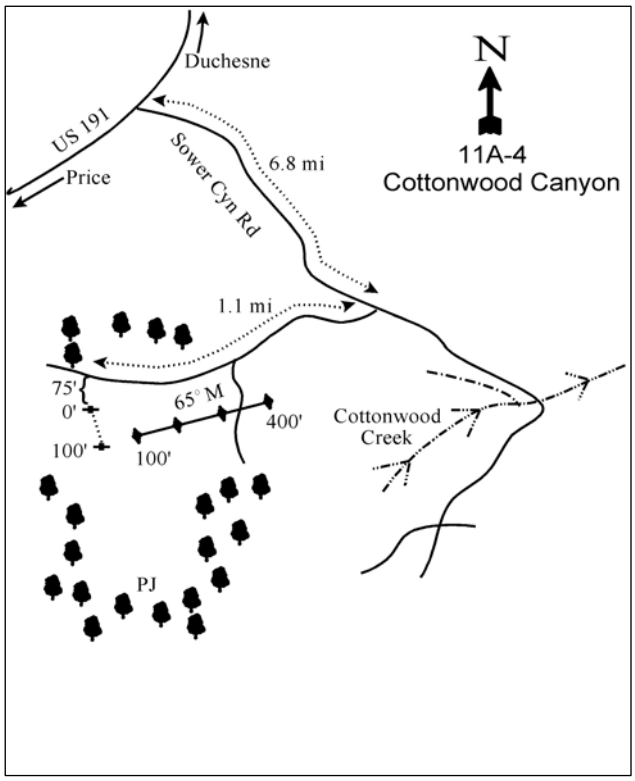
Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: UDWR
Elevation: 6520 ft. (1988 m)
Aspect: East
Slope: 2%
Transect bearing: 0'-100': 151° magnetic, 100'-400': 65° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 4 no rebar.

Directions:
From Duchesne, go up Indian Canyon (U.S. 191) approximately 2.5 miles to the Cottonwood-Sowers Canyon Road. Turn left and to the southeast on the main road 6.4 miles to a jeep trail on top of the ridge just before Cottonwood Creek. Turn right on the jeep trail and drive 1 mile west to a fork. Continue approximately 0.1 miles up the right fork to the study site. The 0-foot baseline stake is 15 paces south of the road and is marked with browse tag #9037. The baseline is interrupted between the first and second lines.

Map Name: Duchesne SW



Diagrammatic Sketch:



Township: 5S Range: 5W Section: 2

GPS: NAD 83, UTM 12T 550716 E 4436264 N

COTTONWOOD CANYON - TREND STUDY NO. 11A-4

Site Information

Site Description: The study samples winter range on the long slope down from Anthro Mountain and the Badland Cliffs to the Duchesne River. The study is in a mixed desert shrub and grass community surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands. It is located on the Utah Division of Wildlife Resources (DWR) Cottonwood Wildlife Management Area (WMA), which is surrounded by Bureau of Land Management (BLM) and Ute tribal lands. The pellet group data has estimated moderate use by elk and light use by deer since 2000 (Table - Pellet Group Data). Antelope also utilize the site, but sign has been relatively infrequent.

Browse: Shadscale (*Atriplex confertifolia*) was historically the dominant browse in cover, but winterfat (*Ceratoides lanata*) increased substantially in cover (Table - Browse Trends) and density in 2005 and is now a co-dominant species. Fringed sagebrush (*Artemisia frigida*) was found in high density at the outset of the study, but density decreased steadily form 1995 to 2005 and fringed sagebrush is now much less prevalent on the site. Shadscale is a mostly mature population of lightly used plants, though utilization was high in 2000. Decadence and vigor of shadscale have been mostly good, but decadence and poor vigor were high in 2000. Recruitment of young shadscale has been poor except in 1986 and 2010. The winterfat population consists of a mixture of mature and young plants that have shown mostly moderate use through the years. Decadence and poor vigor have been low in winterfat except in 2000 when both were high. Recruitment of young winterfat plants was low in 1995 and 2000, but has been excellent since 2005. Most of the fluctuations in the density of winterfat are due to fluctuations in the recruitment of young plants. Other browse species present in low densities include bud sagebrush (*Artemisia spinescens*), black sagebrush (*A. nova*) Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*), fourwing saltbush (*Atriplex canescens*), narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*), broom snakeweed (*Gutierrezia sarothrae*) and prickly pear cactus (*Opuntia sp.*).

Herbaceous Understory: Perennial grasses are abundant, but are not particularly diverse on the site. Needle-and-thread (*Stipa comata*) has slowly gained dominance on the site with a decline in thickspike wheatgrass (*Agropyron dasystachyum*) and blue grama (*Bouteloua gracilis*), though both species also remain abundant. The sum of nested frequency of perennial grasses has decreased gradually over the years, but perennial grasses remain abundant. Perennial forbs are rare and the forb component has, at times, been dominated by annual species. Scarlet globemallow (*Sphaeralcea coccinea*) was fairly abundant in 2005, but has been less prevalent in all other sample years.

Soil: The soil is a moderately deep clay loam texture with slightly alkaline soil reactivity (pH 7.5) (Table - Soil Analysis Data). Bare ground cover has been mostly moderate, but was high in 2005 corresponding to a low in litter cover. Pavement cover is moderately high and provides some protective ground cover (Table - Basic Cover). Soil erosion is not a significant problem due to the high grass frequency, although some soil loss is evident in the interspaces, resulting in pedestaling around shrubs. Erosion is more severe in the surrounding pinyon-juniper woodlands. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **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. Decadence of shadscale decreased from 40% to 10%. Winterfat and fringed sagebrush decreased in decadence to 0%. However, there was also a large decrease in the recruitment of young plants in shadscale and winterfat.
- **1995 to 2000 - down (-2):** There was a decrease in the densities of shadscale, winterfat and fringed sagebrush, and cover of shadscale and winterfat decreased. Decadence and poor vigor of shadscale and winterfat increased substantially.

- **2000 to 2005 - up (+2):** The density of winterfat increased six-fold from 1,080 plants/acre to 6,480 plants/acre, and cover increased from less than 1% to 4%. Decadence and poor vigor of winterfat and shadscale decreased substantially. Fringed sagebrush density decreased substantially and fringed sagebrush was no longer prevalent on the site.
- **2005 to 2010 - slightly up (+1):** The density of winterfat continued to increase by 72% to 11,120 plants/acre, though cover remained similar. However, the density of shadscale decreased by 21% from 1,420 plants/acre to 1,120 plants/acre and cover decreased from 5% to 2%. Both species populations remained healthy with low decadence and good vigor.

Grass:

- **1988 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial grasses. There was a significant decrease in the nested frequency of blue grama and a significant increase in the nested frequency of thickspike wheatgrass.
- **1995 to 2000 - stable (0):** The perennial grass sum of nested frequency remained similar, though cover increased from 18% to 21%. The nested frequency of blue grama decreased significantly.
- **2000 to 2005 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 19% and cover decreased slightly to 19%. Thickspike wheatgrass had a significant decrease in nested frequency and needle-and-thread increased significantly in nested frequency.
- **2005 to 2010 - slightly down (-1):** There was a 13% decrease in the perennial grass sum of nested frequency, though cover increased to 23%. There was a significant decrease in the nested frequency of thickspike wheatgrass.

Forb:

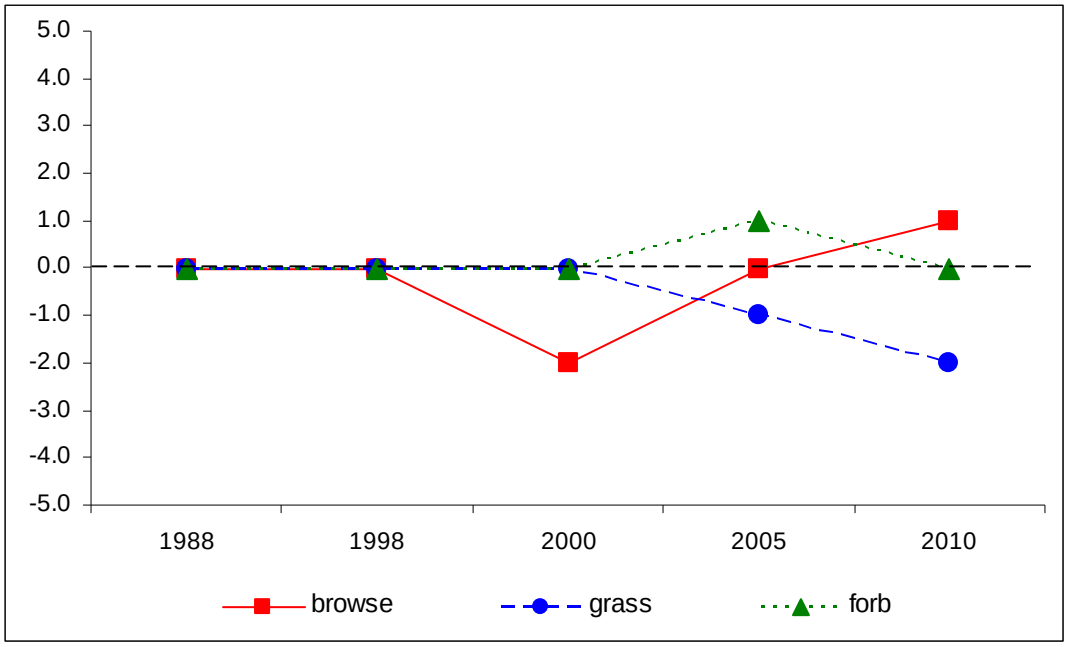
- **1988 to 1995 - stable (0):** Perennial forbs were rare.
- **1995 to 2000 - stable (0):** Perennial forbs were rare.
- **2000 to 2005 - slightly up (+1):** Cover of perennial forbs increased to 2% with a large increase in the cover of scarlet globemallow, but perennial forbs remain rare on the site.
- **2005 to 2010 - slightly down (-1):** Scarlet globemallow cover decreased and perennial forb cover decreased to less than 1%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 11A, study no: 4

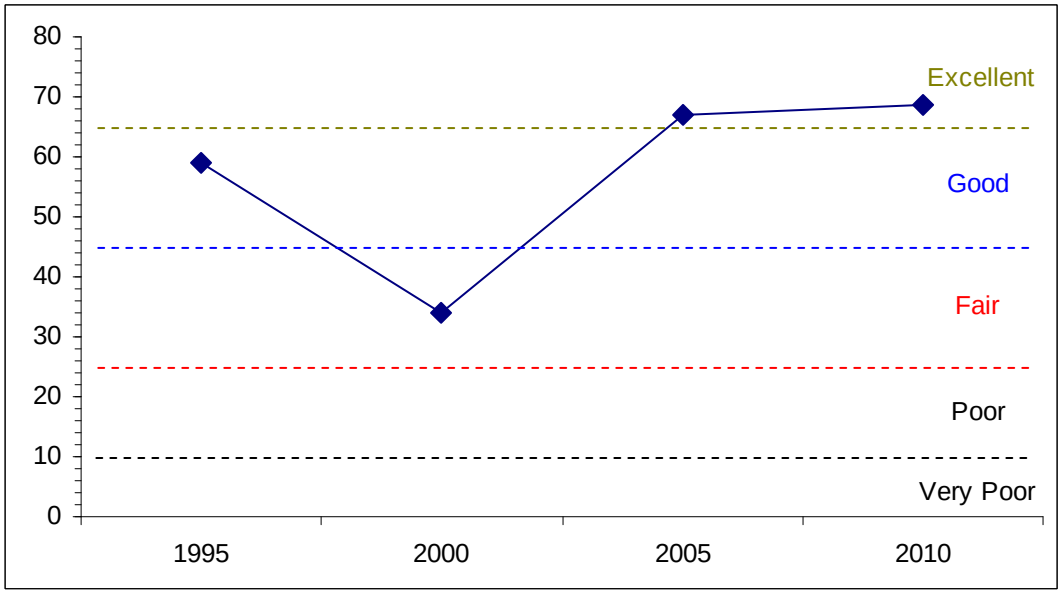
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	8.1	13.1	6.9	30.0	0.0	0.9	0.0	**59.1**	Good
00	3.8	0.0	0.0	30.0	0.0	0.2	0.0	**34.0**	Fair
05	9.6	13.4	9.3	30.0	0.0	4.6	0.0	**66.9**	Good-Excellent
10	7.3	14.5	15.0	30.0	0.0	1.9	0.0	**68.7**	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11A, Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 11A, Study no: 4



HERBACEOUS TRENDS--
Management unit 11A, Study no: 4

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	$_{b}$179	$_{c}$255	$_{c}$279	$_{b}$164	$_{a}$116	6.46	5.86	4.64	2.65
G	Agropyron spicatum	-	4	-	-	-	.04	-	-	-
G	Bouteloua gracilis	$_{d}$298	$_{c}$190	$_{b}$152	$_{a}$82	$_{a}$74	4.76	4.83	2.42	1.70
G	Bromus tectorum (a)	-	1	-	-	-	.00	-	-	-
G	Oryzopsis hymenoides	$_{a}$12	$_{b}$44	$_{ab}$21	$_{ab}$18	$_{ab}$19	1.10	.51	.47	.61
G	Sitanion hystrix	$_{ab}$15	$_{ab}$15	$_{b}$36	$_{ab}$14	$_{a}$7	.09	.84	.34	.04
G	Sporobolus cryptandrus	-	-	-	5	-	-	-	.21	-
G	Stipa comata	$_{a}$190	$_{a}$167	$_{a}$172	$_{b}$251	$_{b}$248	5.62	9.39	11.31	17.50
Total for Annual Grasses		0	1	0	0	0	0.00	0	0	0
Total for Perennial Grasses		694	675	660	534	464	18.08	21.44	19.42	22.51
Total for Grasses		694	676	660	534	464	18.09	21.44	19.42	22.51
F	Astragalus purshii	-	6	-	-	-	.01	-	-	-
F	Chenopodium fremontii (a)	-	$_{c}$77	$_{a}$-	$_{b}$16	$_{ab}$2	.55	-	.03	.00
F	Chenopodium leptophyllum(a)	-	$_{c}$66	$_{a}$-	$_{b}$19	$_{a}$-	.23	-	.19	-
F	Cryptantha sp.	5	4	-	-	-	.01	-	-	-
F	Descurainia pinnata (a)	-	$_{b}$38	$_{a}$-	$_{a}$3	$_{a}$-	.39	-	.01	-
F	Halogeton glomeratus (a)	-	-	-	4	9	-	-	.01	.21
F	Lappula occidentalis (a)	-	$_{c}$32	$_{a}$-	$_{d}$111	$_{b}$14	.32	-	.84	.05
F	Machaeranthera grindelioides	-	3	-	-	-	.00	-	-	-
F	Navarretia intertexta (a)	-	$_{d}$135	$_{a}$-	$_{c}$61	$_{b}$7	1.06	-	.19	.02
F	Orthocarpus luteus (a)	3	-	-	-	-	-	-	-	-
F	Phlox austromontana	3	-	5	-	-	-	.03	-	-
F	Schoencrambe linifolia	$_{a}$1	$_{c}$48	$_{ab}$5	$_{ab}$6	$_{b}$21	.31	.01	.09	.33
F	Sphaeralcea coccinea	$_{ab}$9	$_{ab}$15	$_{a}$8	$_{c}$30	$_{bc}$25	.09	.04	2.17	.64
F	Taraxacum officinale	-	2	-	-	-	.00	-	-	-
F	Townsendia incana	-	4	4	2	-	.01	.01	.03	-
F	Tragopogon dubius	2	-	-	-	-	-	-	-	-
Total for Annual Forbs		3	348	0	214	32	2.56	0	1.29	0.28
Total for Perennial Forbs		20	82	22	38	46	0.45	0.10	2.28	0.97
Total for Forbs		23	430	22	252	78	3.02	0.10	3.58	1.26

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

BROWSE TRENDS--
Management unit 11A, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia frigida	93	87	30	24	1.34	1.63	.49	.26
B	Artemisia nova	5	3	3	3	-	.15	.03	.03
B	Artemisia spinescens	15	1	1	1	.19	.18	.15	.00
B	Artemisia tridentata wyomingensis	1	1	0	0	-	-	-	-
B	Atriplex confertifolia	62	49	45	35	4.85	1.62	4.58	2.11
B	Ceratoides lanata	29	27	61	76	1.56	.30	3.60	3.88
B	Chrysothamnus viscidiflorus stenophyllus	1	2	0	0	-	-	-	-
B	Gutierrezia sarothrae	4	2	1	0	.15	-	.03	-
B	Opuntia sp.	1	0	1	1	-	-	-	-
B	Pediocactus simpsonii	2	0	0	0	-	-	-	-
Total for Browse		213	172	142	140	8.10	3.89	8.89	6.29

CANOPY COVER, LINE INTERCEPT--
Management unit 11A, Study no: 4

Species	Percent Cover	
	'05	'10
Artemisia frigida	1.04	.51
Artemisia nova	.40	.23
Atriplex confertifolia	8.86	4.08
Ceratoides lanata	4.11	3.65
Gutierrezia sarothrae	.10	-

BASIC COVER--
Management unit 11A, Study no: 4

Cover Type	Average Cover %				
	'88	'95	'00	'05	'10
Vegetation	23.50	31.20	28.95	30.33	32.48
Rock	0	.91	.08	.07	.00
Pavement	24.75	7.81	8.63	8.12	5.99
Litter	30.50	28.26	29.41	13.60	46.78
Cryptogams	.25	4.27	1.81	.33	.36
Bare Ground	21.00	20.09	39.95	57.65	28.85

SOIL ANALYSIS DATA --
Management unit 11A, Study no: 4, Study Name: Cottonwood Canyon

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
27.3	7.5	36.9	34.8	28.3	1.9	8.7	233.6	0.7

PELLET GROUP DATA--
Management unit 11A, Study no: 4

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	26	36	48	25
Elk	15	28	39	27
Deer	13	7	14	12
Cattle	2	-	-	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
59 (146)	35 (86)	42 (104)
15 (37)	1 (2)	5 (13)
-	-	-

BROWSE CHARACTERISTICS--
Management unit 11A, Study no: 4

		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									
88	**11931**	39	53	8	466	0	0	10	6/4
95	**14260**	68	32	0	2920	2	0	0	15/9
00	**8680**	17	62	21	20	21	.46	42	2/4
05	**960**	0	100	0	1020	4	8	0	16/14
10	**800**	38	60	3	20	5	3	3	6/7
Artemisia nova									
88	**265**	75	0	25	-	0	0	25	-/-
95	**160**	0	100	0	-	63	0	0	13/18
00	**160**	0	0	100	-	13	63	100	6/21
05	**100**	0	40	60	960	0	0	60	10/18
10	**120**	33	17	50	-	67	0	50	6/16
Artemisia spinescens									
88	**2331**	14	60	26	-	0	0	14	5/6
95	**440**	5	95	0	-	27	73	0	6/12
00	**20**	0	100	0	-	0	0	0	4/13
05	**20**	0	0	100	20	0	0	100	6/14
10	**20**	0	100	0	-	0	0	0	-/-
Artemisia tridentata wyomingensis									
88	**0**	0	0	0	-	0	0	0	-/-
95	**20**	0	100	0	-	100	0	0	17/26
00	**40**	0	50	50	-	0	100	100	21/40
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	17/33
Atriplex canescens									
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	18/31
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	9/15

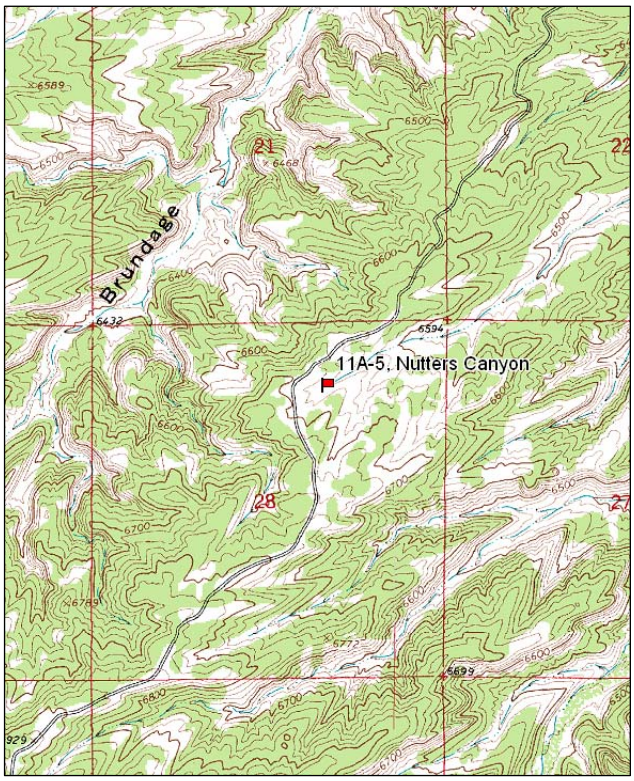
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Atriplex confertifolia									
88	**4198**	21	40	40	333	10	0	2	13/18
95	**2100**	2	89	10	60	10	2	5	13/23
00	**1740**	0	30	70	-	31	48	53	8/17
05	**1420**	4	86	10	300	0	0	7	15/32
10	**1120**	20	77	4	40	2	0	7	11/23
Ceratoides lanata									
88	**4264**	56	28	16	133	13	3	5	6/6
95	**1420**	4	96	0	-	38	1	0	12/11
00	**1080**	4	33	63	-	30	52	63	3/5
05	**6480**	40	59	0	4960	20	2	0	11/13
10	**11120**	35	65	0	80	.35	0	9	8/10
Chrysothamnus viscidiflorus stenophyllus									
88	**1998**	70	30	-	-	0	0	0	7/4
95	**20**	0	100	-	-	0	0	0	10/12
00	**40**	0	100	-	-	0	0	0	2/4
05	**0**	0	0	-	-	0	0	0	9/23
10	**0**	0	0	-	-	0	0	0	7/12
Gutierrezia sarothrae									
88	**265**	25	0	75	-	0	0	25	-/-
95	**120**	0	100	0	40	0	0	0	10/12
00	**60**	0	33	67	-	0	0	0	4/6
05	**20**	0	100	0	-	0	0	0	9/11
10	**0**	0	0	0	-	0	0	0	7/11
Opuntia sp.									
88	**66**	0	100	0	-	0	0	0	4/12
95	**20**	0	0	100	-	0	0	100	6/14
00	**0**	0	0	0	-	0	0	0	3/10
05	**20**	100	0	0	-	0	0	0	4/12
10	**20**	0	100	0	-	0	0	0	5/19
Pediocactus simpsonii									
88	**0**	0	0	-	-	0	0	0	-/-
95	**60**	0	100	-	-	0	0	0	1/2
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Sarcobatus vermiculatus									
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	28/37
10	**0**	0	0	-	-	0	0	0	25/27

NUTTERS CANYON - TREND STUDY NO. 11A-5-10

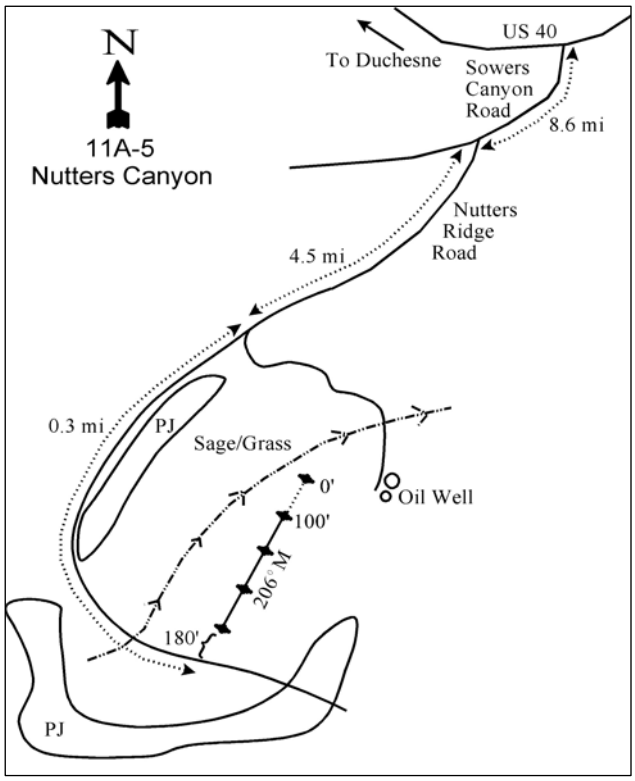
Vegetation Type: Black Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 6675 ft. (2035 m)
Aspect: North
Slope: 4%
Transect bearing: 206° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 3 rebar @ 2ft.

Directions:
From Highway U.S. 40 near Bridgeland, turn south and go up the Anthro Mountain-Sowers Canyon Road 8.6 miles to the turnoff to Nutter's Ridge by an old cabin and an oil well. Turn left and go 4.5 miles up the ridge on the main road (stay left at major forks) to another fork to an oil well. Bear right and continue 0.3 miles to where the road curves and crosses a small drainage. Stop before you drive back into the Pinyon and Juniper and walk down into the sage opening about 180 feet to the 400-foot baseline stake. The 0-foot baseline stake is marked with browse tag #9035.

Map Name: Duchesne SE



Diagrammatic Sketch:



Township: 5S Range: 4W Section: 28

GPS: NAD 83, UTM 12T 556507 E 4430407 N

NUTTERS CANYON - TREND STUDY NO. 11A-5

Site Information

Site Description: This study is located above Nutters Canyon in the middle of a sagebrush (*Artemisia spp.*) and grass swale surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands. Natural sagebrush and grass openings are found within the heads of most of the drainages. There are roads along most of the main ridges, plus spur roads going to numerous oil wells within the area. Cattle grazing and use is relatively light on this Ute Reservation land. Pellet group transect data has estimated mostly moderate use by elk since 2000. Estimated use by deer was light in 2000, but has been more moderate since 2005. The majority of elk pellets were found in the grassy areas and most deer pellets were found in the black sagebrush (*Artemisia nova*) adjacent to the pinyon-juniper woodland. The area also appears to receive some light use from antelope.

Browse: The sagebrush on the study is classified primarily as black sagebrush, although there appears to be some hybridization between Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and black sagebrush. Along the edge of the pinyon-juniper type and along the drainage bottom, there are shrubs more characteristic of mountain big sagebrush (*A. tridentata* ssp. *vaseyana*). Black sagebrush provides the majority of the browse cover on the site (Table - Browse Trends). The black sagebrush population is a mixture of young and old plants that has had moderate to heavy use over the sample years. Decadence of black sagebrush was relatively high in 2000 and 2005, but has been low in the other sample years. Recruitment of young black sagebrush plants has been mostly good over the course of the study, but was low in 2000 and 2005. Other browse species found less commonly include winterfat (*Ceratoides lanata*), shadscale (*Atriplex confertifolia*), fringed sagebrush (*Artemisia frigida*), stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) and broom snakeweed (*Gutierrezia sarothrae*) (Table - Browse Characteristics).

Herbaceous Understory: Grasses on the site are fairly diverse and abundant. Needle-and-thread (*Stipa comata*) has slowly increased in dominance over the course of the study as the other two abundant species, blue grama (*Bouteloua gracilis*) and bottlebrush squirreltail (*Sitanion hystrix*), have slowly decreased in frequency. Other perennial species sampled, but that occur less frequently, include thickspike wheatgrass (*Agropyron dasystachyum*), galleta (*Hilaria jamesii*), Indian ricegrass (*Oryzopsis hymenoides*) and Sandberg bluegrass (*Poa secunda*). Forbs are rare and have provided very little vegetation cover or useful forage during all sampling periods. There were almost no forbs sampled during the 2000 reading. The most common forb species is scarlet globemallow (*Sphaeralcea coccinea*).

Soil: The soils are a loam with a slightly alkaline reaction (pH 7.4) (Table - Soil Analysis Data). Bare ground cover is low due to a large amount of pavement cover. Vegetation and litter cover are also moderately low (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **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. Decadence and vigor of black sagebrush remained similar. Recruitment of young black sagebrush plants decreased, but remained good at 17% of the population.
- **1995 to 2000 - stable (0):** There was a 12% increase in the density of black sagebrush from 10,840 plants/acre to 12,100 plants/acre, though cover remained similar. Decadence of black sagebrush increased from 12% to 39% and poor vigor increased from 5% to 13%. Recruitment of young black sagebrush plants decreased to 3% of the population.
- **2000 to 2005 - down (-2):** The density of black sagebrush decreased by 49% to 6,180 plants/acre and cover decreased from 17% to 8%. Black sagebrush decadence remained high at 37% and poor vigor increased to 26%.

- **2005 to 2010 - slightly up (+1):** There was a large increase in the density of black sagebrush to 9,420 plants/acre due to a large increase in the recruitment of young plants. The density of mature black sagebrush changed little and cover remained similar. Decadence and poor vigor both decreased to 13%.

Grass:

- **1988 to 1995 - down (-2):** The sum of nested frequency of perennial grasses decreased by 28% with a significant decrease in the nested frequency of the three dominant grasses, blue grama, bottlebrush squirreltail and needle-and-thread.
- **1995 to 2000 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased from 7% to 11%.
- **2000 to 2005 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 13%, but cover increased to 18%. There was a significant decreased in the nested frequency of blue grama.
- **2005 to 2010 - stable (0):** The sum of nested frequency and cover of perennial grasses remained similar. There was a significant decrease in the nested frequency of bottlebrush squirreltail and a significant increase in the nested frequency of needle-and-thread.

Forb:

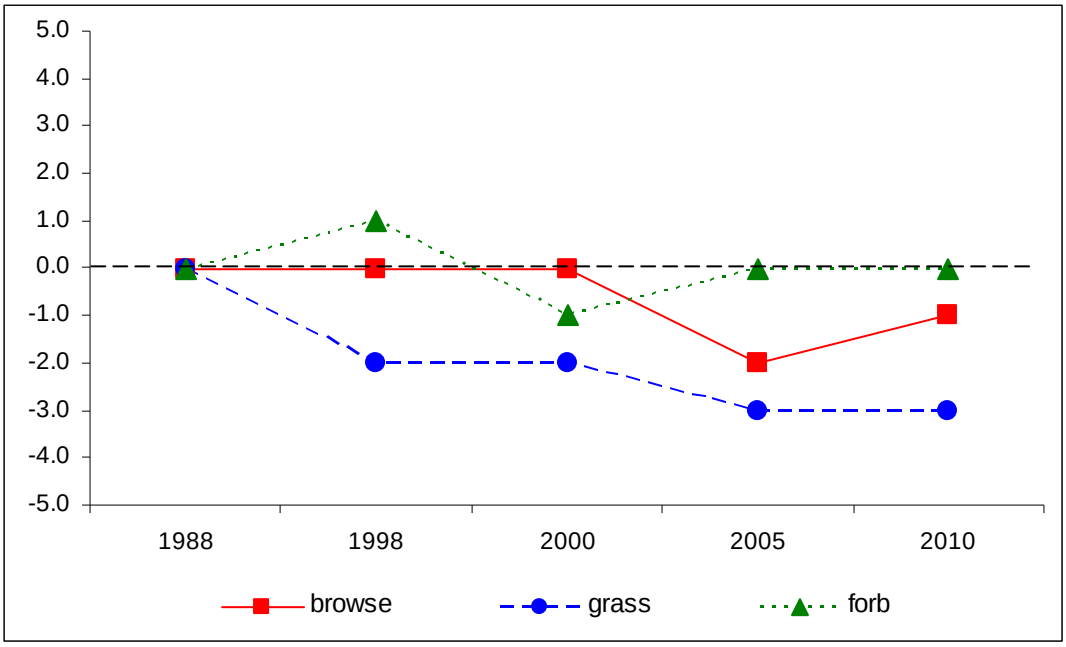
- **1988 to 1995 - slightly up (+1):** There was a large increase in the sum of nested frequency of perennial forbs, but forbs remained rare on the site.
- **1995 to 2000 - down (-2):** There were almost no forbs sampled on the site.
- **2000 to 2005 - slightly up (+1):** More forbs were sampled on the site and cover increased to over 1% due to an increase in the cover of scarlet globemallow, but forbs remain rare on the site.
- **2005 to 2010 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover decreased to less than 1%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 11A, study no: 5

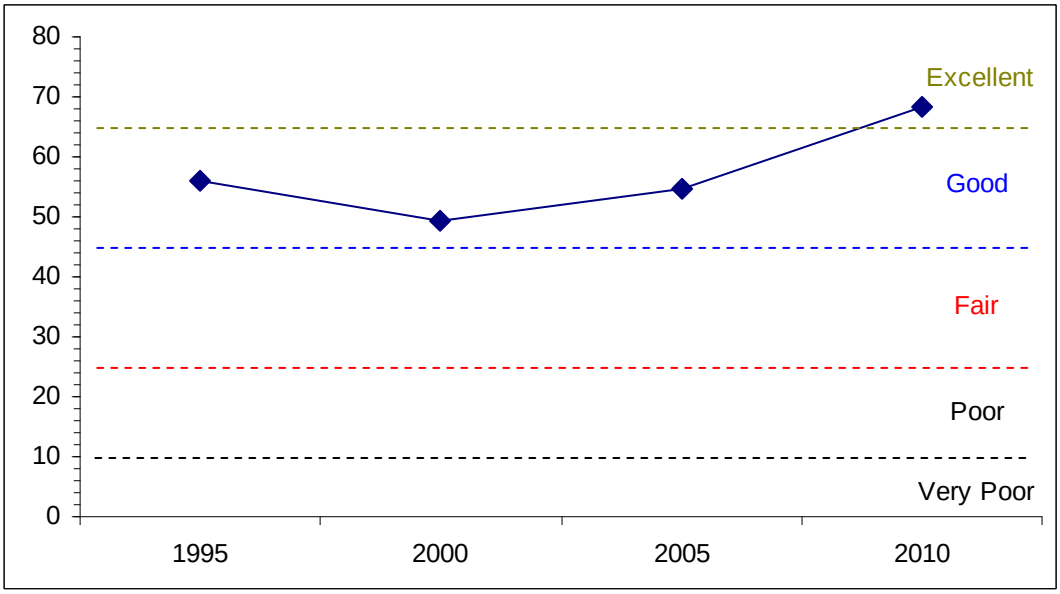
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	21.6	11.5	8.1	13.3	0.0	1.4	0.0	**55.9**	Good
00	21.6	3.0	1.7	22.8	0.0	0.0	0.0	**49.2**	Good
05	11.4	5.7	5.1	30.0	0.0	2.5	0.0	**54.6**	Good
10	10.4	11.4	15.0	30.0	0.0	1.5	0.0	**68.2**	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11A, Study no: 5



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 11A, Study no: 5



HERBACEOUS TRENDS--
Management unit 11A, Study no: 5

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	a-	ab17	b20	ab9	a3	.16	.05	.04	.00
G	Bouteloua gracilis	c209	b139	b154	a65	a65	1.20	3.24	1.54	1.05
G	Hilaria jamesii	a-	b18	ab14	a5	ab9	.24	.07	.04	.07
G	Oryzopsis hymenoides	b10	ab8	ab6	a-	ab4	.06	.07	-	.03
G	Poa secunda	ab14	ab17	a7	b25	c57	.11	.04	.42	.77
G	Sitanion hystrix	c221	b157	b165	bc179	a98	2.01	3.34	7.67	2.79
G	Stipa comata	c281	ab174	a136	a154	b211	2.88	4.56	8.07	13.06
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		735	530	502	437	447	6.67	11.38	17.81	17.79
Total for Grasses		735	530	502	437	447	6.67	11.38	17.81	17.79
F	Arabis perennans	a-	b18	a-	a-	a-	.06	-	-	-
F	Astragalus purshii	a-	c58	a-	b8	a-	.19	-	.02	-
F	Astragalus sp.	ab7	c44	a-	b21	ab10	.15	-	.10	.03
F	Chenopodium fremontii (a)	-	b35	a-	a-	a-	.23	-	-	-
F	Chenopodium leptophyllum(a)	-	3	-	5	2	.01	-	.01	.00
F	Cryptantha sp.	a-	a1	a-	a-	b37	.00	-	-	.22
F	Descurainia pinnata (a)	-	b48	a-	a1	a3	.33	-	.00	.01
F	Erigeron pumilus	-	3	-	-	-	.00	-	-	-
F	Eriogonum cernuum (a)	-	4	-	3	-	.01	-	.03	-
F	Lappula occidentalis (a)	-	b49	a-	b44	a4	.20	-	.18	.01
F	Machaeranthera canescens	1	3	-	1	-	.01	-	.03	-
F	Navarretia intertexta (a)	-	b32	a-	a3	a-	.12	-	.01	-
F	Orobanche sp.	-	1	-	-	-	.00	-	-	-
F	Phlox longifolia	a-	b38	a-	b23	b18	.07	-	.06	.11
F	Schoencrambe linifolia	7	10	4	4	4	.03	.01	.19	.01
F	Sphaeralcea coccinea	b32	b20	a2	ab20	ab21	.13	.01	.85	.35
F	Taraxacum officinale	-	1	-	-	-	.00	-	-	-
F	Townsendia sp.	-	-	-	2	3	-	-	.00	.00
Total for Annual Forbs		0	171	0	56	9	0.91	0	0.24	0.03
Total for Perennial Forbs		47	197	6	79	93	0.68	0.01	1.26	0.73
Total for Forbs		47	368	6	135	102	1.60	0.01	1.51	0.76

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

BROWSE TRENDS--
Management unit 11A, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia frigida	6	5	1	1	.01	.04	.00	-
B	Artemisia nova	92	95	83	90	16.18	16.71	7.67	7.50
B	Artemisia tridentata wyomingensis	1	0	0	0	-	-	-	.00
B	Atriplex confertifolia	12	8	15	16	1.32	.71	1.41	.48
B	Ceratoides lanata	10	6	26	33	.06	.00	.29	.44
B	Chrysothamnus nauseosus graveolens	3	2	0	0	.07	.00	-	-
B	Chrysothamnus viscidiflorus stenophyllus	6	7	7	10	.01	.21	.25	.36
B	Gutierrezia sarothrae	10	23	5	5	.08	.28	.00	-
B	Opuntia sp.	3	2	1	1	.00	.03	.03	.15
B	Pediocactus simpsonii	2	10	4	2	.00	.04	.00	.00
B	Pinus edulis	0	4	4	2	-	-	.03	.03
Total for Browse		145	162	146	160	17.76	18.05	9.69	8.98

CANOPY COVER, LINE INTERCEPT--
Management unit 11A, Study no: 5

Species	Percent Cover	
	'05	'10
Artemisia frigida	-	.03
Artemisia nova	11.80	10.44
Atriplex confertifolia	3.36	.95
Ceratoides lanata	.58	.30
Chrysothamnus viscidiflorus stenophyllus	.50	.51
Gutierrezia sarothrae	-	.15
Pinus edulis	.45	.65

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11A, Study no: 5

Species	Average leader growth (in)	
	'05	'10
Ceratoides lanata	3.8	1.0

BASIC COVER--
Management unit 11A, Study no: 5

Cover Type	Average Cover %				
	'88	'95	'00	'05	'10
Vegetation	11.00	25.97	29.31	27.87	31.72
Rock	.50	.84	2.42	1.05	.77
Pavement	33.00	47.27	44.26	30.35	32.85
Litter	44.50	25.42	19.22	21.31	33.96
Cryptogams	0	.05	2.71	.94	1.72
Bare Ground	11.00	5.48	9.82	28.22	10.73

SOIL ANALYSIS DATA --
Management unit 11A, Study no: 5, Study Name: Nutters Canyon

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.8	7.4	44.9	33.8	21.3	2.3	6.6	220.8	0.9

PELLET GROUP DATA--
Management unit 11A, Study no: 5

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	6	10	6	6
Elk	15	24	37	12
Deer	17	9	24	23

Days use per acre (ha)		
'00	'05	'10
-	-	-
40 (99)	31 (76)	21 (53)
5 (13)	41 (101)	34 (84)

BROWSE CHARACTERISTICS--
Management unit 11A, Study no: 5

		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									
88	**2532**	61	37	3	1199	16	11	5	7/11
95	**240**	58	42	0	40	0	0	0	12/10
00	**200**	30	70	0	-	0	0	0	3/5
05	**20**	0	100	0	-	0	0	0	9/8
10	**20**	0	100	0	-	100	0	0	8/10
Artemisia nova									
88	**21065**	42	43	15	5866	13	.31	5	10/12
95	**10840**	17	71	12	320	58	32	5	11/18
00	**12100**	3	58	39	200	15	35	13	7/15
05	**6180**	2	61	37	21740	8	23	26	7/15
10	**9420**	41	46	13	2580	25	4	13	7/14
Artemisia tridentata wyomingensis									
88	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	100	0	0	15/7
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	32/49
Atriplex confertifolia									
88	**133**	0	100	0	-	0	0	0	8/13
95	**360**	6	89	6	-	0	0	6	16/29
00	**320**	13	25	63	-	19	31	6	13/28
05	**400**	40	55	5	720	0	0	10	16/39
10	**580**	45	45	10	20	0	0	10	13/26

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Ceratoides lanata									
88	**265**	75	0	25	-	0	0	0	-/-
95	**320**	13	88	0	-	19	6	0	10/10
00	**120**	0	83	17	-	33	67	17	3/3
05	**1860**	80	18	2	2020	15	0	2	11/15
10	**2980**	82	18	0	260	13	5	.67	8/11
Chrysothamnus nauseosus graveolens									
88	**0**	0	0	0	-	0	0	0	-/-
95	**300**	20	80	0	-	0	0	0	9/11
00	**40**	0	50	50	-	0	50	50	11/6
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Chrysothamnus viscidiflorus stenophyllus									
88	**132**	0	50	50	66	0	0	0	3/2
95	**140**	0	100	0	-	0	0	0	6/7
00	**340**	12	29	59	40	0	24	59	2/7
05	**1520**	93	7	0	420	0	0	0	8/10
10	**1040**	79	21	0	-	0	0	0	6/9
Gutierrezia sarothrae									
88	**265**	25	75	-	-	0	0	0	5/5
95	**240**	8	92	-	380	0	0	0	7/6
00	**1680**	7	93	-	60	0	0	0	3/5
05	**100**	0	100	-	-	0	0	0	8/8
10	**120**	0	100	-	-	0	0	0	7/9
Opuntia sp.									
88	**0**	0	0	-	-	0	0	0	-/-
95	**60**	0	100	-	-	0	0	0	6/10
00	**40**	0	100	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	3/8
10	**20**	0	100	-	-	0	0	0	3/8
Pediocactus simpsonii									
88	**0**	0	0	-	-	0	0	0	-/-
95	**40**	0	100	-	-	0	0	0	0/1
00	**260**	31	69	-	-	8	0	0	1/2
05	**80**	0	100	-	-	0	0	0	1/1
10	**40**	0	100	-	-	0	0	0	2/3
Pinus edulis									
88	**133**	100	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**100**	100	0	-	20	0	0	0	-/-
05	**100**	100	0	-	-	0	0	0	-/-
10	**60**	100	0	-	20	0	0	0	-/-

SUMMARY
WILDLIFE MANAGEMENT UNIT 11A - NINE MILE, ANTHRO

Community Types

Deer winter range within a unit is summarized into three categories based on ecological potentials which inlude low potential, mid-level potential and high potential. Low potential sites include desert shrub, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and cliffrose (*Cowania mexicana* ssp. *stansburiana*) communities. Mid-level potential sites include mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) communities. High potential sites include mountain brush communities. Black sagebrush (*A. nova*) and basin big sagebrush (*A. tridentata* ssp. *tridentata*) communities are placed within the low potential or mid-level potential scales based on precipitation and elevation. Deer summer range is summarized separately from winter range as a fourth category and typically includes aspen (*Populus tremuloides*) and high elevation mountain brush or mountain meadow communities. Four interagency range trend studies were sampled in Unit 11A during the summer of 2010. Two of the range trend studies in the unit, Cottonwood Canyon (11A-4) and Nutter's Canyon (11A-5), are classified as low potential deer winter range sites and sample a desert shrub community and black sagebrush community, respectively. Both studies are also considered to be elk winter range. The other two studies, Wirefence Canyon (11A-2) and Chokecherry Canyon, are considered to be deer summer range within mountain big sagebrush communities. Both studies are also considered to be elk summer range. The Chokecherry Canyon study was part of a prescribed fire in 1977 and both studies were part of another prescribed fire project that took place in 2007, though the Wirefence Canyon study appeared to have not been burned. There were no studies in this unit that were considered to be high potential or mid-level potential winter range.

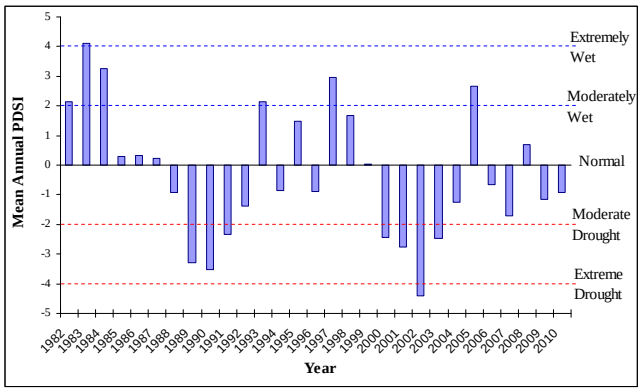


Figure 1. The 29 year mean annual Palmer Drought Severity Index (PDSI) for the Uintah Basin (Division 6). The PDSI is based on climate data gathered from 1895 to 2010. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is ≥4.0 = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and ≤-4.0 = Extreme Drought (Time Series Data 2011).

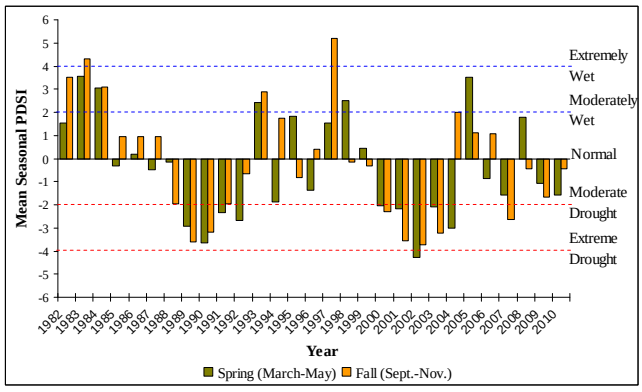


Figure 2. The 29 year mean spring (March-May) and fall (Sept.-Nov.) Palmer Drought Severity Index (PDSI) for the Uintah Basin (Division 6). The PDSI is based on climate data gathered from 1895 to 2010. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is ≥4.0 = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and ≤-4.0 = Extreme Drought (Time Series Data 2011).

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation and Palmer Drought Severity Index (PDSI) data for the unit were compiled from the National Oceanic and Atmospheric Administration (NOAA) Physical Sciences Division (PSD) as part of the Uintah Basin (Division 6). The Uintah Basin had a historic annual mean precipitation of 7.99 inches from 1895 to 2010. The mean annual PDSI of the Uintah Basin displays several prolonged drought periods, over the course of study years. Moderate to extreme wet years in the Uintah Basin included 1982-1984, 1993, 1997 and 2005, and moderate

to extreme drought years included 1989-1991 and 2000-2003 (Figure 1 and Figure 2). (Time Series Data 2011).

Desert Shrub Communities
(Low Potential Winter Range)

Browse: The low potential cumulative median browse trend decreased slightly in 2000, but increased slightly in 2010 (Figure 7a). The browse composition of the Cottonwood Canyon study was comprised primarily of shadscale (*Atriplex confertifolia*) and winterfat (*Ceratoides lanata*). The browse composition of the Nutter's Canyon Study is dominated by black sagebrush. Because the composition of the two studies is different, individual browse species were not summarized for the unit. For further information on browse on these studies, refer to the discussion section.

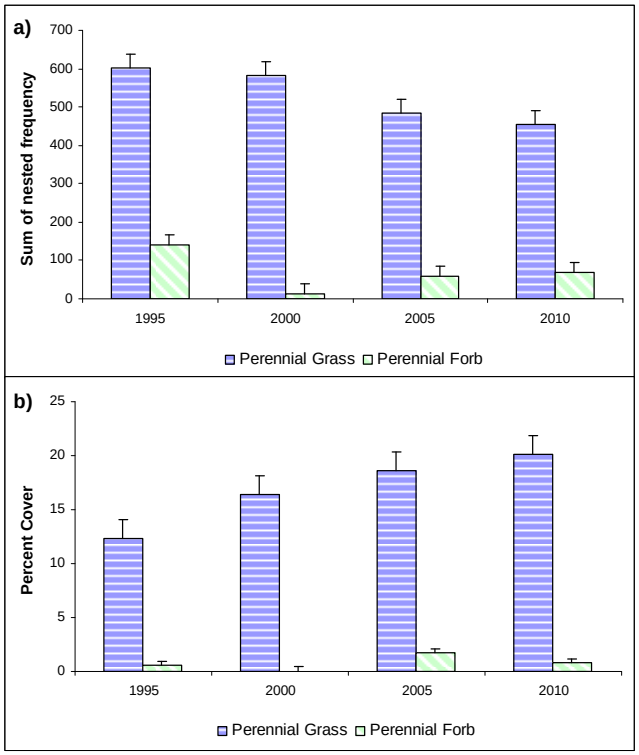


Figure 3. a) Low potential sites mean perennial grass and perennial forb sum of nested frequency (n=2) by year for WMU 11A, Nine Mile, Anthro. **b)** Low potential sites mean perennial grass and perennial forb cover (n=2) by year for WMU 11A.

Herbaceous Understory: Despite a general downward trend in the low potential median cumulative grass trend since 1988 (Figure 7a), grasses on these studies appear to be in good condition. Grasses within these communities are abundant, though diversity is typically low. Both studies are dominated by the native perennial grass species needle-and-thread (*Stipa comata*). The annual species cheatgrass (*Bromus tectorum*) is very rare on the sites. The mean sum of nested frequency of perennial grasses decreased significantly in 2005 and remained lower in 2010 (Figure 3a). Mean cover of perennial grasses increased significantly in 2000 and increased steadily throughout the following sample years (Figure 3b). Much of the discrepancy between the mean trends of sum of nested frequency and cover of perennial grasses is due to a general increase in the dominant grass species, needle-and-thread, as other lower cover species decreased.

The low potential median cumulative forb trend for the unit has fluctuated slightly over the course of the study, but has remained relatively stable since 1988 (Figure 7a). Perennial forbs are not common on the two low potential studies within the unit and provide little usable forage. The mean sum of nested frequency of perennial forbs was significantly higher in 1995 than the remaining sample years (Figure 3a), but mean cover of perennial forbs was significantly higher in 2005 than any other sample year (Figure 3b).

Utilization: Pellet group transect data indicates that elk predominantly use the area. The mean elk days use/acre on the unit has been moderate, but with a marked decrease in use since 2005. The mean deer days use/acre has been mostly light, though there was a notable increase in use since 2005. Most of the increase in deer use was due to a large increase in use by deer on the Nutter's Canyon study (Figure 8a). Cattle use is minimal on the studies with no sign of cattle sampled on the Nutter's Canyon study in any sample year.

Deer Desirable Components Index (DCI): The low potential deer DCI decreased in 2000, but has increased in each subsequent sample year. The DCI has increased despite a decrease in preferred browse cover due to increases in perennial grass cover throughout the years. The ranking of the DCI has ranged from fair in 2000 to excellent in 2010 (Table 1 and Figure 6).

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	14.9	12.3	7.5	21.7	0.0	1.1	0.0	**57.5**	Good
00	12.7	1.5	0.9	26.4	0.0	0.1	0.0	**41.6**	Fair
05	10.5	9.5	7.2	30.0	0.0	3.5	0.0	**60.7**	Good
10	8.8	12.9	15.0	30.0	0.0	1.7	0.0	**68.5**	Excellent

Table 1. Low potential scale mean deer DCI scores (n=2) by year for WMU 11A, Nine Mile, Anthro. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

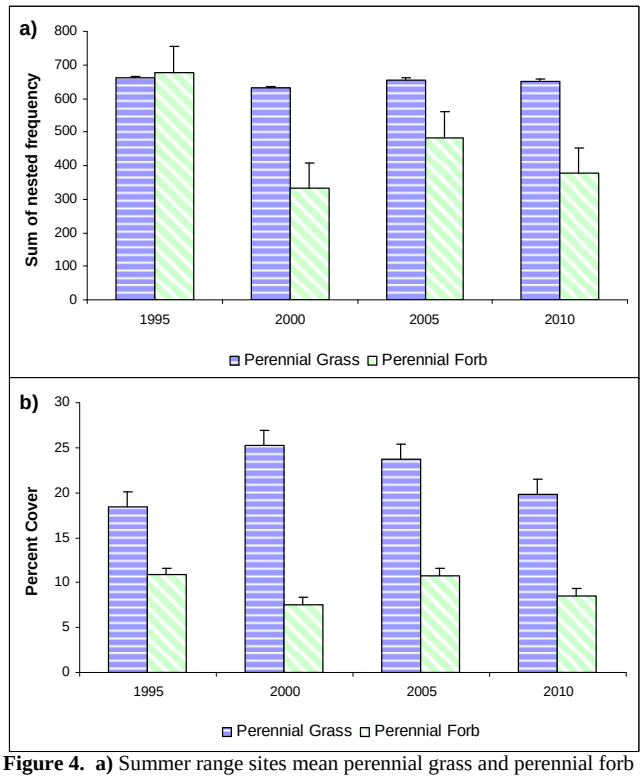


Figure 4. a) Summer range sites mean perennial grass and perennial forb sum of nested frequency (n=2) by year for WMU 11A, Nine Mile, Anthro. **b)** Summer range sites mean perennial grass and perennial forb cover (n=2) by year for WMU 11A.

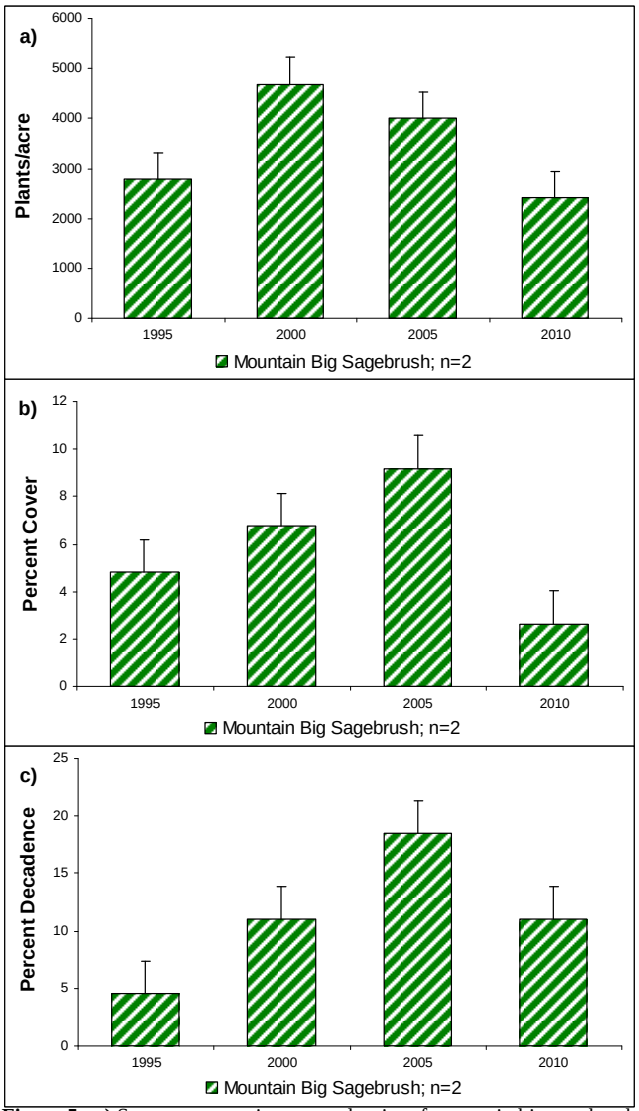


Figure 5. a) Summer range sites mean density of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) by year for WMU 11A, Nine Mile, Anthro. **b)** Summer range sites mean cover of mountain big sagebrush by year for WMU 11A. **c)** Summer range sites mean population decadence of mountain big sagebrush by year for WMU 11A.

Mountain Big Sagebrush Communities (Summer Range)

Browse: The summer range studies cumulative median browse trend increased from in 1988 and remained stable through 2000, but has decreased steadily since 2005 (Figure 7b). The dominant browse species on both of these studies is mountain big sagebrush with a substantial component of mountain low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *lanceolatus*). The mean density of mountain big sagebrush increased significantly in 2000 remaining similar in 2005, and mean cover of mountain big sagebrush increased steadily from 1995 to 2005. Both density and cover decreased significantly in 2010 (Figure 5a and Figure 5b) due to the prescribed fire that decreased browse on the Chokecherry Canyon

study. The mean decadence of sagebrush followed a similar trend as cover, increasing to moderate levels by 2005, but decreasing significantly in 2010 (Figure 5c).

Herbaceous Understory: The summer range median cumulative grass trend has decreased slightly from 1988 to 2000, but increased slightly from 2005 to 2010 (Figure 7b). Grasses within these communities are diverse and very abundant. The mean sum of nested frequency of perennial grasses has remained similar throughout the sample years (Figure 4a). Mean cover of perennial grasses, however, was significantly higher in 2000 and 2005 than in 1995 and 2010 (Figure 4b).

The summer range median cumulative forb trend has fluctuated over the sample years with increases in 1995 and 2005 and decreases in 2000 and 2010 (Figure 7b). Perennial forbs are also diverse and fairly abundant within the sampled communities. The mean sum of nested frequency of perennial forbs was similar to perennial grasses in 1995, but was significantly lower in the subsequent sample years (Figure 4a). Mean cover of perennial forbs has not fluctuated as drastically as the sum of nested frequency, but cover was significantly higher in 1995 and 2005 than in 2000 and 2010 (Figure 4b).

Utilization: Pellet group transect data indicates that both deer and elk predominantly use these study areas, though rates vary between the two studies. Elk use is more prevalent on the Chokecherry Canyon study and deer use is more prevalent on the Wirefence Canyon study. Cattle use is fairly heavy on the Wirefence Canyon study, while there was little sign of cattle sampled at the Chokecherry Canyon study. The mean deer days use/acre on the unit has been mostly light, though there was a marked increase in use by deer to moderate levels in 2005. The mean elk days use/acre has steadily decreased over the sample years from moderately heavy levels in 2000 to light use in 2010. Cattle use has been fairly stable on the unit (Figure 8b).

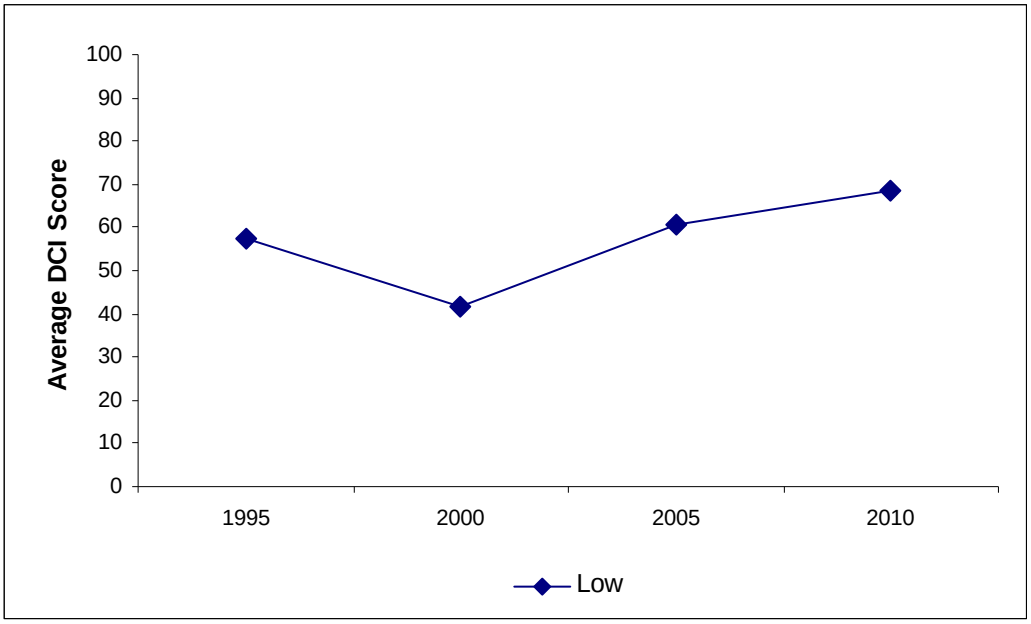


Figure 6. Mean low (n=2) potential scale deer DCI scores by year for WMU 11A, Nine Mile, Anthro. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high. There were no mid-level or high potential studies were sample on WMU 11A.

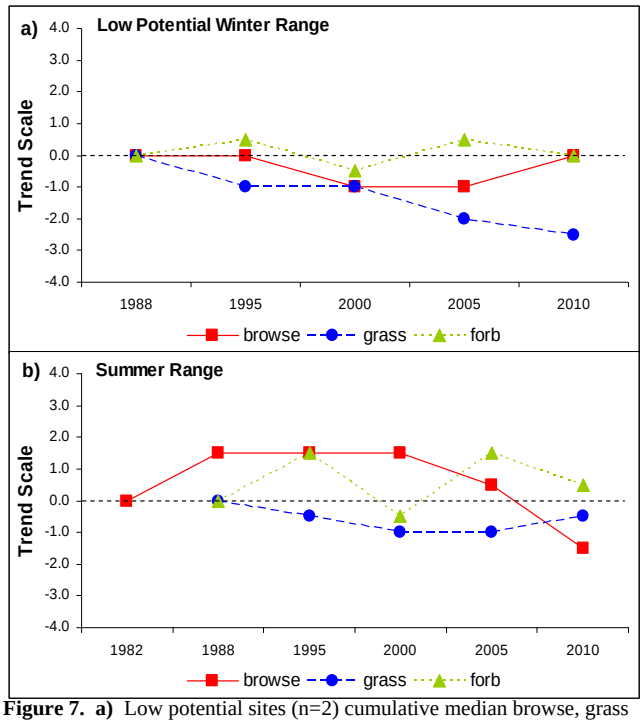


Figure 7. a) Low potential sites (n=2) cumulative median browse, grass and forb trends by year for WMU 11A, Nine Mile, Anthro. **b)** Summer range sites (n=2) cumulative median browse, grass and forb trends by year for WMU 11A.

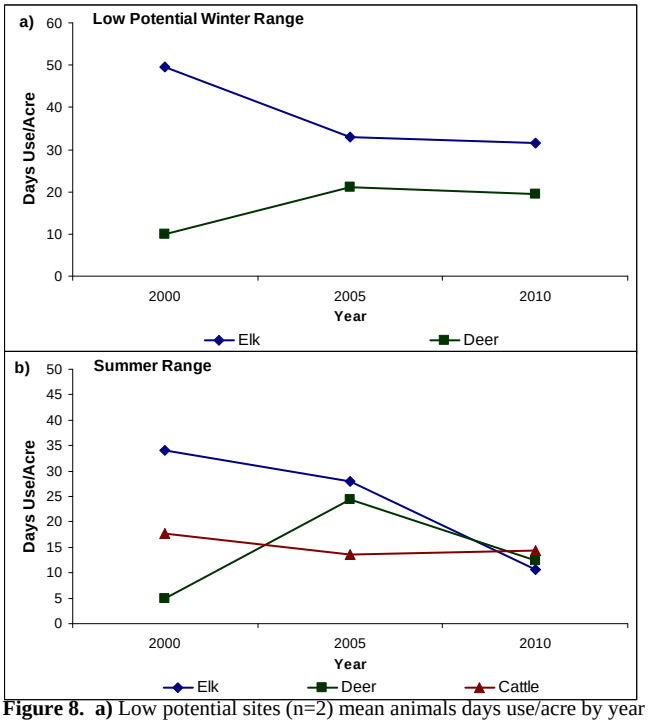
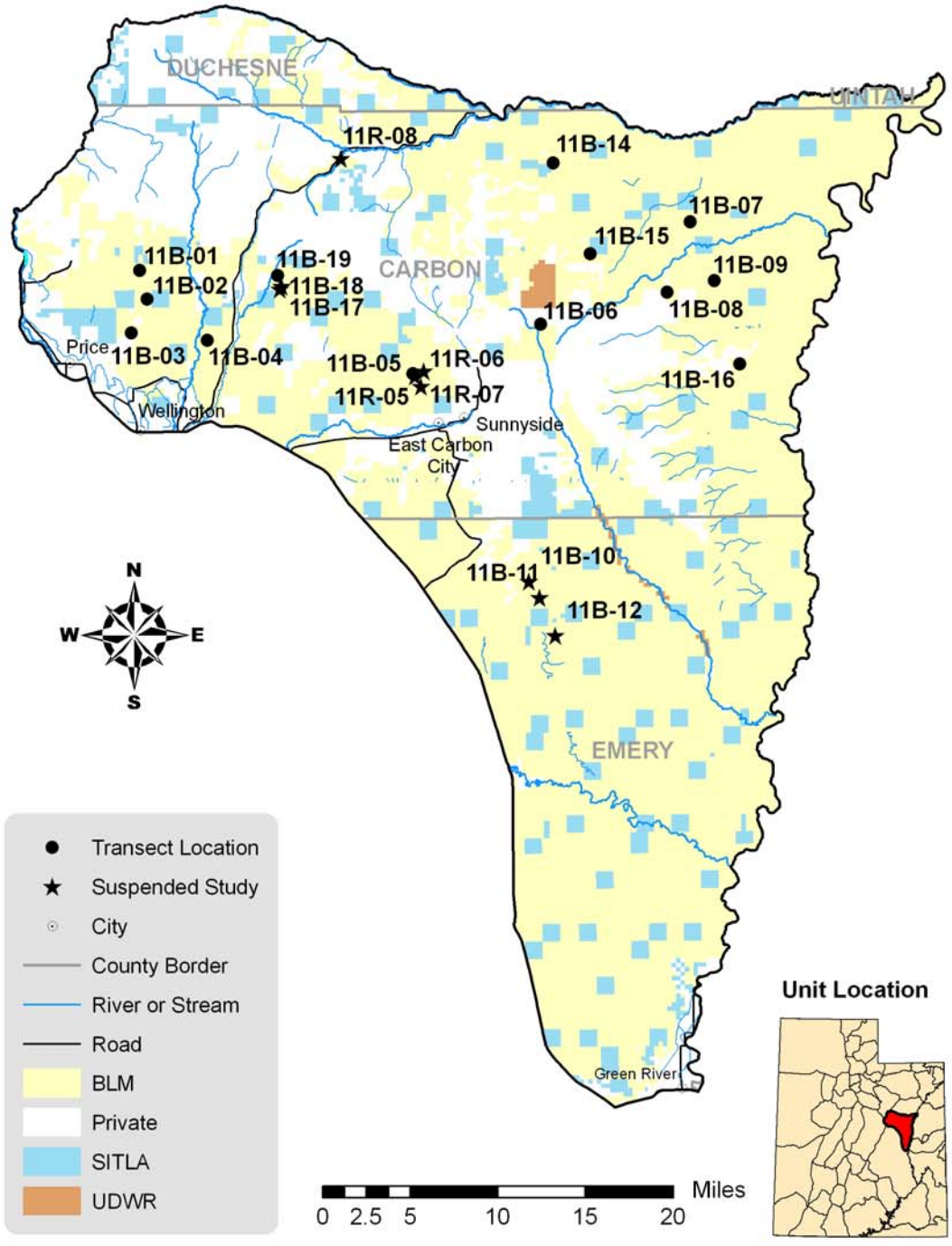


Figure 8. a) Low potential sites (n=2) mean animals days use/acre by year for WMU 11A, Nine Mile, Anthro. **b)** Summer range sites (n=2) mean animal days use/acre by year for WMU 11A.

Management Unit 11B



WILDLIFE MANAGEMENT UNIT 11B - NINE MILE, RANGE CREEK

Boundary Description

Carbon, Duchesne and Emery counties - Boundary begins in Green River and Interstate 70; then west on I-70 to highway US-6; northwest on US-6 to Highway US-191; northeast on US-191 to the Argyle Canyon road; southeast on the Argyle Canyon road to the Nine-mile Canyon road; east on the Nine-Mile Canyon road to its end near Bull Canyon; then continuing along Nine-Mile Creek to the Green River; south along the Green River to I-70 and beginning point.

Management Unit Description

The Nine Mile, Range Creek unit contains the eastern portion of Carbon County, the northeastern part of Emery County, and a small piece of southern Duchesne County. This triangular unit encompasses the West Tavaputs Plateau, bounded by the Book Cliffs and Soldier Canyon on the west, the Price River-Duchesne River drainage divide on the north and Green River on the east. Topography is steep and rough. The major drainages are Nine-Mile Creek, which drains Minnie Maude, Dry, Argyle, Cow and Harmon Canyons into the Green River; Range Creek, which drains the east side; Pace, Whitmore and Horse Canyons. Elevation ranges from 4,064 feet at Green River to 10,285 feet on Bruin Point. Communities within the unit include Helper, Price, Wellington, Sunnyside, East Carbon, and Green River. Major activities in the area include mining and grazing.

There is an estimated 881,000 acres classified as deer range on Unit 11B with 62% classified as winter range, 24% as summer range and 14% as year-long range. Bureau of Land Management (BLM) managed land comprises 61% of this range, Utah State Institutional Trust Lands (SITLA) comprises 9% and private land comprises 30% of the range. There is approximately 713,600 acres classified as elk range on Unit 11B with 43% classified as winter range, 23% as summer range and 35% as year-long range. Of the elk range, 59% is administered by the BLM, 9% by SITLA, 1% by the Division of Wildlife Resources (DWR) and 31% is on private land. The unit presents several challenges to public land and wildlife managers. Since a majority of the summer range is private land, hunting access is limited. Some of the ranches are privately managed for trophy hunting.

Normal winter range below the 8,500 foot elevation completely encompasses the summer range. Severe winter range is limited to areas below 7,000 feet. On the east side of the unit, steep bare slopes limit use to the ridge tops and canyon bottoms along lower Nine-Mile Creek and the Green River. During severe winters, all deer wintering in these areas are forced into the canyon bottoms, usually causing heavy winter losses. Along the west side of the unit, from Soldier Creek Canyon east to Horse Canyon, access to the winter range is good. However, from Horse Canyon south, the Roan and Book Cliffs drop off sharply presenting major obstacles to deer migration and preventing use of much of the lower elevation range. Winter concentration areas include: Nine-Mile Creek, Rock House Cow Camp area, Cedar Ridge, Argyle Canyon, and Little Park.

Range Trend Studies

Thirteen interagency range trend studies were sampled on Unit 11B in the summer of 2010. Nine of the studies were established in 1986 with regular monitoring through 2010. Of these studies, three studies [Deadman (11B-1), Airport Bench (11B-2) and 'B' Canyon (11B-5)] sample chained and seeded pinyon-juniper communities. Deadman was retreated with a bullhog and seeding treatment in 2007. Two studies [Coal Creek (11B-4) and Cottonwood (11B-7)] sample Wyoming big sagebrush communities, one study [Airport (11B-3)] samples a chained and seeded Wyoming big sagebrush community, one study [Upper Cottonwood Ridge (11B-6)] samples a high elevation, dry meadow, one study [Cedar Corral (11B-8)] samples a pinyon-juniper community and one study [Cedar Ridge (11B-9)] samples a black sagebrush community. Three further studies were established in 1994 with two of these studies [Twin Hollow (11B-15) and Steer Ridge (11B-16)] sampling mountain brush communities and one study [Prickly Pear (11B-14)] sampling a

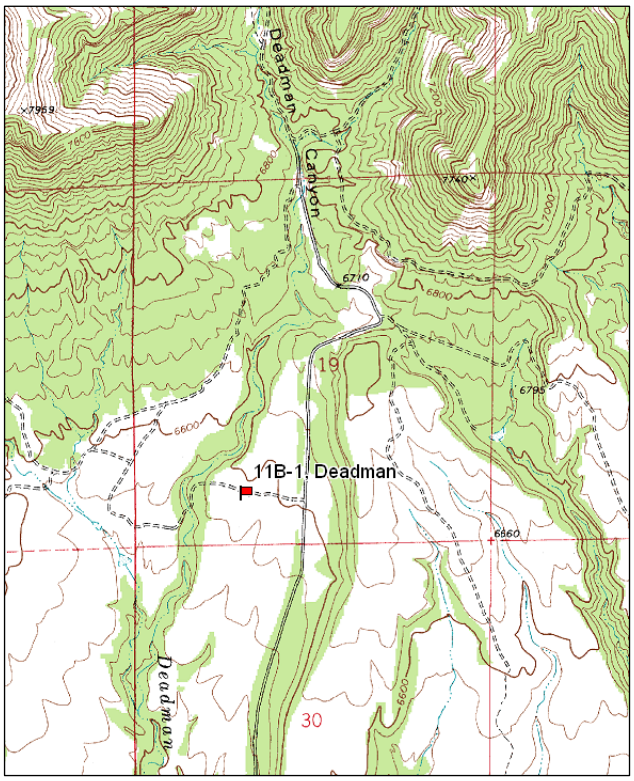
chained pinyon-juniper community. There was a special study [Dugout Creek PJ Chained (11B-19)] that was established in 1997 and read as a regular trend study since 2005, which samples a chained pinyon-juniper community. There are nine studies on Unit 11B that have been suspended for various reasons and were not sampled in 2010. For further information on suspended studies, refer to past reports at http://wildlife.utah.gov/range/.

DEADMAN - TREND STUDY NO. 11B-1-10

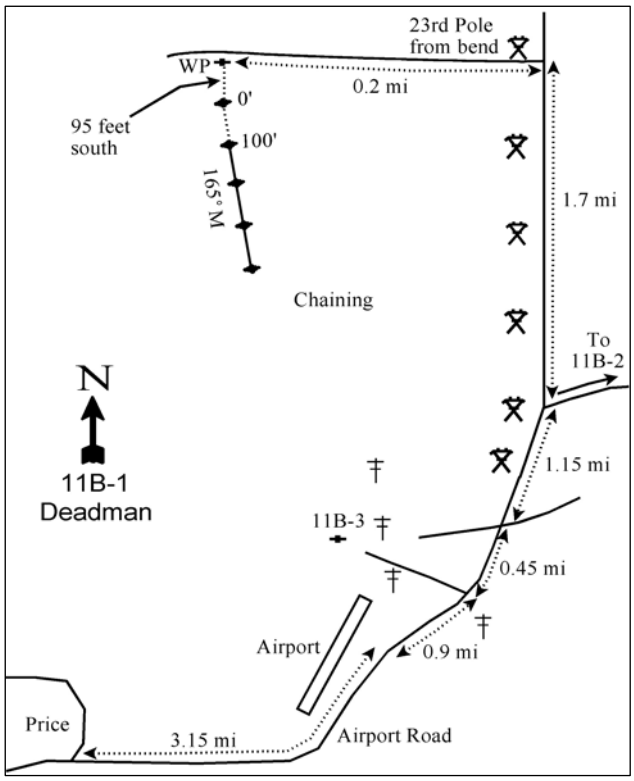
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Semidesert Stony Loam (Utah Juniper-Pinyon), R034XY247UT
Land Ownership: BLM
Elevation: 6600 ft. (2012 m)
Aspect: South
Slope: 3%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 1 rebar @ 1ft, belt 3 rebar @ 10 ft.

Directions:
From the southeast end of Price, take the Airport Road east 3.15 miles to the airport. Continue 0.9 miles to a power line (and a left turn to the Airport transect). Proceed 0.45 miles to an intersection. Stay left on the main road for 1.15 miles to a corral and a fork to the right which leads to the Airport Bench transect. There is a bend in the power line on the left. Stay left and proceed up the main road another 1.7 miles (to the 23rd pole from the bend in the power line) and turn left. Proceed 0.2 miles, passing power pole #365, to a witness post on the left side of the road in a chaining. The 0-foot stake is 95 feet south of the witness post and marked with browse tag #7854.

Map Name: Deadman Canyon



Diagrammatic Sketch:



Township: 13S Range: 11E Section: 19

GPS: NAD 83, UTM 12S 522861 E 4391842 N

DEADMAN - TREND STUDY NO. 11B-1

Site Information

Site Description: The study is located near the mouth of Deadman Canyon and samples the bench lands northeast of Price and south of the Book Cliffs. Much of the area, managed by the Bureau of Land Management (BLM) Price River Resource Area, was chained and seeded in 1965-66. Many young surviving pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees had reestablished on the site and the area was retreated as part of the West Coal Creek project (WRI Project #847) in the fall and winter of 2007 using a bullhog and reseeding (Table - Seed Mix). Seed was aerially applied prior to the bullhog treatment. The study is near Deadman Creek, which only contains water seasonally, and drains south into the Price River. Human activity is high with numerous roads making the area very accessible. There is also activity associated with the coal mines located farther up the canyon. Grazing is managed be the BLM as part of the Coal Creek allotment. Pellet group transect data estimated moderately light use by deer in 2000 and 2010, and was heavy in 2005. Elk use was only sampled in 2010 at moderately light rates. Estimated cattle use has been light since 2000 (Table - Pellet Group Data).

Browse: Preferred browse is fairly limited on the site. Prior to the bullhog treatment, the most abundant key browse species was true mountain mahogany (*Cercocarpus montanus*). However, following the treatment, mahogany cover decreased substantially and was not abundant on the site (Table - Browse Trends). Prior to the treatment, the small mahogany population was decreasing in density and average height and crown measurements. Decadence was low in the mahogany population until 2005, when all of the sampled plants were decadent. Utilization of mahogany was mostly light to moderate at the outset of the study, but increased to mostly heavy use in 2000. Important browse species that were seeded when the area was chained include fourwing saltbush (*Atriplex canescens*) and bitterbrush (*Purshia tridentata*). Individuals of these species are widely scattered and are mostly older plants. They do not appear to be reproducing although the plants are vigorous and putting on good growth. A few mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plants occur in the area. Green ephedra (*Ephedra viridis*) is fairly common on the site and has been vigorous with mostly light use, though use was very heavy in 2000 and 2010 (Table - Browse Characteristics).

Prior to the treatment, pinyon and juniper trees had reestablished and dominated the overstory. There was evidence of light browsing of juniper. Both the juniper and pinyon appeared to be resuming their dominance of the site and provided nearly all of the browse cover (Table - Browse Trends). Point-quarter data indicated that juniper density had remained similar, but pinyon density was increasing from 1994 to 2005. Following the treatment, density of pinyon and juniper decreased substantially with most of the sampled trees being less than 4 feet tall in 2010 (Table - Point-Quarter Tree Data).

Herbaceous Understory: The seeded species crested wheatgrass (*Agropyron cristatum*) established a fair stand, but declined markedly between 2000 and 2005 and grasses are now rare on the site. A wide variety of forbs are found on the site, although none provide substantial forage. The seeded species alfalfa (*Medicago sativa*) was encountered early in the study, but has not been sampled since 1994. Annual forb species increased substantially in nested frequency in 2005, and had a large increase in cover in 2010, following the treatment. The annual species nodding eriogonum (*Eriogonum cernuum*) and Russian thistle (*Salsola iberica*) were very common in 2010 (Table - Herbaceous Trends).

Soil: The soil texture is a sandy loam with a mildly alkaline soil reaction (pH 7.5). Phosphorus may have limited availability for plant growth and development at 4.3 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Much of the rock on the site contains a calcium carbonate coating and some areas have developed a weak hardpan at a depth of about 12 inches. There is also some exposed sandstone bedrock in the area. Prior to the treatment bare ground was high with large areas of bare soil in the shrub and tree interspaces, but the bullhog treatment caused a large increase in litter cover and bare ground cover was low in 2010 (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 to 1994 - stable (0):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Preferred browse species are limited on the site and there was little change in the populations of the preferred browse that are present. However, recruitment of young true mountain mahogany decreased with no new recruitment.
- **1994 to 2000 - slightly down (-1):** There was little change in the density of preferred browse species, but decadence increased in green ephedra and rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *hololeucus*). The combined cover of pinyon and juniper increased from 8% to 13%.
- **2000 to 2005 - slightly down (-1):** The density and cover of preferred browse species changed little, but decadence of true mountain mahogany increased from 0% to 100%. Pinyon and juniper cover increased to 17%.
- **2005 to 2010 - slightly up (+1):** Preferred browse decreased following the treatment and is very rare on the site. However, the density and cover of pinyon and juniper was decreased substantially as well to 2%.

Grass:

- **1986 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 22% with a significant decrease in the nested frequency of crested wheatgrass.
- **1994 to 2000 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses
- **2000 to 2005 - down (-2):** The perennial grass sum of nested frequency decreased by 82% and cover decreased from 4% to less than 1%. The only common grass, crested wheatgrass, had a significant decrease in nested frequency and became rare on the site.
- **2005 to 2010 - stable (0):** There was a decrease in the sum of nested frequency of perennial grasses, but cover increased slightly. Perennial grasses are rare on the site.

Forb:

- **1986 to 1994 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 18%.
- **1994 to 2000 - down (-2):** The perennial forb sum of nested frequency decreased by 28%, though cover remained similar.
- **2000 to 2005 - up (+2):** There was a 55% increase in the sum of nested frequency of perennial forbs with a slight increase in cover. Annual forbs also increased substantially in frequency.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 16%, though cover increased slightly. Annual species increased again in sum of nested frequency and cover increased from 1% to 7%. Nodding eriogonum and Russian thistle are the dominant species on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 11B, study no: 1

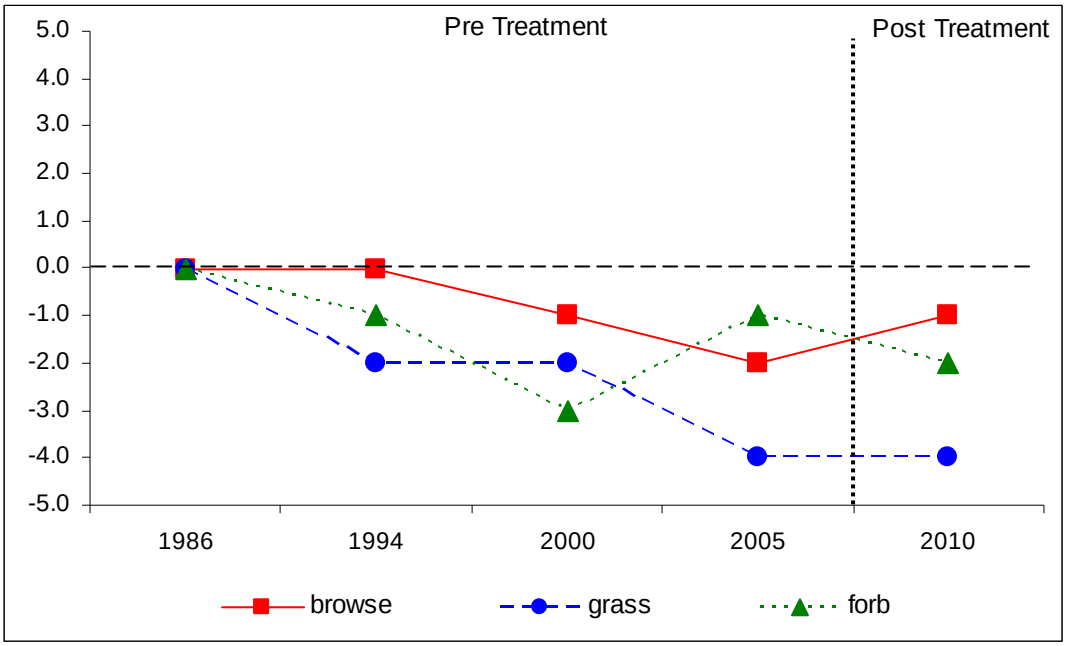
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	2.8	0.0	0.0	10.5	0.0	2.7	0.0	**16.0**	Poor
00	3.3	0.0	0.0	8.7	0.0	3.3	0.0	**15.3**	Poor
05	2.4	0.0	0.0	0.3	0.0	4.8	0.0	**7.5**	Very Poor
10	0.4	0.0	0.0	1.7	0.0	5.7	0.0	**7.8**	Very Poor

SEED MIX --
Management Unit 11B, study no: 1

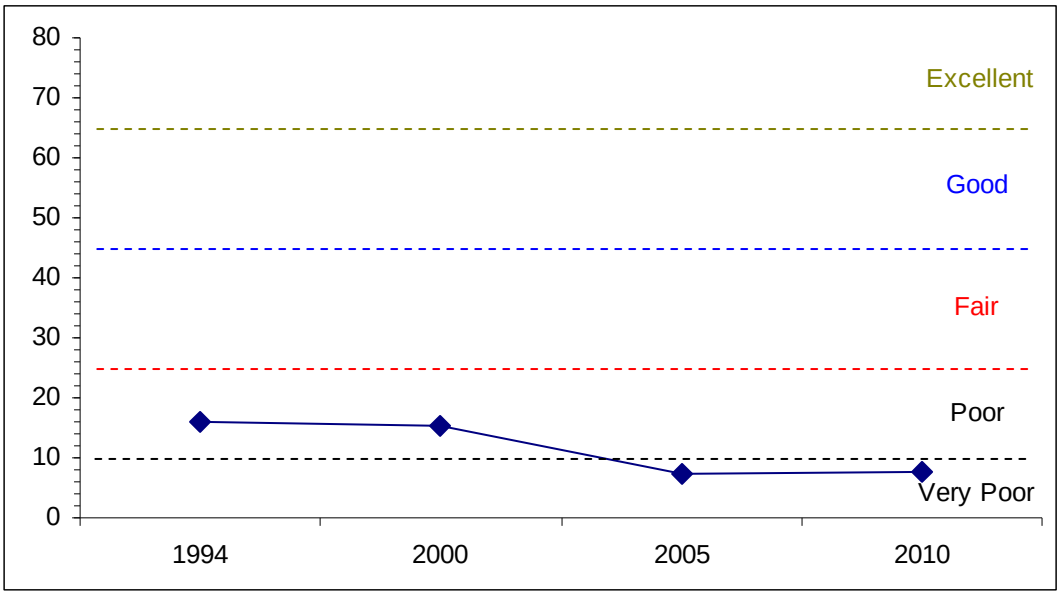
Project name: West Coal Creek WRI Database #: 847 Size (acre): 1912		
Seed type	lbs in mix	lbs/acre
Alfalfa 'Ladak'	600	0.31
Alfalfa 'Ranger'	600	0.31
Alfalfa 'Spredor 4'	600	0.31
Blue Flax 'Appar'	500	0.26
Blue Grama	640	0.33
Forage Kochia 'Immigrant'	900	0.47
Fourwing Saltbush	2312	1.21
Indian Ricegrass 'Rimrock'	3600	1.88
Intermediate Wheatgrass	2581	1.35
Russian Wildrye	2868	1.50
Sand Dropseed	90	0.05
Siberian Wheatgrass 'Vavilov'	2581	1.35
Snake River Wheatgrass 'Secar'	2581	1.35
Big Bluegrass 'Sherman'	100	0.05
Palmer Penstemon	150	0.08
Winterfat	125	0.07
BULK POUNDS:	20828	10.89
PLS POUNDS:		8.41

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 1



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 11B, Study no: 1



HERBACEOUS TRENDS--
Management unit 11B, Study no: 1

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron cristatum	c292	b223	b237	a37	a4	5.12	4.13	.13	.15
G	Aristida purpurea	-	4	1	-	4	.03	.15	-	.38
G	Bouteloua gracilis	-	-	-	1	-	-	-	.00	-
G	Oryzopsis hymenoides	8	8	10	8	7	.08	.08	.01	.34
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		300	235	248	46	15	5.24	4.36	0.15	0.87
Total for Grasses		300	235	248	46	15	5.24	4.36	0.15	0.87
F	Arabis perennans	b16	a-	a-	a-	a-	-	-	-	-
F	Astragalus convallarius	5	-	1	-	-	.00	.00	-	-
F	Astragalus sp.	-	-	-	-	9	-	-	-	.02
F	Chenopodium fremontii (a)	-	a2	a-	b86	a-	.00	-	.27	-
F	Cryptantha fulvocanescens	b43	b44	bc51	c72	a10	.58	1.02	.58	.42
F	Descurainia pinnata (a)	-	a5	a-	b21	a1	.01	-	.28	.00
F	Eriogonum alatum	a-	a-	a4	a-	b35	-	.01	.00	.16
F	Eriogonum cernuum (a)	-	a-	a-	b104	c172	-	-	.43	3.40
F	Eriogonum umbellatum	19	16	15	9	11	.09	.13	.04	.19
F	Euphorbia fendleri	c80	b24	b30	b14	a-	.07	.11	.03	-
F	Gilia sp. (a)	-	-	-	3	-	-	-	.00	-
F	Hedysarum boreale	5	-	-	-	-	-	-	-	-
F	Ipomopsis aggregata	ab3	ab8	a-	b8	ab2	.01	-	.07	.00
F	Lactuca serriola	a-	a-	a-	a-	b67	-	-	-	.80
F	Lappula occidentalis (a)	-	-	-	1	-	-	-	.00	-
F	Lesquerella ludoviciana	a-	b21	a2	a3	a-	.10	.00	.03	-
F	Lithospermum multiflorum	2	2	-	1	-	.01	-	.03	-

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
F	Machaeranthera canescens	a-	b20	a1	ab3	c36	.12	.00	.04	.24
F	Machaeranthera grindelioides	4	5	-	-	-	.01	-	-	-
F	Medicago sativa	b18	ab5	a-	a-	a-	.04	-	-	-
F	Penstemon caespitosus	-	3	-	-	-	.01	-	-	-
F	Penstemon cyanocaulis	a31	a27	a14	b96	a11	.16	.09	1.51	.81
F	Salsola iberica (a)	-	c77	a-	b16	d201	.82	-	.04	3.47
F	Sphaeralcea coccinea	5	20	15	19	9	.11	.22	.03	.16
F	Townsendia incana	b14	ab7	b12	a-	a-	.01	.03	-	-
Total for Annual Forbs		0	84	0	231	374	0.84	0	1.03	6.88
Total for Perennial Forbs		245	202	145	225	190	1.36	1.64	2.40	2.83
Total for Forbs		245	286	145	456	564	2.21	1.64	3.43	9.71

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

BROWSE TRENDS--
Management unit 11B, Study no: 1

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Artemisia tridentata vaseyana	0	0	1	0	-	-	.00	-
B	Cercocarpus montanus	5	5	3	2	1.46	2.04	1.37	.15
B	Chrysothamnus nauseosus hololeucus	5	7	4	7	.00	.38	.03	.15
B	Ephedra viridis	4	6	6	5	.03	.18	.30	.15
B	Gutierrezia sarothrae	14	57	17	6	.45	1.75	.03	.03
B	Juniperus osteosperma	0	12	12	4	3.27	5.59	6.90	1.52
B	Opuntia sp.	5	5	3	1	.00	.03	.06	-
B	Pinus edulis	0	8	7	0	4.42	7.23	9.59	.15
B	Purshia tridentata	2	1	0	0	.38	.03	-	-
Total for Browse		35	101	53	25	10.03	17.25	18.29	2.16

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 1

Species	Percent Cover		
	'00	'05	'10
Cercocarpus montanus	-	.70	.08
Chrysothamnus nauseosus hololeucus	-	.03	.01
Ephedra viridis	-	.93	.81
Gutierrezia sarothrae	-	.10	.28
Juniperus osteosperma	5.00	9.36	2.78
Pinus edulis	6.59	17.73	1.18

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 1

Species	Average leader growth (in)	
	'05	'10
Cercocarpus montanus	0.5	2.8
Ephedra viridis	-	4.6

POINT-QUARTER TREE DATA--
Management unit 11B, Study no: 1

Species	Trees per Acre			
	'94	'00	'05	'10
Cercocarpus montanus	-	-	-	37
Juniperus osteosperma	208	184	213	34
Pinus edulis	83	105	118	20

Average diameter (in)			
'94	'00	'05	'10
-	-	-	0.9
5.1	2.1	4.3	2.7
6.7	3.6	5.4	3.8

BASIC COVER--
Management unit 11B, Study no: 1

Cover Type	Average Cover %				
	'86	'94	'00	'05	'10
Vegetation	6.25	17.24	25.72	20.64	11.90
Rock	2.25	8.81	9.61	8.77	7.43
Pavement	10.00	4.03	9.95	8.51	7.18
Litter	58.25	30.11	34.09	36.68	56.17
Cryptogams	0	.18	.13	.53	1.34
Bare Ground	23.25	29.17	37.48	41.76	17.90

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 1, Study Name: Deadman

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.9	7.5	57.3	24.7	18.0	2.6	4.3	70.4	0.8

PELLET GROUP DATA--
Management unit 11B, Study no: 1

Type	Quadrat Frequency			
	'94	'00	'05	'10
Sheep	-	1	-	-
Rabbit	44	23	49	9
Elk	5	-	-	1
Deer	42	15	23	24
Cattle	-	2	-	2

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	-
-	-	21 (51)
19 (47)	60 (149)	27 (68)
3 (7)	2 (4)	6 (14)

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 1

		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									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	6/5
00	**0**	0	0	-	-	0	0	0	29/62
05	**20**	100	0	-	20	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Cercocarpus montanus									
86	**232**	14	86	0	33	29	0	0	83/29
94	**100**	0	100	0	-	40	0	0	59/78
00	**100**	0	100	0	-	20	60	0	56/65
05	**80**	0	0	100	20	0	100	0	42/48
10	**40**	50	0	50	20	0	50	50	27/38
Chrysothamnus nauseosus hololeucus									
86	**0**	0	0	0	-	0	0	0	-/-
94	**100**	0	100	0	-	0	0	0	21/21
00	**140**	14	43	43	100	14	57	29	24/12
05	**80**	0	50	50	-	0	100	50	16/21
10	**240**	67	33	0	20	8	8	0	20/20
Ephedra viridis									
86	**0**	0	0	0	-	0	0	0	-/-
94	**180**	56	44	0	-	0	0	0	24/30
00	**160**	13	63	25	-	13	75	13	31/35
05	**320**	6	81	13	-	13	0	0	31/40
10	**260**	38	54	8	-	8	38	8	14/23
Gutierrezia sarothrae									
86	**0**	0	0	0	-	0	0	0	-/-
94	**760**	3	97	0	40	0	0	0	8/8
00	**9380**	9	87	4	120	0	0	1	6/5
05	**520**	92	4	4	80	0	4	4	3/5
10	**200**	20	80	0	-	0	0	0	4/8
Juniperus osteosperma									
86	**198**	50	50	-	-	33	17	0	122/67
94	**0**	0	0	-	-	0	0	0	-/-
00	**260**	69	31	-	-	0	0	0	-/-
05	**400**	55	45	-	-	0	0	0	-/-
10	**100**	40	60	-	-	0	0	0	-/-

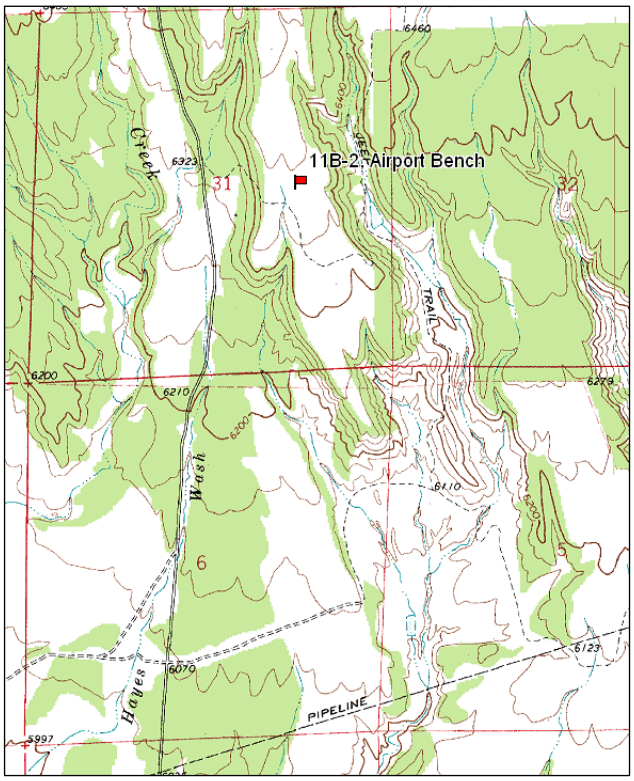
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
94	**140**	0	86	14	-	0	0	0	3/13
00	**180**	22	56	22	20	0	0	22	4/14
05	**80**	0	100	0	-	0	0	0	3/12
10	**20**	0	100	0	-	0	0	0	3/11
Pinus edulis									
86	**165**	40	60	-	-	0	0	0	59/48
94	**0**	0	0	-	-	0	0	0	-/-
00	**180**	11	89	-	-	0	0	0	-/-
05	**140**	0	100	-	-	0	0	14	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Purshia tridentata									
86	**0**	0	0	-	-	0	0	0	-/-
94	**60**	0	100	-	-	67	0	0	6/12
00	**20**	100	0	-	-	0	0	0	33/72
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-

AIRPORT BENCH - TREND STUDY NO. 11B-2-10

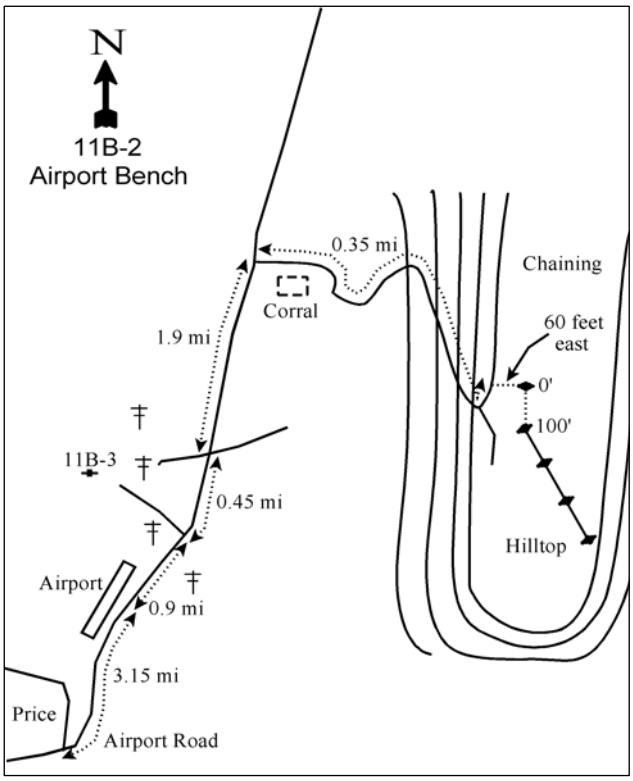
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Semidesert Stony Loam (Utah Juniper-Pinyon), R034XY247UT
Land Ownership: BLM
Elevation: 6400 ft. (1951 m)
Aspect: Southeast
Slope: 4%
Transect bearing: 170° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft). Belt 2 on line 3 rebar @ 1ft.

Directions:
Turn east on the Airport Road at the southeast end of Price and go 3.15 miles to the airport. After another 0.9 miles on the main road, you cross under a power line. Continue 0.45 miles to an intersection. Stay left. Go another 1.9 miles and turn right onto a dirt road just beyond a corral. Drive up this rocky road 0.35 miles to a fork on top of the bench. Bear left and go approximately 100 feet. The transect is in the chaining on the right side of the road. The 0-foot end of the baseline is 60 feet east of the road and is marked by browse tag #7818.

Map Name: Deadman Canyon



Diagrammatic Sketch:



Township: 13S Range: 11E Section: 31

GPS: NAD 83, UTM 12S 523526 E 4389232 N

AIRPORT BENCH - TREND STUDY NO. 11B-2

Site Information

Site Description: The study is located approximately two miles south of the Deadman (11B-1) on a bench that was also part of the 1965 chaining and seeding project. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Coal Creek allotment. The pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) on the site were selectively burned in May of 2005 and the site was read in August of that year. Human pressure is high because of its proximity and easy access from Price. Evidence of human activity includes wood cutting, ORV tracks, and litter. Pellet group transect data estimated moderately heavy deer use in 2000, with more moderate use since 2005. Estimated elk and cattle use has been light since 2000 (Table - Pellet Group Data).

Browse: Preferred browse species are very limited on the site and consists of only a few scattered Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), fourwing saltbush (*Atriplex canescens*), true mountain mahogany (*Cercocarpus montanus*), green ephedra (*Ephedra viridis*) and antelope bitterbrush (*Purshia tridentata*). There are some tall mahogany plants scattered throughout the site which appear to be heavily hedged, but much of the forage is unavailable due to height. Prior to the treatment, Utah Juniper provided most of the browse cover (Table - Browse Trends) with high density, and trees averaged 8-10 feet in height before treatment. These trees also appeared to have been released by the chaining, since only 10% of the junipers sampled were tipped over surviving chained trees. After the fire, density of juniper trees decreased substantially and all of sampled trees were 1-4 feet tall (Table - Point-Quarter Tree Data).

Herbaceous Understory: Grasses are abundant, but have very low diversity and are dominated by crested wheatgrass (*Agropyron cristatum*). The only other grass species that is fairly common is Indian ricegrass (*Oryzopsis hymenoides*). Perennial forbs are not very common and do not provide substantial forage. There was a surge in growth of both perennial and annual forbs in 2005, immediately following the fire, but forb levels decreased again in 2010 (Table - Herbaceous Trends).

Soil: The soil has a sandy clay loam texture with a slightly alkaline soil reaction (pH 7.5) (Table - Soil Analysis Data). Bare ground cover has remained fairly low due to a high amount of rock and pavement cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 to 1994 - stable (0):** Differences in density may be related to the larger sample area used in 1994; therefore trend was determined using other parameters. There was little change in the browse component on the site and the condition remains poor.
- **1994 to 2000 - slightly down (-1):** The browse composition remains poor with few useful shrubs. Juniper and pinyon cover increased from 2% to 9%.
- **2000 to 2005 - slightly up (+1):** The treatment reduced pinyon and juniper cover to 1%, effectively removing all pinyon and reducing juniper density from 211 trees/acre to 27 trees/acre. Wyoming big sagebrush was sampled for the first time with the entire population comprised of young plants. The weedy species broom snakeweed (*Gutierrezia sarothrae*) decreased substantially in density from 3,320 plants/acre to 340 plants/acre, though cover increased slightly.
- **2005 to 2010 - stable (0):** There was little change in the meager browse on the site. Some of the young Wyoming big sagebrush plants sampled in 2005 have apparently established with some of the population being mature and the size of plants increasing.

Grass:

- **1986 to 1994 - slightly down (-1):** All changes in the grass component are driven by the dominant species, crested wheatgrass. There was a significant decrease in the nested frequency of crested wheatgrass.
- **1994 to 2000 - slightly up (+1):** Crested wheatgrass increased significantly in nested frequency and cover increased from 7% to 16%.
- **2000 to 2005 - down (-2):** The nested frequency of crested wheatgrass decreased significantly and cover decreased to 3%.
- **2005 to 2010 - up (+2):** There was a significant increase in the nested frequency of crested wheatgrass and cover increased to 12%.

Forb:

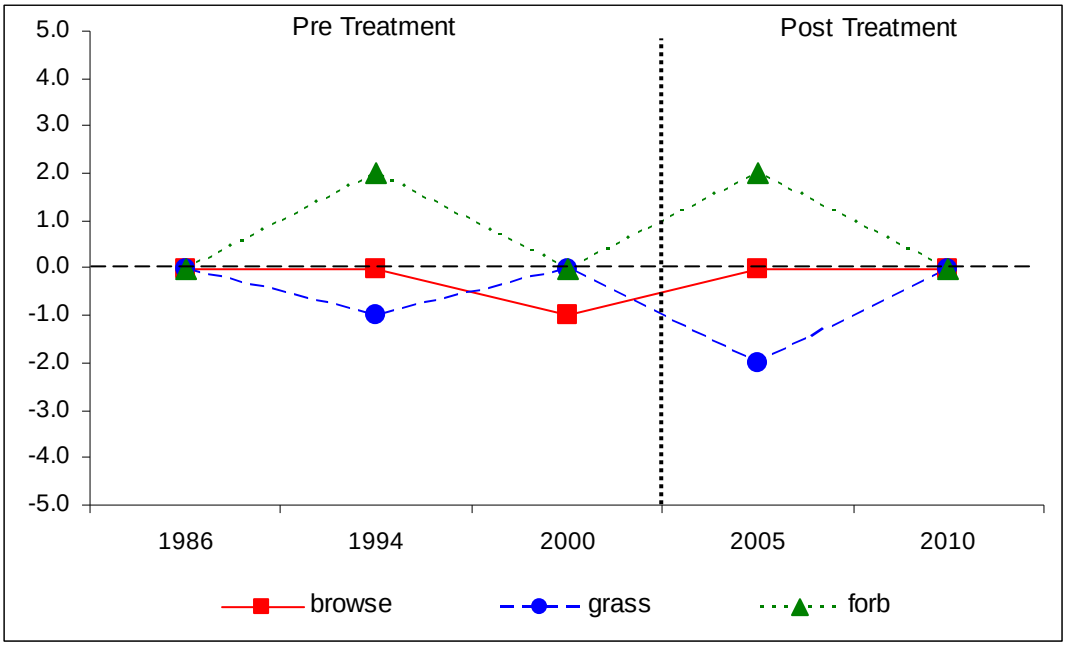
- **1986 to 1994 - up (+2):** The sum of nested frequency of perennial forbs increased nearly three-fold.
- **1994 to 2000 - down (-2):** The perennial forb sum of nested frequency decreased to 1986 levels and cover decreased from 1% to less than 1%.
- **2000 to 2005 - up (+2):** The sum of nested frequency of perennial forbs more than doubled and cover increased to 3%. However, annual forbs also had a substantial increase in frequency and cover increased from 0% to 11%.
- **2005 to 2010 - down (-2):** There was a large decrease in the sum of nested frequency of perennial forbs with a return to 1986 and 2000 levels. Cover of perennial forbs decreased to less than 1%. Annual forbs also decreased in frequency and cover decreased to 1%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 11B, study no: 2

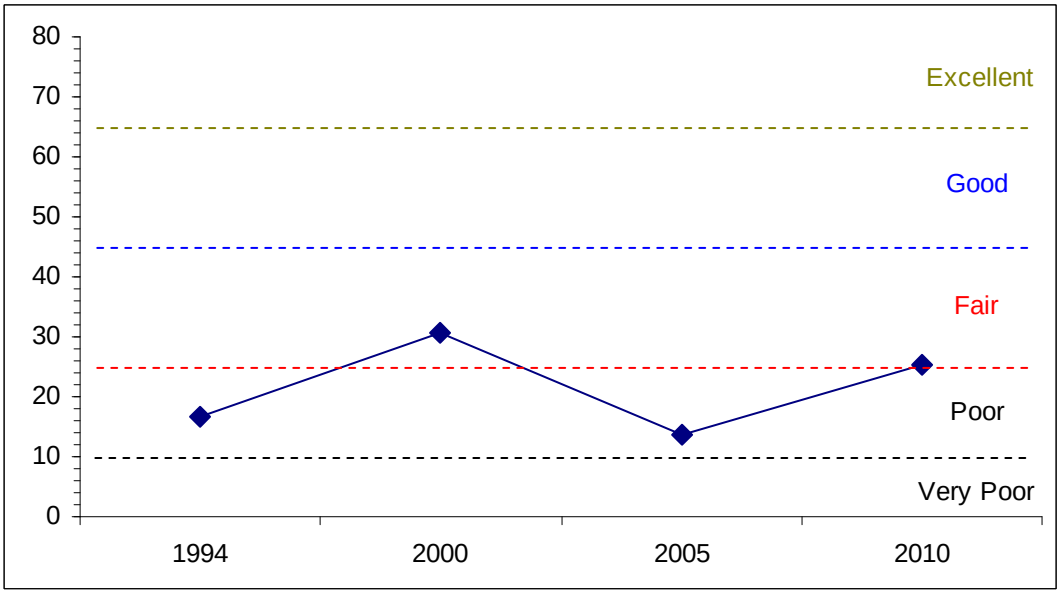
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	0.3	0.0	0.0	14.3	0.0	2.2	0.0	**16.7**	Poor
00	0.2	0.0	0.0	30.0	0.0	0.5	0.0	**30.6**	Fair
05	1.8	0.0	0.0	6.0	0.0	5.8	0.0	**13.6**	Poor
10	0.5	0.0	0.0	24.2	0.0	0.8	0.0	**25.5**	Poor-Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 2



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 11B, Study no: 2



HERBACEOUS TRENDS--
Management unit 11B, Study no: 2

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron cristatum	$_{d}$302	$_{c}$240	$_{d}$298	$_{a}$93	$_{b}$175	6.41	16.37	2.44	10.79
G	Agropyron intermedium	-	-	-	-	-	-	-	.01	-
G	Bromus tectorum (a)	-	-	-	-	12	-	-	-	.04
G	Oryzopsis hymenoides	16	42	28	19	24	.72	.11	.45	1.29
G	Poa fendleriana	6	-	-	-	1	-	-	-	.00
G	Sitanion hystrix	-	-	-	5	-	-	-	.09	-
Total for Annual Grasses		0	0	0	0	12	0	0	0	0.04
Total for Perennial Grasses		324	282	326	117	200	7.13	16.48	3.00	12.09
Total for Grasses		324	282	326	117	212	7.13	16.48	3.00	12.14
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{a}$-	$_{b}$13	$_{a}$-	-	-	.23	-
F	Chenopodium leptophyllum(a)	-	-	-	6	-	-	-	.04	-
F	Cirsium sp.	-	-	-	-	-	-	-	.03	-
F	Collinsia parviflora (a)	-	-	-	3	5	-	-	.00	.01
F	Cryptantha fulvocanescens	$_{ab}$8	$_{b}$17	$_{ab}$9	$_{ab}$6	$_{a}$2	.21	.07	.17	.00
F	Descurainia pinnata (a)	-	$_{b}$11	$_{a}$-	$_{c}$74	$_{a}$-	.03	-	.66	-
F	Eriogonum cernuum (a)	-	$_{a}$-	$_{a}$1	$_{a}$185	$_{b}$97	-	.00	5.49	.45
F	Eriogonum ovalifolium	-	$_{a}$8	$_{a}$1	$_{a}$4	$_{b}$32	.07	.00	.04	.21
F	Eriogonum umbellatum	$_{b}$19	$_{b}$17	$_{a}$-	$_{a}$-	$_{a}$-	.03	-	-	-
F	Euphorbia fendleri	$_{ab}$10	$_{c}$24	$_{a}$9	$_{ab}$23	$_{a}$2	.26	.04	.73	.01
F	Gayophytum ramosissimum(a)	-	-	-	2	-	-	-	.03	-
F	Ipomopsis aggregata	-	1	-	-	2	.00	-	-	.00
F	Lactuca serriola	-	-	-	6	-	-	-	.04	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{a}$-	$_{c}$85	$_{b}$16	-	-	.52	.09
F	Lesquerella sp.	$_{a}$-	$_{ab}$6	$_{b}$14	$_{ab}$1	$_{ab}$3	.03	.03	.01	.15
F	Linum lewisii	-	-	-	-	-	-	-	.00	-
F	Lithospermum incisum	2	7	4	3	3	.08	.03	.04	.03
F	Machaeranthera canescens	$_{a}$-	$_{ab}$4	$_{a}$3	$_{b}$15	$_{a}$1	.04	.00	.64	.00
F	Malcolmia africana	-	-	-	3	-	-	-	.03	-
F	Medicago sativa	11	9	2	-	-	.02	.03	-	-
F	Penstemon cyanocaulis	$_{a}$2	$_{b}$50	$_{a}$2	$_{b}$38	$_{a}$1	.34	.01	1.11	.00
F	Salsola iberica (a)	-	$_{c}$263	$_{a}$4	$_{b}$186	$_{b}$191	5.12	.00	3.72	.63
F	Sisymbrium altissimum (a)	-	-	-	12	-	-	-	.73	-
F	Sphaeralcea coccinea	-	-	-	-	3	-	-	-	.00
F	Tragopogon dubius	-	-	-	8	1	-	-	.04	.00
Total for Annual Forbs		0	274	5	566	309	5.15	0.00	11.45	1.18
Total for Perennial Forbs		52	143	44	107	50	1.10	0.23	2.90	0.42
Total for Forbs		52	417	49	673	359	6.26	0.24	14.35	1.61

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

BROWSE TRENDS--
Management unit 11B, Study no: 2

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Artemisia tridentata wyomingensis	0	0	3	3	-	-	.03	.30
B	Atriplex canescens	0	1	2	1	-	.15	.88	-
B	Cercocarpus montanus	2	0	0	1	.18	-	-	-
B	Chrysothamnus nauseosus	0	1	0	2	-	-	.03	.00
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	1	1	-	-	-	-
B	Ephedra viridis	2	2	1	1	-	.00	.53	.38
B	Gutierrezia sarothrae	2	31	12	20	-	.73	1.21	.42
B	Juniperus osteosperma	0	11	2	2	1.77	8.03	1.00	1.36
B	Opuntia sp.	1	1	0	0	-	-	-	-
B	Pinus edulis	0	1	0	0	-	.88	-	-
Total for Browse		7	48	16	27	1.95	9.80	3.69	2.47

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 2

Species	Percent Cover		
	'00	'05	'10
Artemisia tridentata wyomingensis	-	-	.13
Atriplex canescens	-	1.31	-
Chrysothamnus nauseosus	-	-	.08
Chrysothamnus viscidiflorus viscidiflorus	-	.28	-
Ephedra viridis	-	1.08	.93
Gutierrezia sarothrae	-	1.14	.38
Juniperus osteosperma	4.19	.76	1.20

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 2

Species	Average leader growth (in)	
	'05	'10
Cercocarpus montanus	4.3	2.0

POINT-QUARTER TREE DATA--
Management unit 11B, Study no: 2

Species	Trees per Acre			Average diameter (in)		
	'00	'05	'10	'00	'05	'10
Juniperus osteosperma	211	27	37	3.2	1.8	2.3
Pinus edulis	97	-	18	3.6	-	-

BASIC COVER--
Management unit 11B, Study no: 2

Cover Type	Average Cover %				
	'86	'94	'00	'05	'10
Vegetation	14.00	14.85	26.38	19.81	17.95
Rock	5.25	7.11	3.84	3.25	5.00
Pavement	10.25	5.91	11.58	22.76	16.04
Litter	51.25	28.81	45.04	31.90	36.47
Cryptogams	0	0	.04	0	.01
Bare Ground	19.25	24.90	23.78	30.25	28.23

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 2, Study Name: Airport Bench

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.0	7.5	54.0	22.0	24.0	3.9	6.3	147.2	0.7

PELLET GROUP DATA--
Management unit 11B, Study no: 2

Type	Quadrat Frequency			
	'94	'00	'05	'10
Rabbit	58	30	31	51
Elk	3	-	1	5
Deer	60	42	17	41
Cattle	6	5	2	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	16 (40)
55 (134)	36 (88)	24 (60)
1 (2)	5 (13)	2 (5)

BROWSE CHARACTERISTICS--
Management unit 11B, 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)
Artemisia tridentata wyomingensis									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**240**	100	0	-	40	0	0	0	7/6
10	**200**	70	30	-	-	0	0	0	11/14
Atriplex canescens									
86	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
00	**20**	0	100	0	-	100	0	0	22/46
05	**40**	50	50	0	-	0	0	0	56/91
10	**20**	0	0	100	-	0	0	100	43/57

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Cercocarpus montanus									
86	**199**	33	67	-	-	100	0	0	63/39
94	**40**	0	100	-	-	0	0	0	46/45
00	**0**	0	0	-	-	0	0	0	60/71
05	**0**	0	0	-	-	0	0	0	47/51
10	**20**	0	100	-	-	0	100	0	47/65
Chrysothamnus nauseosus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**80**	100	0	-	40	0	0	0	22/21
05	**0**	0	0	-	-	0	0	0	-/-
10	**80**	25	75	-	-	0	0	0	16/16
Chrysothamnus viscidiflorus viscidiflorus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	0	0	0	5/7
05	**60**	100	0	-	-	0	0	0	18/15
10	**20**	0	100	-	-	0	0	0	3/6
Echinocereus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	6/18
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Ephedra viridis									
86	**0**	0	0	0	-	0	0	0	-/-
94	**100**	20	60	20	-	0	0	0	39/59
00	**80**	0	100	0	-	25	0	0	32/48
05	**20**	0	100	0	-	0	0	0	37/63
10	**20**	0	100	0	-	0	0	0	39/70
Gutierrezia sarothrae									
86	**0**	0	0	0	-	0	0	0	-/-
94	**160**	0	50	50	-	0	0	0	9/10
00	**3320**	1	95	4	200	0	0	3	5/6
05	**340**	0	100	0	-	0	0	0	13/20
10	**1720**	5	95	0	20	0	0	0	4/7
Juniperus osteosperma									
86	**199**	67	33	0	-	0	0	0	31/30
94	**0**	0	0	0	-	0	0	0	-/-
00	**240**	42	50	8	-	0	0	8	-/-
05	**40**	50	0	50	-	0	0	50	-/-
10	**40**	100	0	0	-	0	0	0	31/32

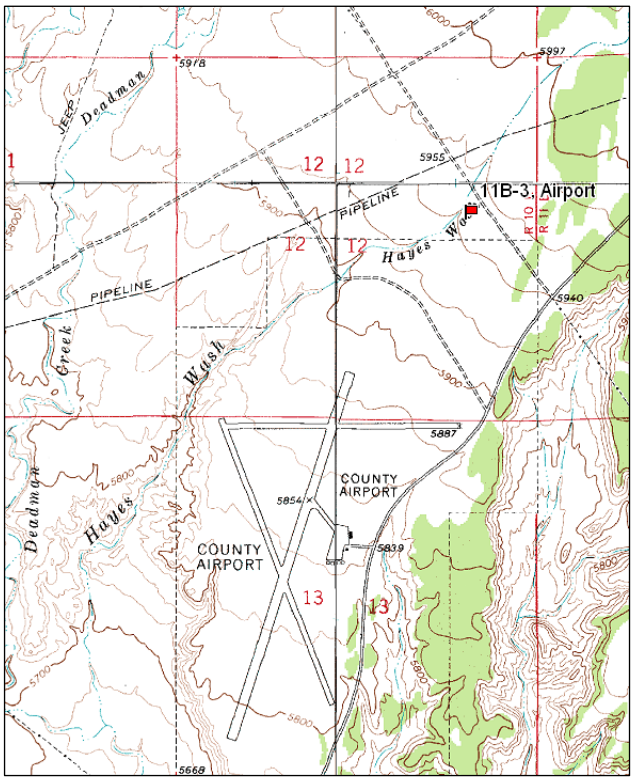
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**20**	0	100	-	-	0	0	0	4/13
00	**40**	0	100	-	-	0	0	0	4/18
05	**0**	0	0	-	-	0	0	0	3/14
10	**0**	0	0	-	-	0	0	0	-/-
Pinus edulis									
86	**66**	0	100	-	-	0	0	0	87/70
94	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Purshia tridentata									
86	**199**	0	100	-	-	33	0	0	31/45
94	**0**	0	0	-	-	0	0	0	26/47
00	**0**	0	0	-	-	0	0	0	24/69
05	**0**	0	0	-	-	0	0	0	52/88
10	**0**	0	0	-	-	0	0	0	8/19

AIRPORT - TREND STUDY NO. 11B-3-10

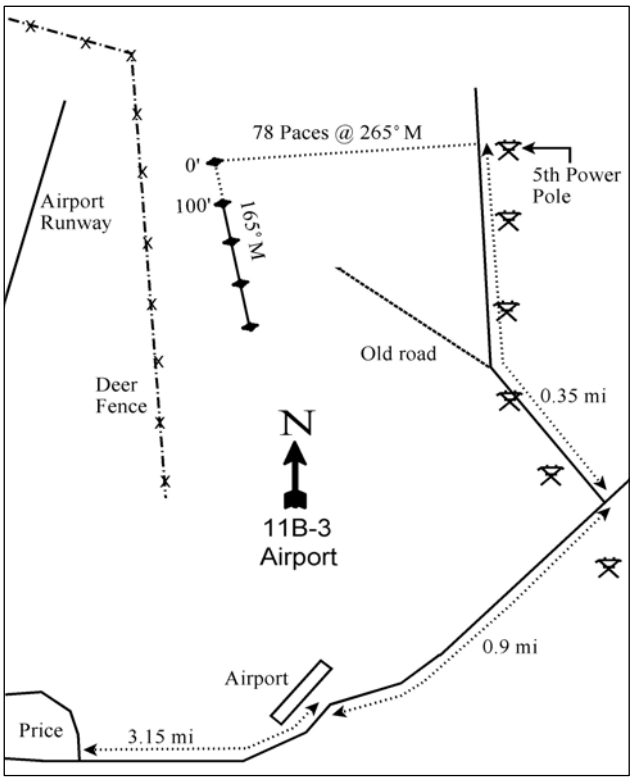
Vegetation Type: Chained, Seeded Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Semidesert Gravelly Loam (Wyoming Big Sagebrush), R034XY205UT
Land Ownership: BLM
Elevation: 5960 ft. (1817 m)
Aspect: West
Slope: 2%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (51ft), line 4 (71ft).

Directions:
From the intersection of Main Street and the Airport Road in Price, go 3.15 miles to the airport. Continue on the paved road 0.9 miles past the Carbon County Airport to a point where two power lines cross the road and there is a dirt road turning off to the left. Turn on this road and follow the power line 0.35 miles to a witness post on the left (west) side of the road. From the witness post, walk west 78 paces @ 265°M to the 0-foot stake, a rebar tagged #7891.

Map Name: Wellington



Diagrammatic Sketch:



Township: 14S Range: 10E Section: 12

GPS: NAD 83, UTM 12S 522100 E 4386096 N

AIRPORT - TREND STUDY NO. 11B-3

Site Information

Site Description: This study is located on a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat one mile north and slightly east of the Carbon County Airport. The large flat extends several miles north to the higher benches and mesas of the West Tavaputs Plateau. Mature Utah juniper (*Juniperus osteosperma*) stands border the east side. This area was chained and drill seeded with crested wheatgrass (*Agropyron cristatum*) in 1965-66 by the Bureau of Land Management (BLM). Now the area supports a moderately low density of Wyoming big sagebrush with a crested wheatgrass understory. Sometime after the 1994 reading, the Carbon County Airport was expanded with a longer runway. A large deer fence now encloses the airport and is only about 300 feet west of the study site, which may concentrate more deer use on the site shown by increased quadrat frequency of deer pellets from 1994 to 2000. Pellet group transect data has estimated moderately light use by deer since 2000 with light use by elk. Deer remains were found on the site in 2005. Grazing in the area is managed by the BLM as part of the Hayes Wash allotment. Estimated cattle use has been light since 2000. Quadrat frequency also indicates heavy use by rabbits on the site (Table - Pellet Group Data).

Browse: The site supports a moderate dense stand of Wyoming big sagebrush which provides the majority of browse cover on the site. Wyoming big sagebrush cover (Table - Browse Trends) and density have increased substantially since 1994, with the highest levels in 2005. Some of the sagebrush on this site display characteristics of black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*). There is obviously some hybridizing occurring between the sagebrush subspecies, but all sagebrush were classified as Wyoming big sagebrush in the study. The sagebrush population is a mixture of mature and young plants with mostly light use, though heavy use was noted in 1986. Sagebrush plants with the heaviest use appeared to have more characteristics of mountain big sagebrush, which is the most palatable of the sagebrush subspecies. Decadence of sagebrush was high at the outset of the study in 1986, but has been low in every other sample year. The only other preferred browse on the site consists of a few scattered fourwing saltbush (*Atriplex canescens*) and green ephedra (*Ephedra viridis*). Both species have had heavy browsing. Broom snakeweed (*Gutierrezia sarothrae*) is the only other common browse species on the site with a fluctuating density over the sample years (Table - Browse Characteristics).

Herbaceous Understory: At the outset of the study, grasses were dominated by the seeded species crested wheatgrass, but there was a large decrease in crested wheatgrass in 2005 and grasses have been rare on the site since. Perennial grass species are now uncommon, though a number of species including galleta (*Hillaria jamesii*), Indian ricegrass (*Oryzopsis hymenoides*) and sand dropseed (*Sporobolus cryptandrus*), were sampled for the first time in 2010. Forbs are limited and dominated by annual species. The most common perennial forb species is scarlet globemallow (*Sphaeralcea coccinea*) (Table - Herbaceous Trends).

Soil: The soil has a sandy clay loam texture with a slightly alkaline soil reaction (pH 7.8). Organic matter is low at only 1%, which is the lowest reading on the entire unit (Table - Soil Analysis Data). Bare ground cover is high and increased with the decrease in vegetation cover provided by crested wheatgrass. There is a high amount of pavement cover that provides some protective ground cover (Table - Basic Cover). Rows of seeded crested wheatgrass are contoured to the slight slope which limits erosion and also helps the buildup of litter. Windrowed piles of juniper and sagebrush are remnants of the pre-treatment of the flat. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 to 1994 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Decadence of sagebrush decreased

from 47% to 14%. There was a slight decrease in the recruitment of young sagebrush plants, but recruitment remained good.

- **1994 to 2000 - up (+2):** There was a two-fold increase in the density of Wyoming big sagebrush from 1,120 plants/acre to 2,280 plants/acre, and cover increased slightly from 4% to 5%. Recruitment of young sagebrush plants increased from 16% to 32% and decadence decreased to 11%.
- **2000 to 2005 - up (+2):** The density of sagebrush increased by two-fold to 4,580 plants/acre and cover increased to 9%. Decadence of sagebrush decreased to 5% and recruitment of young sagebrush increased to 72% of the population. There was a very large number of sagebrush seedlings also sampled.
- **2005 to 2010 - stable (0):** Density of sagebrush increased slightly to 4,900 plants/acre and cover remained similar. Many of the young plants that were sampled in 2005 have established on the site with an increase in mature plants. Recruitment of young sagebrush plants decreased, but young plants still comprised nearly half the population.

Grass:

- **1986 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1994 to 2000 - stable (0):** The perennial grass sum of nested frequency changed little, though cover increased slightly from 15% to 16%.
- **2000 to 2005 - down (-2):** There was a 78% decrease in the sum of nested frequency of perennial grasses and cover decreased to less than 1%. There was a significant decrease in the nested frequency of crested wheatgrass. Grasses became rare on the site.
- **2005 to 2010 - slightly up (+1):** The perennial grass sum of nested frequency increased slightly and cover increased to 2%. A number of perennial species were sampled for the first time, though grasses remain rare on the site.

Forb:

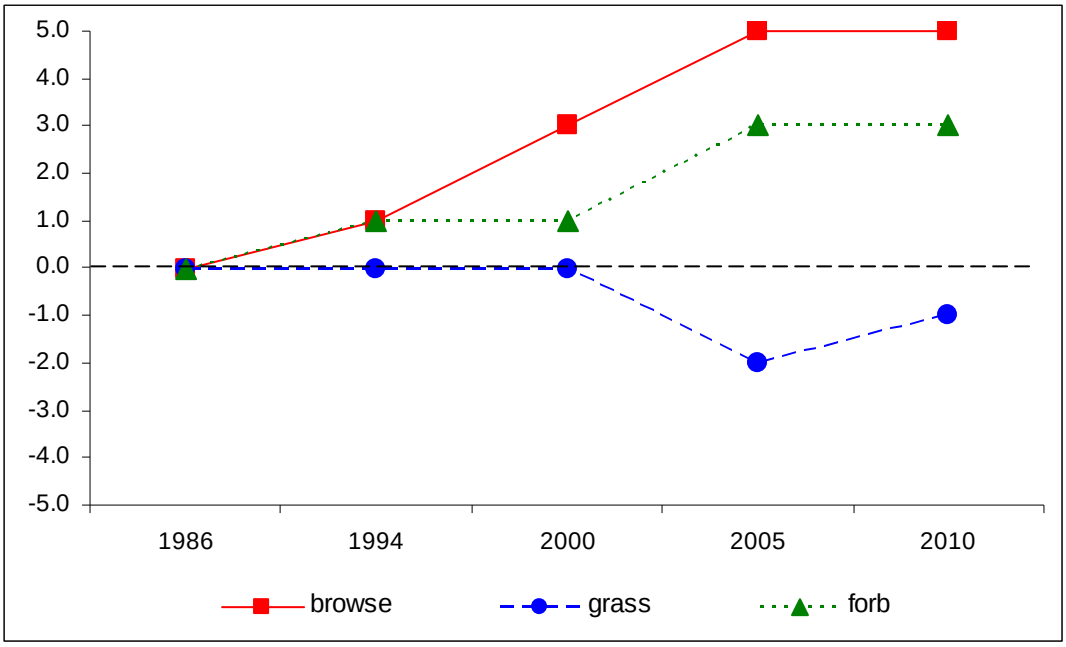
- **1986 to 1994 - slightly up (+1):** The perennial forb sum of nested frequency increased, but perennial forbs remain fairly rare on the site.
- **1994 to 2000 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover increased slightly from less than 1% to 2%.
- **2000 to 2005 - up (+2):** The sum of nested frequency of perennial forbs increased by 62% and cover increased to 5%.
- **2005 to 2010 - stable (0):** The perennial forb sum of nested frequency increased slightly, but cover decreased to 3%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 11B, study no: 3

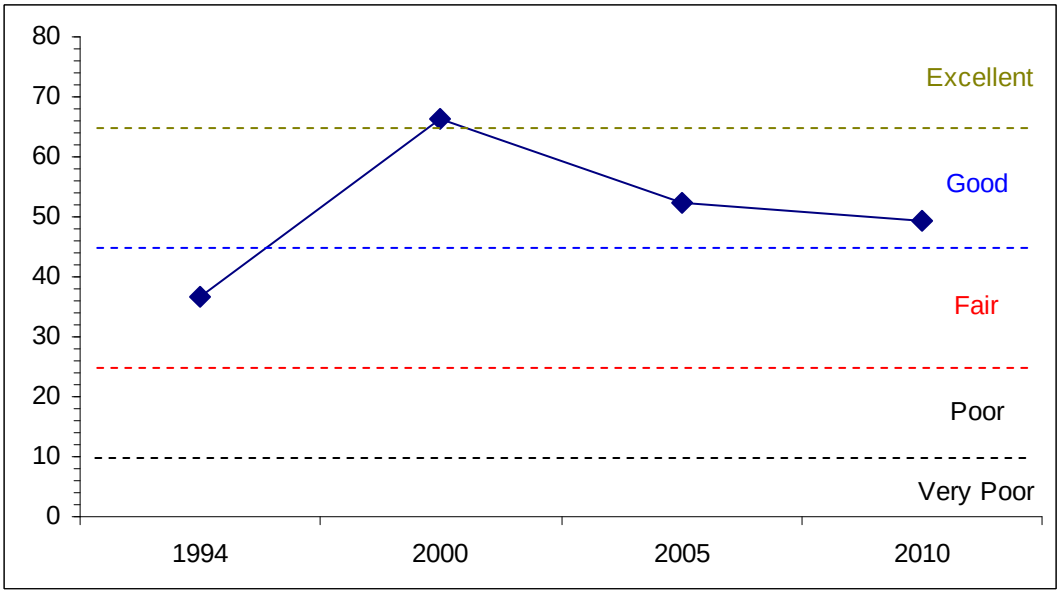
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	5.8	0.0	0.0	30.0	0.0	1.0	0.0	**36.8**	Fair
00	6.6	11.4	15.0	30.0	0.0	3.3	0.0	**66.2**	Good-Excellent
05	12.1	13.6	15.0	1.7	0.0	10.0	0.0	**52.4**	Good
10	11.1	13.5	15.0	4.0	0.0	5.9	0.0	**49.4**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 3



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 11B, Study no: 3



HERBACEOUS TRENDS--
Management unit 11B, Study no: 3

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron cristatum	$_{b}$298	$_{b}$289	$_{b}$301	$_{a}$59	$_{a}$26	15.34	16.43	.81	1.05
G	Agropyron dasystachyum	7	-	3	1	-	-	.01	.03	-
G	Agropyron trachycaulum	5	-	-	-	-	-	-	-	-
G	Bouteloua gracilis	-	-	-	7	3	-	-	.01	.03
G	Bromus tectorum (a)	-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$26	-	-	-	.04
G	Hilaria jamesii	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$37	-	-	-	.88
G	Oryzopsis hymenoides	1	-	-	-	4	-	-	-	.04
G	Poa secunda	-	1	-	-	-	.00	-	-	-
G	Sporobolus cryptandrus	-	-	-	-	7	-	-	-	.01
Total for Annual Grasses		0	0	0	0	26	0	0	0	0.04
Total for Perennial Grasses		311	290	304	67	77	15.34	16.44	0.85	2.02
Total for Grasses		311	290	304	67	103	15.34	16.44	0.85	2.07
F	Astragalus convallarius	$_{ab}$1	$_{a}$-	$_{ab}$5	$_{ab}$6	$_{b}$11	-	.23	.18	.28
F	Chaenactis douglasii	-	-	-	1	-	-	-	.00	-
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{a}$-	$_{b}$24	$_{b}$27	-	-	.06	.08
F	Cirsium sp.	-	-	-	3	-	-	-	.00	-
F	Cryptantha fulvocanescens	-	-	-	9	-	-	-	.04	-
F	Descurainia pinnata (a)	-	$_{a}$-	$_{a}$-	$_{b}$145	$_{a}$4	-	-	2.97	.01
F	Eriogonum cernuum (a)	-	$_{a}$-	$_{a}$-	$_{b}$163	$_{b}$160	-	-	.78	2.04
F	Eriogonum ovalifolium	-	1	-	-	-	.00	-	-	-
F	Halogeton glomeratus (a)	-	-	-	2	-	-	-	.00	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{a}$-	$_{c}$174	$_{b}$52	-	-	3.40	.35
F	Lepidium sp. (a)	-	$_{a}$-	$_{a}$-	$_{b}$27	$_{a}$9	-	-	.23	.35
F	Leucelene ericoides	-	-	3	3	9	-	.00	.38	.10
F	Navarretia intertexta (a)	-	-	-	-	2	-	-	-	.00
F	Orobanche fasciculata	-	-	1	-	-	-	.00	-	-
F	Salsola iberica (a)	-	$_{a}$-	$_{a}$-	$_{b}$17	$_{c}$48	-	-	.03	.15
F	Sphaeralcea coccinea	$_{a}$50	$_{ab}$79	$_{a}$69	$_{b}$104	$_{ab}$92	.50	1.38	4.48	1.99
F	Sphaeralcea grossulariifolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$31	-	-	-	.55
Total for Annual Forbs		0	0	0	552	302	0	0	7.49	3.01
Total for Perennial Forbs		51	80	78	126	143	0.50	1.63	5.10	2.93
Total for Forbs		51	80	78	678	445	0.50	1.63	12.59	5.94

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

BROWSE TRENDS--
Management unit 11B, Study no: 3

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Artemisia tridentata wyomingensis	32	49	65	76	4.21	5.21	9.35	8.81
B	Atriplex canescens	1	1	1	0	.03	.03	.20	-
B	Chrysothamnus viscidiflorus stenophyllus	4	0	0	18	.15	-	-	.25
B	Ephedra viridis	1	1	3	2	.38	.03	.15	.03
B	Gutierrezia sarothrae	11	54	35	29	.52	2.72	2.67	1.85
B	Opuntia polyacantha	10	8	5	2	.00	.03	-	.00
Total for Browse		59	113	109	127	5.30	8.03	12.38	10.95

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 3

Species	Percent Cover	
	'05	'10
Artemisia tridentata wyomingensis	7.48	11.63
Chrysothamnus viscidiflorus stenophyllus	-	.08
Ephedra viridis	.05	-
Gutierrezia sarothrae	2.31	1.93
Opuntia polyacantha	-	.08

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 3

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	2.5	1.5
Atriplex canescens	2.2	-

POINT-QUARTER TREE DATA--
Management unit 11B, Study no: 3

Species	Trees per Acre	Average diameter (in)
	'10	'10
Juniperus osteosperma	20	3.4

BASIC COVER--
Management unit 11B, Study no: 3

Cover Type	Average Cover %				
	'86	'94	'00	'05	'10
Vegetation	3.25	21.21	27.20	24.29	16.96
Rock	.50	5.38	.18	.32	.45
Pavement	18.00	5.61	9.19	12.31	10.81
Litter	50.75	15.90	14.14	18.38	24.85
Cryptogams	0	.11	1.45	.32	.48
Bare Ground	27.50	31.23	47.47	53.56	55.41

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 3, Study Name: Airport

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.2	7.8	59.6	19.8	20.6	1.0	7.5	291.2	0.6

PELLET GROUP DATA--
Management unit 11B, Study no: 3

Type	Quadrat Frequency			
	'94	'00	'05	'10
Rabbit	50	73	81	70
Elk	1	1	1	4
Deer	8	22	18	10
Cattle	4	10	2	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	17 (43)
24 (58)	27 (68)	24 (60)
2 (4)	10 (25)	2 (4)

BROWSE CHARACTERISTICS--
Management unit 11B, 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 tridentata wyomingensis									
86	**1065**	22	31	47	133	6	88	0	18/22
94	**1120**	16	70	14	520	0	2	4	22/34
00	**2280**	32	57	11	240	28	4	4	18/23
05	**4580**	72	23	5	394200	6	3	3	20/29
10	**4900**	47	48	5	160	13	1	3	18/27
Atriplex canescens									
86	**0**	0	0	0	-	0	0	0	-/-
94	**20**	0	100	0	-	0	0	0	44/63
00	**20**	0	0	100	20	100	0	0	44/56
05	**20**	100	0	0	580	0	100	0	38/64
10	**0**	0	0	0	-	0	0	0	40/49

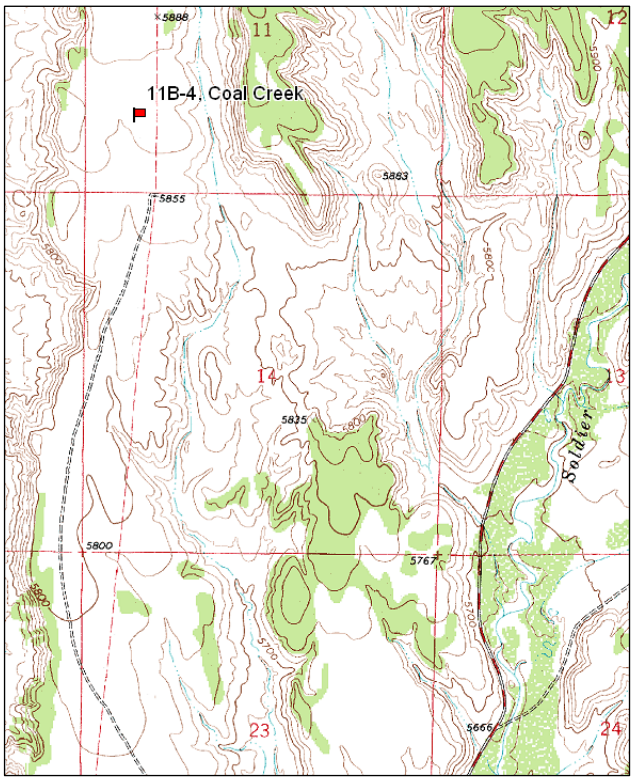
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus stenophyllus									
86	**99**	0	0	100	-	0	100	0	-/-
94	**100**	0	100	0	-	0	0	0	6/12
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**900**	2	93	4	-	0	0	4	6/8
Ephedra viridis									
86	**132**	25	75	0	-	25	25	0	17/6
94	**220**	0	100	0	-	0	0	0	24/31
00	**20**	0	0	100	-	0	100	0	-/-
05	**60**	33	67	0	-	0	67	0	22/37
10	**40**	0	100	0	-	0	50	0	16/32
Gutierrezia sarothrae									
86	**265**	12	12	75	-	0	0	0	6/4
94	**420**	0	100	0	20	0	0	0	9/11
00	**8940**	2	82	16	120	0	.44	13	7/12
05	**1920**	4	95	1	3000	0	0	0	8/12
10	**1200**	0	87	13	-	0	0	3	6/8
Opuntia polyacantha									
86	**432**	8	54	38	-	0	0	38	4/6
94	**260**	0	92	8	-	0	0	8	3/15
00	**240**	0	92	8	20	0	0	0	3/6
05	**100**	0	100	0	-	0	0	0	5/15
10	**40**	0	100	0	-	0	0	0	4/18

COAL CREEK - TREND STUDY NO. 11B-4-10

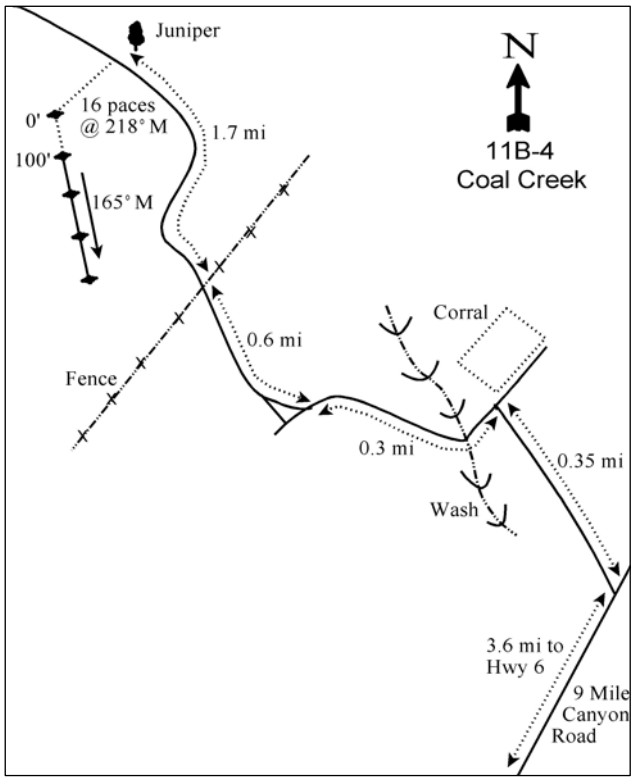
Vegetation Type: Wyoming Big Sagebrush
Range Type: Substantial Deer Winter
NRCS Ecological Site Description: Semidesert Gravelly Loam (Wyoming Big Sagebrush), R034XY205UT
Land Ownership: BLM
Elevation: 5860 ft. (1786 m)
Aspect: South
Slope: 2%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From Highway 6 east of Wellington, turn northeast on the Soldier Creek Road (9 Mile Canyon). Stay on this road 3.6 miles, then turn left onto a dirt road. Go 0.35 miles up to a fork near a corral. From the fork proceed 0.3 miles to another fork. Turn right and continue 0.6 miles to a wire gate. Go through the gate and drive 1.7 miles to a small juniper (*Juniperus osteosperma*) tree 20 feet to the right of the road. The transect baseline starts 16 paces from the juniper at a bearing of 218ºM. There is a browse tag #7839 on the 0-foot baseline stake.

Map Name: Wellington



Diagrammatic Sketch:



Township: 14S Range: 11E Section: 11

GPS: NAD 83, UTM 12S 529044 E 4385450 N

COAL CREEK - TREND STUDY NO. 11B-4

Site Information

Site Description: The study is in an open Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat about four miles south of the mouth of Soldier Creek Canyon. The study is on top of a long, narrow, south-sloping plateau between Coal Creek and Soldier Creek. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Soldier Canyon allotment. Sign of cattle use was infrequent on this particular site in 1986 and deer pellet groups were encountered only occasionally. A pellet group transect located further up Coal Creek (elevation 6,300) is the lowest elevation pellet group transect in the unit. In the past, it has consistently shown the highest use of any area sampled in the herd unit. Numbers are usually higher in hard winters as the deer inevitably move to the lower elevations those years, even though thermal cover is limited on the plateau. Pellet group transect data on the study has estimated only light use by deer and cattle since 2000 (Table - Pellet Group Data). During the reading of 2005, a deer carcass was found on the site. Rabbits appear to be abundant on the site with numerous pellets and trails.

Browse: Wyoming big sagebrush dominates the plateau and provides nearly all of the browse cover (Table - Browse Trends). The density of sagebrush has fluctuated over the sample years with a fluctuation in the recruitment of young sagebrush plants. Decadence has been mostly moderate, but there was high decadence in sagebrush in 2005. Utilization of sagebrush has been mostly light to moderate, though heavy use was noted in 1986. The two desirable shrubs, winterfat (*Ceratoides lanata*) and shadscale (*Atriplex confertifolia*), have been sampled on the site at fairly low densities, but winterfat has not been sampled since 1994 and shadscale has decreased in density since 1994. Rabbits appear to be using these low growing shrubs. Broom snakeweed (*Gutierrezia sarothrae*) has been very abundant on the site, but has also decreased in density since 2000 (Table - Browse Characteristics).

Herbaceous Understory: Grasses are fairly diverse, but are not overly abundant. The grass component is comprised of a number of native perennial grasses including blue grama (*Bouteloua gracilis*), bottlebrush squirreltail (*Sitanion hystrix*), needle-and-thread (*Stipa comata*), galleta (*Hilaria jamesii*) and Indian ricegrass (*Oryzopsis hymenoides*). The forb composition is poor with few perennial forbs sampled (Table - Herbaceous Trends).

Soil: The soil texture is a sandy clay loam with a soil reaction that is slightly alkaline (pH 7.5). Organic matter is low at only 1%, which is comparable to the Airport (11B-3) site as the lowest sites on unit 11, with respect to soil organic matter (Table - Soil Analysis Data). Bare ground cover is high despite the abundant pavement cover on the surface in exposed areas. Vegetation and litter cover are both low (Table - Basic Cover). The soil erosion condition was classified as slight in 2005 due to localized soil loss evidenced by soil pedestaling around shrubs and grasses, but was stable in 2010.

Trend Assessments

Browse:

- **1986 to 1994 - stable (0):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Recruitment of young Wyoming big sagebrush plants decreased, but there were a high number of seedlings sampled. Decadence of winterfat and shadscale decreased substantially.
- **1994 to 2000 - up (+2):** The density of Wyoming big sagebrush nearly doubled from 2,900 plants/acre to 5,560 plants/acre due to a large increase in the recruitment of young plants, though cover only increased slightly from 15% to 17%. Sagebrush seedlings were very numerous and abundant on the site. Winterfat was no longer sampled on the site.
- **2000 to 2005 - down (-2):** Wyoming big sagebrush density decreased by 47% to 2,940 plants/acre and cover decreased to 14%. Most of the loss in density was due to a large decrease in the recruitment of

young sagebrush plants. Decadence of sagebrush increased from 22% to 71%. Shadscale also decreased substantially in density.

- **2005 to 2010 - up (+2):** Recruitment of young sagebrush increased causing a 59% increase in the density of sagebrush to 4,680 plants/acre. Cover of sagebrush increased to 16% and decadence decreased to 26%. Shadscale density continued to decrease.

Grass:

- **1986 to 1994 - up (+2):** There was nearly a two-fold increase in the sum of nested frequency of perennial grasses.
- **1994 to 2000 - up (+2):** The sum of nested frequency of perennial grasses increased by 48% and cover increased from 3% to 4%.
- **2000 to 2005 - up (+2):** The perennial grass sum of nested frequency increased by 24% and cover increased to 6%.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 18%, though cover increased slightly to 7%.

Forb:

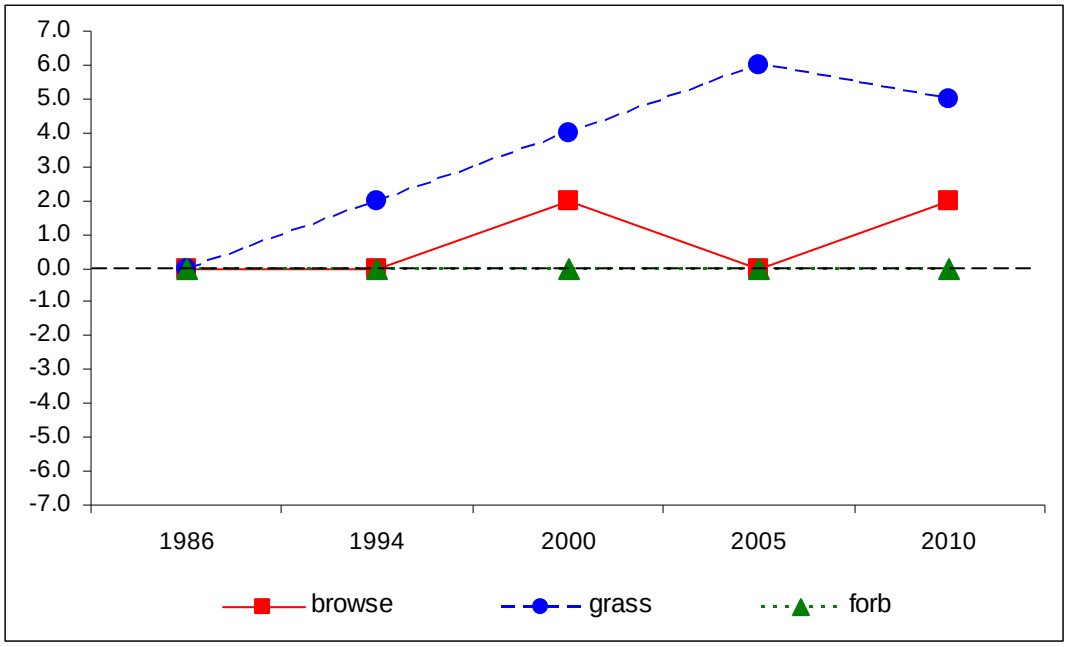
- **1986 to 1994 - stable (0):** Perennial forbs are rare on the site.
- **1994 to 2000 - stable (0):** Perennial forbs are rare on the site.
- **2000 to 2005 - stable (0):** Perennial forbs are rare on the site.
- **2005 to 2010 - stable (0):** Perennial forbs are rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 11B, study no: 4

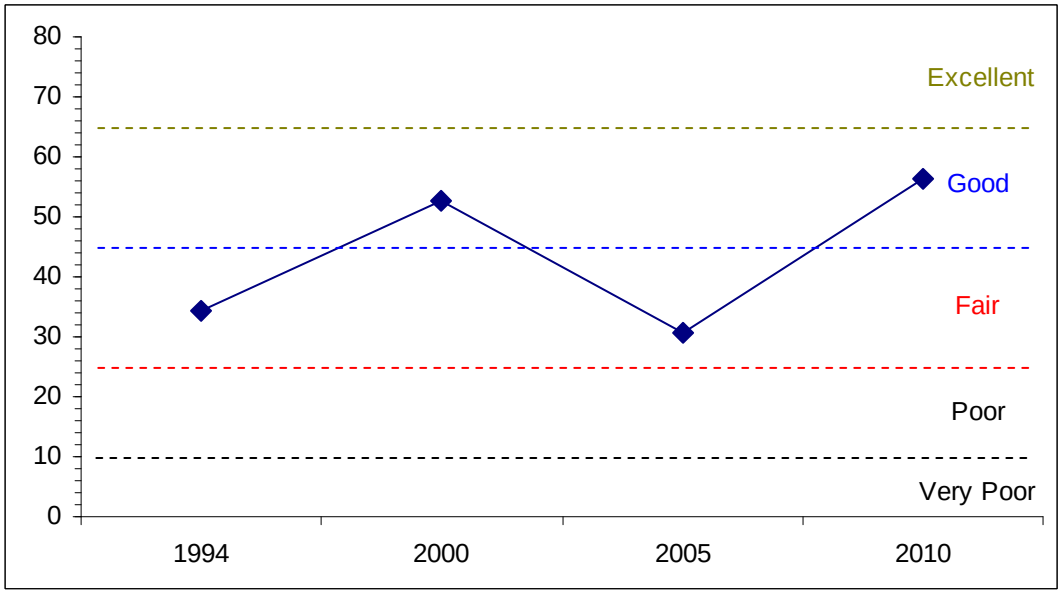
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	19.3	7.7	1.5	5.2	0.0	0.9	0.0	**34.5**	Fair
00	21.0	8.1	15.0	8.5	0.0	0.1	0.0	**52.7**	Good
05	17.9	-5.7	3.9	12.8	0.0	1.9	0.0	**30.8**	Fair
10	20.4	7.2	15.0	13.3	0.0	0.6	0.0	**56.5**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 11B, Study no: 4



HERBACEOUS TRENDS--
Management unit 11B, Study no: 4

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
G	Aristida purpurea	a-	b10	ab7	b10	a-	.08	.16	.21	-
G	Bouteloua gracilis	a17	ab41	bc65	bc43	c69	1.04	1.86	1.52	2.80
G	Hilaria jamesii	a-	b34	a5	ab26	ab17	.66	.18	.61	.64
G	Oryzopsis hymenoides	a-	b9	b15	b20	b13	.03	.44	.07	.27
G	Poa fendleriana	-	3	-	-	-	.01	-	-	-
G	Sitanion hystrix	a28	a16	b65	b70	b60	.20	.81	2.06	2.07
G	Stipa comata	a1	ab14	bc31	d64	cd32	.57	.77	1.91	.86
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		46	127	188	233	191	2.61	4.23	6.41	6.66
Total for Grasses		46	127	188	233	191	2.61	4.23	6.41	6.66
F	Astragalus convallarius	-	2	-	-	2	.00	-	.00	.03
F	Chenopodium fremontii (a)	-	a-	a-	b34	a-	-	-	.08	-
F	Chenopodium leptophyllum(a)	-	-	-	9	-	-	-	.02	-
F	Cruciferae	-	3	-	-	-	.03	-	-	-
F	Cryptantha sp.	-	4	-	4	-	.15	-	.01	-
F	Descurainia pinnata (a)	-	a-	a-	b59	a-	-	-	.72	-
F	Eriogonum cernuum (a)	-	a2	a-	b41	a	.00	-	.15	-
F	Eriogonum ovalifolium	-	3	1	-	-	.01	.00	-	-
F	Gilia sp. (a)	-	a-	a-	b76	a-	-	-	.27	-
F	Lappula occidentalis (a)	-	ab4	a-	b8	a-	.01	-	.02	-
F	Lepidium montanum	-	ab24	a4	b24	ab18	.08	.01	.77	.24
F	Leucelene ericoides	-	4	4	8	-	.15	.03	.06	-
F	Oenothera sp.	-	-	-	3	-	-	-	.00	-
F	Sphaeralcea coccinea	3	1	-	4	6	.00	-	.09	.04
Total for Annual Forbs		0	6	0	227	0	0.01	0	1.26	0
Total for Perennial Forbs		3	41	9	43	26	0.43	0.05	0.95	0.31
Total for Forbs		3	47	9	270	26	0.45	0.05	2.22	0.31

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

BROWSE TRENDS--
Management unit 11B, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Artemisia tridentata wyomingensis	74	82	78	86	15.10	16.59	13.94	16.26
B	Atriplex confertifolia	19	20	8	1	.45	.31	.44	.03
	Ceratoides lanata	2	0	0	0	-	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	37	38	20	19	1.63	.66	.70	.91
B	Echinocereus sp.	0	1	1	1	-	.00	-	-
B	Gutierrezia sarothrae	81	95	40	26	2.20	4.37	.96	.27
B	Juniperus osteosperma	0	1	1	1	-	-	-	-
B	Leptodactylon pungens	5	7	4	4	.30	.30	.18	.18
B	Opuntia sp.	29	34	8	5	.25	.48	.03	.18
Total for Browse		247	278	160	143	19.96	22.75	16.25	17.84

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 4

Species	Percent Cover	
	'05	'10
Artemisia tridentata wyomingensis	14.16	14.50
Atriplex confertifolia	.41	-
Chrysothamnus viscidiflorus stenophyllus	.30	.18
Gutierrezia sarothrae	.81	.06
Leptodactylon pungens	.13	.06

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 4

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	2.4	4.8

BASIC COVER--
Management unit 11B, Study no: 4

Cover Type	Average Cover %				
	'86	'94	'00	'05	'10
Vegetation	3.75	21.64	28.34	23.04	25.34
Rock	0	10.46	1.77	2.06	2.29
Pavement	18.25	4.25	17.54	11.66	15.68
Litter	39.00	20.09	17.54	22.19	27.73
Cryptogams	3.50	3.26	10.94	5.90	4.86
Bare Ground	35.50	35.29	47.24	47.62	42.68

SOIL ANALYSIS DATA --

Management unit 11B, Study no: 4, Study Name: Coal Creek

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.2	7.5	54.0	22.0	24.0	1.0	6.4	140.8	0.6

PELLET GROUP DATA--

Management unit 11B, Study no: 4

Type	Quadrat Frequency			
	'94	'00	'05	'10
Rabbit	45	39	60	44
Elk	-	1	-	-
Deer	15	3	3	4
Cattle	-	-	-	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	-
4 (10)	7 (17)	4 (10)
-	1 (2)	3 (7)

BROWSE CHARACTERISTICS--

Management unit 11B, Study no: 4

		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 wyomingensis									
86	**1865**	18	61	21	66	64	29	0	14/15
94	**2900**	3	73	24	2860	12	5	9	20/31
00	**5560**	41	36	22	2020	15	3	10	22/35
05	**2940**	7	22	71	294680	27	6	39	23/34
10	**4680**	38	36	26	2500	22	2	18	22/36
Atriplex canescens									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	17/14
10	**0**	0	0	-	-	0	0	0	16/13
Atriplex confertifolia									
86	**133**	0	0	100	-	0	100	100	-/-
94	**600**	0	60	40	-	7	7	7	10/13
00	**540**	4	26	70	-	7	85	70	8/14
05	**240**	33	58	8	40	8	25	0	14/17
10	**20**	0	100	0	-	0	0	0	7/8
Ceratoides lanata									
86	**533**	0	0	100	-	0	75	75	-/-
94	**60**	33	33	33	-	33	0	33	6/7
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	6/12
10	**0**	0	0	0	-	0	0	0	6/11

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus stenophyllus									
86	**1865**	0	4	96	-	4	0	18	3/7
94	**1740**	0	75	25	20	1	7	11	7/10
00	**1360**	1	10	88	20	1	6	74	4/7
05	**740**	0	70	30	-	5	5	11	8/11
10	**540**	22	63	15	-	0	0	11	7/10
Echinocereus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	0	0	0	3/12
05	**20**	0	100	-	-	0	0	0	3/9
10	**20**	0	100	-	-	0	0	0	3/10
Gutierrezia sarothrae									
86	**11465**	15	58	27	866	0	0	7	7/8
94	**6280**	11	81	8	20	0	0	5	8/7
00	**26900**	4	88	8	100	0	0	4	4/5
05	**1360**	0	100	0	120	0	0	0	8/9
10	**640**	16	81	3	-	0	0	3	5/7
Juniperus osteosperma									
86	**66**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**20**	0	100	-	-	0	0	0	-/-
Leptodactylon pungens									
86	**0**	0	0	0	-	0	0	0	-/-
94	**440**	0	95	5	-	0	0	5	5/7
00	**700**	9	9	83	40	0	40	20	8/7
05	**260**	0	77	23	-	0	0	8	5/8
10	**280**	0	100	0	-	0	0	0	3/6
Opuntia sp.									
86	**1332**	5	85	10	-	0	0	40	4/6
94	**1140**	2	96	2	-	0	0	0	3/11
00	**1220**	0	67	33	-	0	0	13	4/8
05	**220**	0	27	73	-	0	0	64	4/9
10	**120**	0	100	0	-	0	0	0	4/13
Pinus edulis									
86	**0**	0	0	-	66	0	0	0	-/-
94	**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	-/-

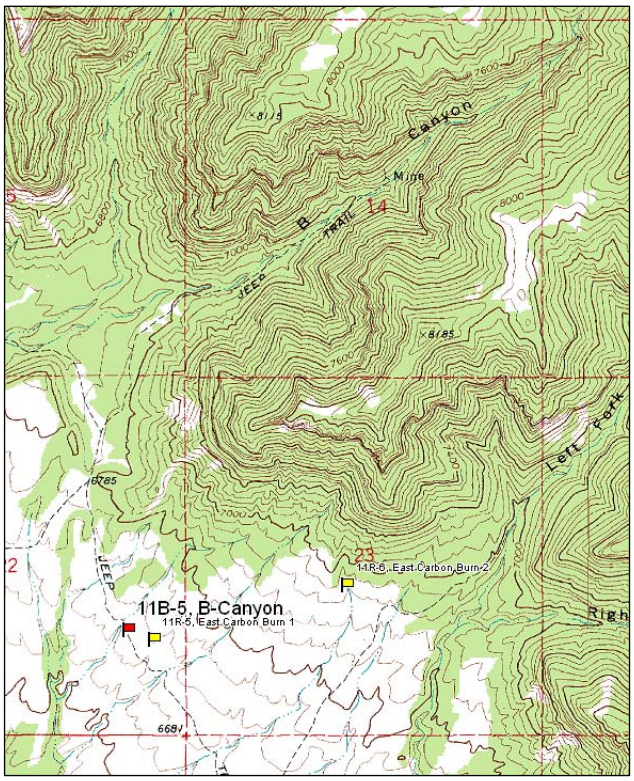
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Purshia tridentata									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	6/11

‘B’ CANYON - TREND STUDY NO. 11B-5-10

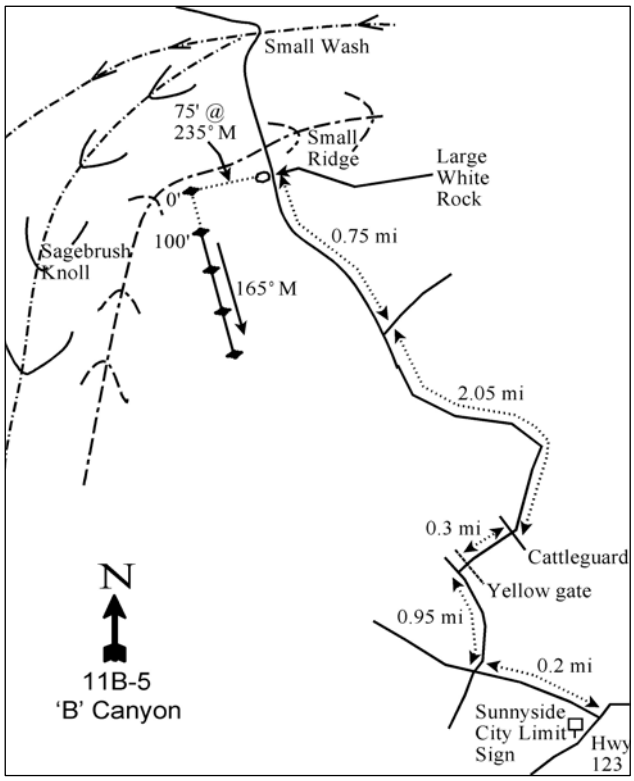
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Year-Long
NRCS Ecological Site Description: Upland Stony Loam (Pinyon-Utah Juniper), R034XY330UT
Land Ownership: BLM
Elevation: 6700 ft. (2043 m)
Aspect: South-Southwest
Slope: 5%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the Sunnyside city limit sign on Highway 123 at the west end of town, turn north and go 0.2 miles, passing the East Carbon High School football field. Turn right and go 0.95 miles. Turn right and pass through a yellow metal gate, continuing 0.3 miles to a cattle guard. Stay on the main road and go north 2.05 miles to an intersection. Keep left at the intersection (right turn goes to A Canyon transect) and go 0.75 miles more to the top of the ridge. On the left side of the road you should find a rock. The 0-foot stake, marked by a red painted rebar (tag #7894), is 75 feet away at a bearing of 235ºM.

Map Name: Sunny Side



Diagrammatic Sketch:



Township: 14S Range: 13E Section: 22

GPS: NAD 83, UTM 12S 547929 E 4382377 N

‘B’ CANYON - TREND STUDY NO. 11B-5

Site Information

Site Description: This study is located near the mouth of ‘B’ Canyon at the base of the West Tavaputs Plateau, about four miles northwest of Sunnyside. In 1966, the area was two-way chained to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), and was seeded to crested wheatgrass (*Agropyron cristatum*), fourwing saltbush (*Atriplex canescens*) and nomad alfalfa (*Medicago sativa*). After 20 years, the site was again dominated by the release of the young trees left after the original chaining. In 1996, the area was part of the East Carbon wildfire that burned 1,094 acres. After the fire, the site was chained and apparently seeded with a dribbler. The wildfire eliminated all of the trees and nearly all of the shrubs. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Mud Springs allotment. Pellet group transect data has estimated light use by deer and elk since 2000, and light use by cattle in 2000 and 2010 with heavy use in 2005 (Table - Pellet Group Data).

Browse: The only shrubs sampled following the wildfire are a few surviving true mountain mahogany (*Cercocarpus montanus*), antelope bitterbrush (*Purshia tridentata*), fourwing saltbush, broom snakeweed (*Gutierrezia sarothrae*) and resprouting green ephedra (*Ephedra viridis*). The most numerous shrub species prior to the 1996 fire was black sagebrush (*Artemisia nova*). Bitterbrush was seeded after the fire and was sampled at low density in 2000 and 2005, but was not sampled in 2010. Fourwing, mountain mahogany and green ephedra have shown heavy use over the course of the study (Table - Browse Characteristics).

Herbaceous Understory: Before and after the fire, crested wheatgrass was the dominant herbaceous plant and has increased in cover since 1994. Plants are tall, vigorous and were lightly grazed until 2005, when grazing was heavy. Comparing photos from 2000 and 2005 clearly shows heavy cattle grazing. A few other valuable perennial grass species include Indian ricegrass (*Oryzopsis hymenoides*), smooth brome (*Bromus inermis*), bluebunch wheatgrass (*Agropyron spicatum*) and mutton bluegrass (*Poa fendleriana*) have been sampled, but provide only limited forage. Abundance of forbs is low and has produced less than 1% cover every year. Only four herbaceous species established from the post-fire seeding treatment: intermediate wheatgrass (*Agropyron intermedium*), orchardgrass (*Dactylis glomerata*), alfalfa and small burnet (*Sanguisorba minor*), but orchardgrass, alfalfa and small burnet have not been sampled since 2000. The seeded species, Russian wildrye (*Elymus junceus*), was sampled for the first time in 2010 (Table - Herbaceous Trends).

Soil: The soil has a sandy clay loam texture with a soil reaction that is neutral (pH 7.3). Phosphorus may have limited availability for plant growth and development at 5.2 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). There are patches of exposed soil, but overall ground cover is good and erosion minimal. Rocks and pavement are found in the bare areas and large rocks and boulders are common on the surface (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 to 1994 - stable (0):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. The primary browse species, black sagebrush, had a slight decrease in decadence, but the population remained similar.
- **1994 to 2000 - down (-2):** A wildfire removed nearly all of the browse from the site.
- **2000 to 2005 - stable (0):** The density and cover of preferred browse remained low.
- **2005 to 2010 - stable (0):** There was a slight increase in the cover and density of true mountain mahogany and green ephedra, but a slight decrease in the density and cover of fourwing saltbush and bitterbrush.

Grass:

- **1986 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.

- **1994 to 2000 - up (+2):** The sum of nested frequency of perennial grasses increased by 20% and cover increased from 10% to 21%. There was a significant increase in the nested frequency of the seeded species intermediate wheatgrass.
- **2000 to 2005 - stable (0):** The perennial grass sum of nested frequency decreased by 7%, but cover decreased to 17%. There was a significant decrease in the nested frequency of intermediate wheatgrass.
- **2005 to 2010 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased to 28% due to a large increase in the cover of crested wheatgrass. Russian wildrye was sampled for the first time at moderate frequency and cover.

Forb:

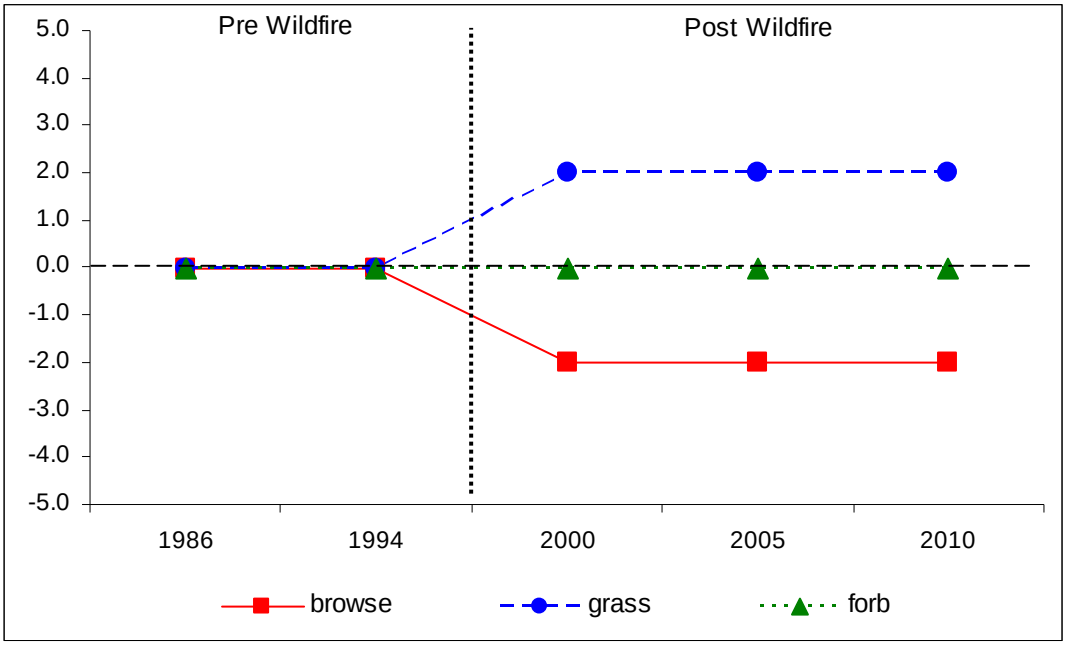
- **1986 to 1994 - stable (0):** Forbs are rare on the site.
- **1994 to 2000 - stable (0):** Forbs are rare on the site.
- **2000 to 2005 - stable (0):** Forbs are rare on the site.
- **2005 to 2010 - stable (0):** Forbs are rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 11B, study no: 5

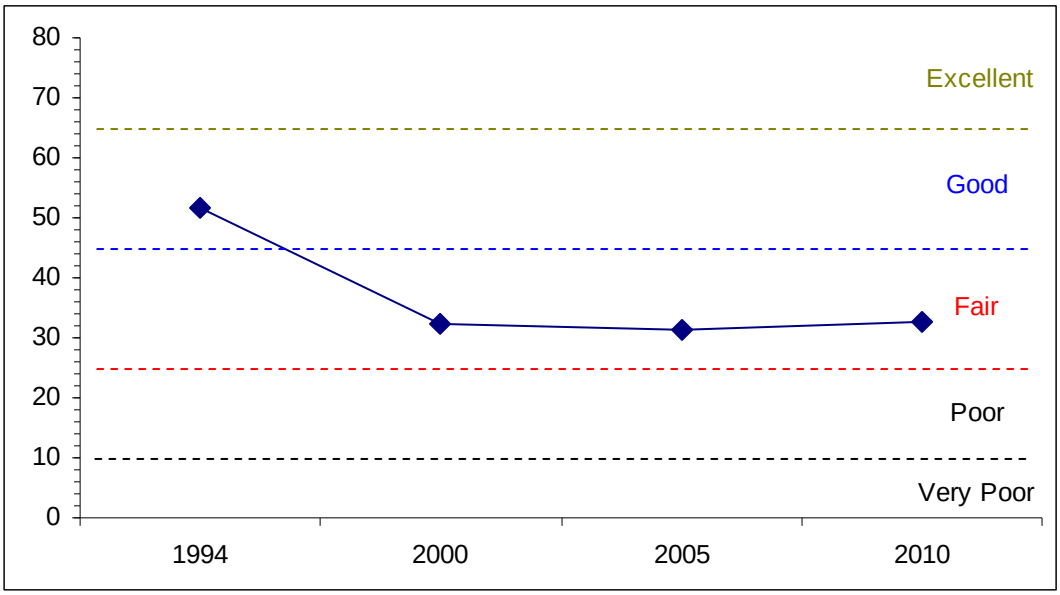
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	14.1	11.4	4.0	20.7	0.0	1.5	0.0	**51.7**	Good
00	0.5	0.0	0.0	30.0	0.0	1.9	0.0	**32.3**	Fair
05	0.5	0.0	0.0	30.0	0.0	0.8	0.0	**31.2**	Fair
10	1.1	0.0	0.0	30.0	0.0	1.7	0.0	**32.8**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 5



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 11B, Study no: 5



HERBACEOUS TRENDS--
Management unit 11B, Study no: 5

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron cristatum	269	263	274	289	297	9.44	17.78	16.36	26.35
G	Agropyron intermedium	$_{ab}$4	$_{a}$-	$_{c}$43	$_{ab}$1	$_{b}$10	-	1.74	.00	.28
G	Agropyron spicatum	-	6	-	-	-	.33	-	-	-
G	Bouteloua gracilis	$_{a}$-	$_{b}$12	$_{a}$3	$_{a}$1	$_{a}$-	.10	.03	.03	-
G	Bromus inermis	$_{ab}$12	$_{ab}$6	$_{a}$4	$_{b}$21	$_{a}$3	.21	.38	.47	.38
G	Dactylis glomerata	-	-	9	-	-	-	.04	-	-
G	Elymus junceus	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$32	-	-	-	1.17
G	Festuca ovina	$_{a}$-	$_{a}$-	$_{b}$15	$_{a}$1	$_{a}$1	-	.09	.00	.15
G	Oryzopsis hymenoides	$_{b}$10	$_{ab}$4	$_{ab}$8	$_{b}$19	$_{a}$-	.06	.99	.24	-
G	Poa fendleriana	-	7	-	-	-	.21	-	-	-
G	Sitanion hystrix	1	-	-	-	-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		296	298	356	332	343	10.36	21.06	17.11	28.33
Total for Grasses		296	298	356	332	343	10.36	21.06	17.11	28.33
F	Arabis selbyi	$_{ab}$2	$_{b}$11	$_{a}$-	$_{a}$-	$_{a}$-	.02	-	-	-
F	Astragalus convallarius	$_{a}$13	$_{a}$9	$_{ab}$21	$_{b}$33	$_{ab}$14	.20	.55	.13	.36
F	Astragalus wingatanus	$_{c}$21	$_{b}$15	$_{a}$-	$_{ab}$2	$_{ab}$4	.46	.06	.15	.15
F	Chenopodium fremontii (a)	-	-	6	5	-	-	.01	.02	-
F	Descurainia pinnata (a)	-	-	-	3	-	-	-	.00	-
F	Gilia sp. (a)	-	-	-	1	-	-	-	.00	-
F	Hedysarum boreale	2	-	3	3	-	-	.15	.03	-
F	Lappula occidentalis (a)	-	-	-	-	1	-	-	-	.00
F	Lesquerella ludoviciana	3	7	5	-	-	.01	.01	-	-
F	Linum lewisii	-	-	8	-	-	-	.02	-	-

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
F	Machaeranthera grindelioides	3	1	-	-	-	.03	-	-	-
F	Medicago sativa	5	-	5	-	-	-	.01	-	-
F	Penstemon cyanocaulis	$_{b}$17	$_{a}$5	$_{a}$4	$_{a}$-	$_{a}$-	.01	.03	-	-
F	Salsola iberica (a)	-	$_{a}$-	$_{ab}$12	$_{b}$13	$_{a}$-	-	.04	.03	-
F	Sanguisorba minor	-	-	1	-	-	-	.03	-	-
F	Schoencrambe linifolia	$_{a}$-	$_{ab}$3	$_{bc}$16	$_{a}$1	$_{c}$32	.01	.06	.01	.29
F	Sphaeralcea coccinea	3	-	6	5	6	-	.01	.06	.04
F	Townsendia incana	-	-	-	1	-	-	-	.00	-
F	Trifolium sp.	-	-	-	2	3	-	-	.00	.00
Total for Annual Forbs		0	0	18	22	1	0	0.05	0.06	0.00
Total for Perennial Forbs		69	51	69	47	59	0.76	0.94	0.38	0.86
Total for Forbs		69	51	87	69	60	0.76	1.00	0.45	0.86

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

BROWSE TRENDS--
Management unit 11B, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Artemisia nova	78	0	0	0	8.85	-	-	-
B	Artemisia tridentata vaseyana	3	0	0	0	.81	-	-	-
B	Atriplex canescens	0	2	2	1	-	-	-	-
B	Cercocarpus montanus	3	1	1	1	1.00	.03	.03	.15
B	Ephedra viridis	2	2	3	4	.41	.15	.15	.66
B	Gutierrezia sarothrae	8	1	1	4	.21	-	-	.03
B	Juniperus osteosperma	0	0	0	0	3.00	-	-	-
B	Opuntia sp.	1	0	1	1	-	-	-	-
B	Pinus edulis	0	0	0	0	1.63	-	-	-
B	Purshia tridentata	0	1	1	0	-	.15	.15	-
Total for Browse		95	7	9	11	15.93	0.33	0.33	0.83

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 5

Species	Percent Cover	
	'05	'10
Atriplex canescens	.13	-
Cercocarpus montanus	-	.15
Ephedra viridis	.55	.55

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 5

Species	Average leader growth (in) '10
Atriplex canescens	1.0
Cercocarpus montanus	5.1
Ephedra viridis	2.7
Purshia tridentata	4.6

BASIC COVER--
Management unit 11B, Study no: 5

Cover Type	Average Cover %				
	'86	'94	'00	'05	'10
Vegetation	11.50	28.43	24.17	17.87	32.15
Rock	7.00	10.55	13.60	13.45	14.89
Pavement	3.75	1.52	6.80	2.12	8.76
Litter	60.50	45.45	30.78	17.16	29.53
Cryptogams	.75	2.80	.63	.04	.06
Bare Ground	16.50	15.73	38.27	55.37	23.05

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 5, Study Name: B Canyon

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.7	7.3	51.0	26.4	22.6	2.2	5.2	124.8	0.7

PELLET GROUP DATA--
Management unit 11B, Study no: 5

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'00	'05	'10	'00	'05	'10
Rabbit	20	66	27	16	-	-	-
Elk	1	-	10	2	-	7 (17)	1 (3)
Deer	35	20	11	4	9 (22)	6 (15)	5 (13)
Cattle	-	1	12	6	5 (11)	42 (104)	13 (32)

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 5

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
86	**0**	0	0	-	-	0	0	0	-/-
94	**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	43/92
Artemisia nova									
86	**6131**	10	63	27	399	10	67	3	9/16
94	**6080**	9	77	14	100	31	.65	3	15/21
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Artemisia tridentata vaseyana									
86	**199**	0	100	0	-	100	0	0	20/20
94	**180**	11	78	11	-	44	0	0	16/28
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	10/15
10	**0**	0	0	0	-	0	0	0	12/17
Atriplex canescens									
86	**66**	0	0	100	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
00	**40**	100	0	0	-	0	100	0	-/-
05	**40**	0	100	0	-	0	100	0	18/20
10	**20**	100	0	0	-	100	0	0	20/27
Cercocarpus montanus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**60**	0	100	-	-	33	0	0	38/42
00	**20**	0	100	-	-	0	100	0	9/8
05	**40**	0	100	-	-	0	100	0	14/11
10	**60**	0	100	-	-	0	100	0	22/21
Chrysothamnus nauseosus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**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	13/23

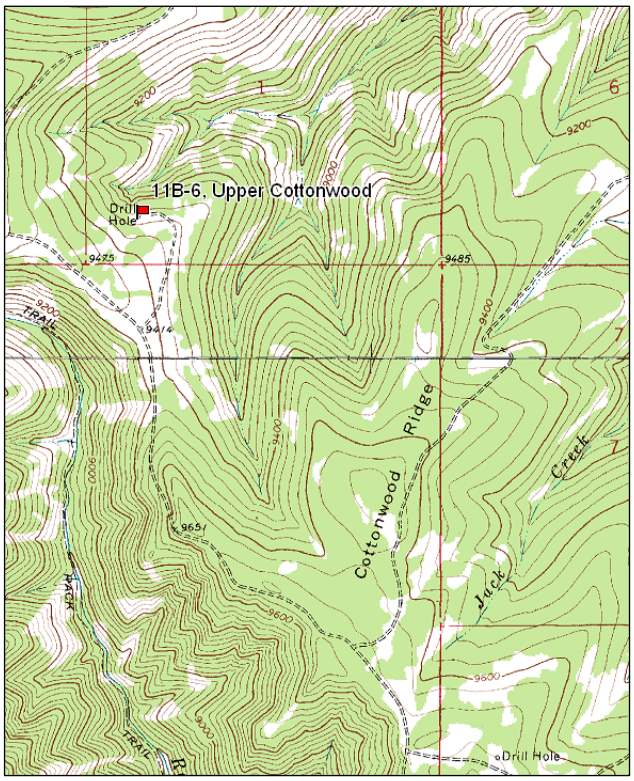
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Ephedra viridis									
86	**66**	0	100	-	-	100	0	100	36/25
94	**40**	0	100	-	-	0	0	0	26/24
00	**200**	10	90	-	-	10	90	0	11/12
05	**160**	0	100	-	-	0	100	0	14/27
10	**160**	50	50	-	-	50	50	0	20/34
Gutierrezia sarothrae									
86	**0**	0	0	-	-	0	0	0	-/-
94	**300**	20	80	-	-	0	0	0	8/7
00	**20**	0	100	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	5/8
10	**100**	0	100	-	-	0	0	0	5/7
Juniperus osteosperma									
86	**265**	25	75	-	-	25	25	0	72/35
94	**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	-/-
Opuntia sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**20**	0	100	-	-	0	0	0	5/13
00	**0**	0	0	-	-	0	0	0	6/16
05	**40**	0	100	-	-	0	0	0	2/10
10	**40**	0	100	-	-	0	0	0	5/14
Pinus edulis									
86	**132**	50	50	-	-	0	0	0	108/71
94	**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	-/-
Purshia tridentata									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	13/24
05	**20**	0	100	-	-	0	100	0	10/18
10	**0**	0	0	-	-	0	0	0	23/36

UPPER COTTONWOOD RIDGE - TREND STUDY NO. 11B-6-10

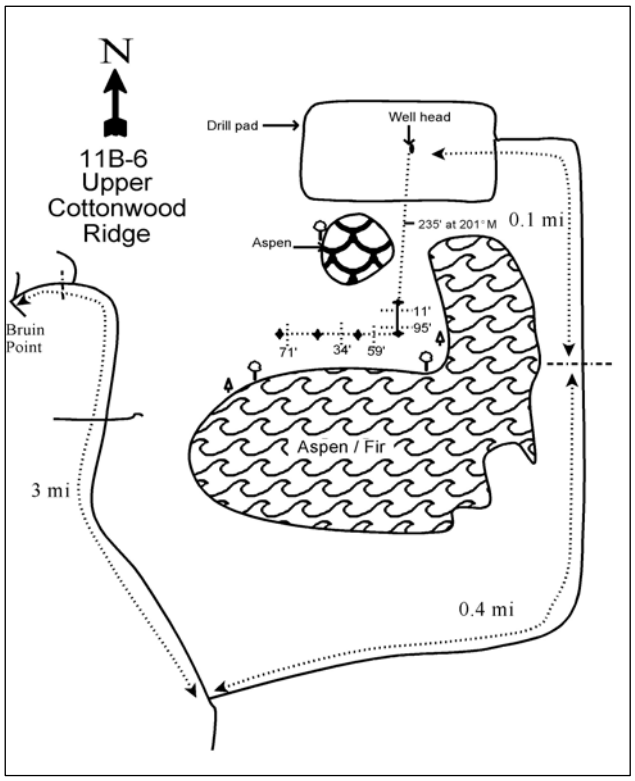
Vegetation Type: Dry Meadow
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer
NRCS Ecological Site Description: High Mountain Stony Loam (Engelmann Spruce), R048AY524UT
Land Ownership: BLM
Elevation: 9300 ft. (2835 m)
Aspect: North
Slope: 18%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft)

Directions:
From Sunnyside, proceed up Water Canyon to the summit at Bruin Point (approximately 5.6 miles). Take the middle fork and go 0.35 miles to a cattle guard. Stay right just beyond the cattle guard and proceed 0.85 miles to an intersection and a large pipe gateway. Go straight through the gateway and go 1.8 miles to a fork. Turn left and go 0.4 miles to a fence. Walk 0.1 miles to the end of the road, an oil drilling pad. The baseline is located 235 feet south (201ºM) of the well head. The 0-foot end of the frequency baseline is marked by a 4-foot tall fence post tagged #7835.

Map Name: Bruin Point



Diagrammatic Sketch:



Township: 14S Range: 14E Section: 1

GPS: NAD 83, UTM 12S 559655 E 4386924 N

UPPER COTTONWOOD RIDGE - TREND STUDY NO. 11B-6

Site Information

Site Description: The study is located in an open meadow surrounded by quaking aspen (*Populus tremuloides*), subalpine fir (*Abies lasiocarpa*) and Douglas fir (*Pseudotsuga menziesii*). The meadow is near the ridge top at the headwaters of Cottonwood Creek. The high, cool, north-facing slope supports an abundant variety of plant life. The lack of a permanent water source nearby limits the use of the area by big game during the summer. Grazing is managed by the Bureau of Land Management (BLM) as part of the large Green River allotment. Oil and gas exploration has been carried out in the area in the past, but there are no signs of any current activity. An extensive road system encourages recreational use by the public throughout the area, but direct access to the site was closed in 2010. Pellet group transect data estimated light use by deer and elk in 2000 and 2010, and estimated cattle use has been light since 2000 (Table - Pellet Group Data).

Browse: Browse is an insignificant component of the vegetation on the site. However, a few seedling and young aspen provide some forage which has had moderate to heavy browsing since 1986. Some gooseberry current (*Ribes montigenum*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and snowberry (*Symphoricarpos oreophilus*) plants occur in scattered patches over the site, but none has had heavy use (Table - Browse Characteristics). The site is surrounded by large mature aspen, subalpine fir and Douglas fir which appear to be slowly moving in from the edges.

Herbaceous Understory: Grasses are abundant and diverse, but are dominated by Kentucky bluegrass (*Poa pratensis*). Other species of grasses, subalpine needlegrass (*Stipa columbiana*), Letterman needlegrass (*S. lettermani*), blue wildrye (*Elymus glaucus* spp. *glaucus*), sedge (*Carex sp.*) and several other perennial grasses, are less abundant, but provide additional forage. Forbs are an important source of forage for deer and elk on the summer range. Forbs on this site are diverse and abundant. Dandelion (*Taraxacum officinale*) has dominated the forb composition, but other, more desirable forbs, are present and provide good forage (Table - Herbaceous Trends).

Soil: The soil texture is a clay loam with a neutral soil reaction (pH 6.7). Organic matter is quite high (5.5%) with abundant plant life. Bare ground cover is low with high amounts of vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **1986 to 1994 - stable (0):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Browse is limited on the site, but is not considered crucial forage on summer range. There was little change in any of the preferred browse found on the site.
- **1994 to 2000 - stable (0):** There was a slight increase in the cover and density of mountain big sagebrush and gooseberry current. However, cover of subalpine fir also increased and conifers appear to be beginning to encroach on the meadow.
- **2000 to 2010 - slightly up (+1):** The density of mountain big sagebrush increased substantially due to a large increase in the recruitment of young plants, but cover remained low. There was a large increase in the cover of gooseberry current, though density remained similar. Conifer species continued to increase in cover.

Grass:

- **1986 to 1994 - up (+2):** The sum of nested frequency of perennial grasses increased by 20% with a significant increase in the nested frequency of the two needlegrass species and blue wildrye.

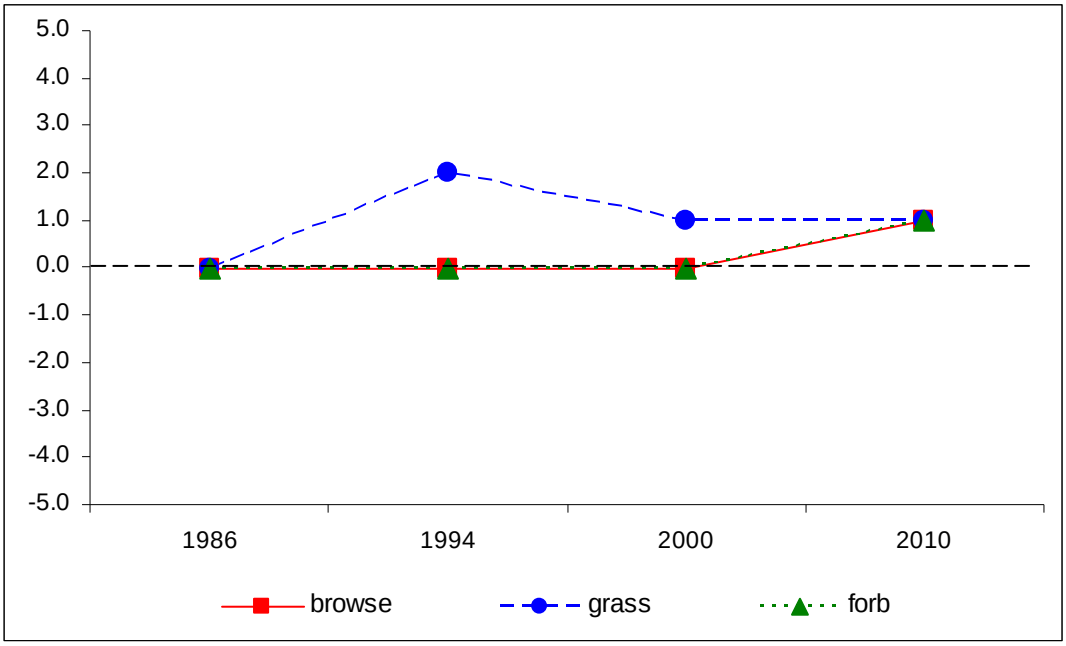
- **1994 to 2000 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 11% and cover decreased from 13% to 12%. There was a significant decrease in the nested frequency of the dominant species, Kentucky bluegrass.
- **2000 to 2010 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased substantially to 26%.

Forb:

- **1986 to 1994 - stable (0):** The sum of nested frequency of perennial forbs changed little.
- **1994 to 2000 - stable (0):** There was little change in the sum of nested frequency of perennial forbs.
- **2000 to 2010 - slightly up (+1):** The perennial forb sum of nested frequency changed little, but there was a positive change in composition. The nested frequency of dandelion decreased significantly and many other desirable forbs increased in abundance.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 6



HERBACEOUS TRENDS--
Management unit 11B, Study no: 6

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'10	'94	'00	'10
G	Agropyron spicatum	ab3	ab-	a-	b10	-	-	.22
G	Bromus carinatus	b73	a6	a27	a8	.07	.44	.30
G	Carex sp.	22	39	26	31	.13	.35	.69
G	Elymus glaucus glaucus	a2	b75	b64	a6	.64	1.11	.30
G	Poa fendleriana	a5	a-	a3	b26	-	.03	.82
G	Poa pratensis	b307	b289	a241	a243	11.51	7.83	19.31
G	Stipa columbiana	a-	b23	c63	bc52	.33	1.69	2.19
G	Stipa lettermani	a1	b55	a22	b63	.33	.17	2.29
G	Trisetum spicatum	ab6	b14	a-	b11	.22	-	.05

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'10	'94	'00	'10
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		419	501	446	450	13.25	11.63	26.19
Total for Grasses		419	501	446	450	13.25	11.63	26.19
F	Achillea millefolium	$_{b}$160	$_{b}$144	$_{a}$91	$_{ab}$133	1.52	.81	4.00
F	Agoseris aurantiaca	$_{a}$10	$_{a}$7	$_{b}$62	$_{b}$42	.02	.44	1.21
F	Androsace septentrionalis (a)	-	$_{a}$-	$_{b}$39	$_{a}$1	-	.33	.00
F	Antennaria parvifolia	37	38	41	41	.45	1.33	2.00
F	Aquilegia coerulea	8	-	-	-	-	-	-
F	Arabis drummondi	$_{a}$1	$_{b}$17	$_{ab}$9	$_{a}$-	.04	.05	-
F	Aster sp.	$_{a}$-	$_{a}$41	$_{b}$89	$_{b}$104	.36	1.26	4.22
F	Astragalus miser	$_{ab}$20	$_{a}$5	$_{b}$36	$_{a}$-	.01	.42	-
F	Calochortus gunnisoni	$_{b}$13	$_{a}$-	$_{a}$-	$_{a}$2	-	-	.06
F	Chaenactis douglasii	-	9	-	4	.01	-	.03
F	Chenopodium fremontii (a)	-	-	2	-	-	.03	-
F	Cirsium calcareum	15	24	9	22	.26	.02	.64
F	Collinsia parviflora (a)	-	$_{a}$-	$_{ab}$7	$_{b}$7	-	.02	.07
F	Comandra pallida	$_{a}$-	$_{a}$-	$_{b}$17	$_{a}$4	-	.14	.00
F	Descurainia pinnata (a)	-	$_{a}$-	$_{b}$32	$_{a}$-	-	.24	-
F	Erigeron speciosus	$_{ab}$5	$_{a}$-	$_{bc}$17	$_{c}$32	-	.22	.68
F	Erigeron speciosus	$_{a}$-	$_{b}$11	$_{a}$-	$_{a}$-	.10	-	-
F	Fragaria vesca	$_{a}$8	$_{b}$39	$_{ab}$21	$_{b}$41	.70	.41	.99
F	Gayophytum ramosissimum(a)	-	-	4	6	-	.04	.01
F	Gentiana prostrata	$_{a}$-	$_{a}$-	$_{b}$35	$_{a}$-	-	.63	-
F	Gentiana sp.	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$27	-	-	.31
F	Lupinus argenteus	$_{a}$2	$_{a}$1	$_{a}$10	$_{b}$28	.03	.39	1.53
F	Monardella odoratissima	4	-	-	-	-	-	-
F	Osmorhiza occidentalis	-	5	3	5	.04	.01	.03
F	Phlox longifolia	$_{b}$22	$_{b}$10	$_{a}$-	$_{b}$20	.02	-	.19
F	Polygonum douglasii (a)	-	$_{c}$74	$_{a}$5	$_{b}$34	.16	.01	.19
F	Potentilla gracilis	-	3	-	4	.01	-	.18
F	Ranunculus alismaefolius	$_{c}$45	$_{b}$14	$_{b}$12	$_{a}$-	.03	.36	-
F	Sedum lanceolatum	-	-	-	3	-	-	.03
F	Silene menziesii	$_{b}$30	$_{b}$35	$_{a}$2	$_{a}$-	.15	.00	-
F	Taraxacum officinale	$_{b}$236	$_{b}$255	$_{b}$253	$_{a}$186	7.49	9.01	7.16
F	Thalictrum fendleri	-	4	7	1	.03	.01	.03
F	Unknown forb-perennial	$_{b}$58	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Vicia americana	$_{b}$12	$_{ab}$6	$_{a}$-	$_{a}$-	.41	-	-
F	Viola adunca	54	53	56	40	.34	.87	.52
Total for Annual Forbs		0	74	89	48	0.16	0.68	0.29
Total for Perennial Forbs		740	721	770	739	12.07	16.44	23.86
Total for Forbs		740	795	859	787	12.23	17.12	24.15

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

BROWSE TRENDS--
Management unit 11B, Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'10	'94	'00	'10
B	Abies lasiocarpa	0	11	12	2.13	4.99	6.95
B	Artemisia tridentata vaseyana	4	5	16	.03	1.13	.81
B	Picea pungens	0	0	1	-	-	.63
B	Populus tremuloides	0	31	31	2.31	1.10	2.40
B	Pseudotsuga menziesii	0	0	0	-	.53	-
B	Purshia tridentata	0	1	0	-	-	-
B	Ribes montigenum	14	17	21	.82	1.83	4.77
B	Rosa woodsii	1	0	2	-	-	.15
B	Symphoricarpos oreophilus	14	15	15	.23	.21	.89
Total for Browse		33	80	98	5.54	9.81	16.62

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 6

Species	Percent Cover	
	'00	'10
Abies lasiocarpa	6.19	16.00
Artemisia tridentata vaseyana	-	1.43
Picea pungens	-	.30
Populus tremuloides	4.59	17.29
Ribes montigenum	-	6.93
Symphoricarpos oreophilus	-	1.88

BASIC COVER--
Management unit 11B, Study no: 6

Cover Type	Average Cover %			
	'86	'94	'00	'10
Vegetation	27.75	36.17	45.02	58.81
Rock	.25	.59	.11	1.04
Pavement	.25	.21	.34	.99
Litter	53.50	38.91	62.68	51.82
Cryptogams	0	2.36	.65	.01
Bare Ground	18.25	11.34	17.66	15.39

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 6, Study Name: Upper Cottonwood

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.1	6.7	28.0	34.7	34.6	5.5	17.3	246.4	0.8

PELLET GROUP DATA--
Management unit 11B, Study no: 6

Type	Quadrat Frequency			Days use per acre (ha)	
	'94	'00	'10	'00	'10
Sheep	-	-	1	-	-
Rabbit	4	-	-	-	-
Grouse	-	-	-	-	9/acre
Elk	17	12	1	26 (63)	3 (7)
Deer	2	-	3	8 (20)	-
Cattle	2	-	3	-	4 (9)

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 6

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Abies lasiocarpa									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**380**	74	26	-	60	0	0	0	-/-
10	**320**	63	38	-	260	6	0	0	-/-
Artemisia tridentata vaseyana									
86	**0**	0	0	-	-	0	0	0	-/-
94	**100**	20	80	-	-	0	0	0	23/20
00	**120**	17	83	-	-	0	0	0	20/32
10	**980**	76	24	-	300	20	0	2	17/22
Cercocarpus ledifolius									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	20	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Juniperus communis									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	26/120
00	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Picea pungens									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
10	**20**	100	0	-	-	0	0	0	-/-
Populus tremuloides									
86	**333**	100	0	0	266	60	20	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
00	**1480**	78	20	1	-	0	0	0	-/-
10	**1160**	88	12	0	280	16	12	3	-/-

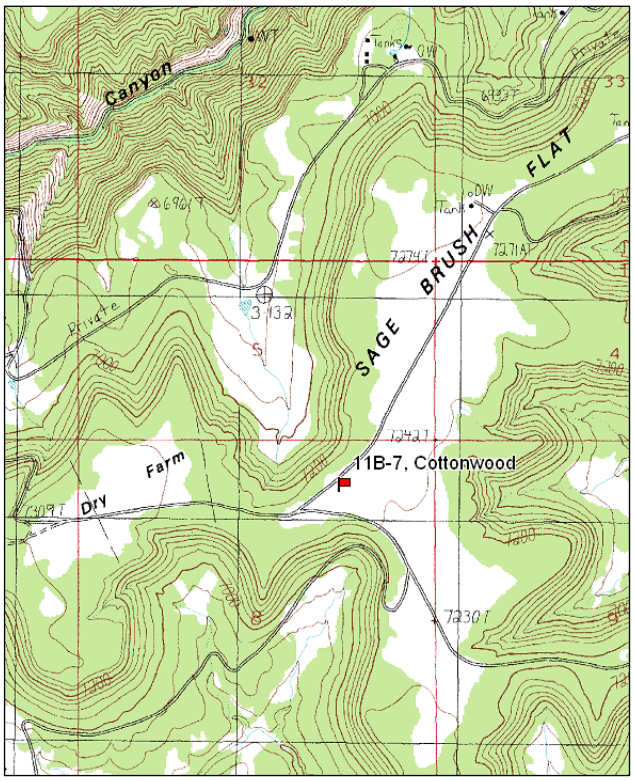
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pseudotsuga menziesii									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	40	0	0	0	-/-
10	**0**	0	0	-	20	0	0	0	-/-
Purshia tridentata									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Ribes montigenum									
86	**2599**	51	36	13	133	0	0	8	25/28
94	**460**	30	70	0	20	0	0	0	26/62
00	**760**	8	92	0	-	0	0	0	20/43
10	**700**	17	83	0	20	0	0	0	28/63
Rosa woodsii									
86	**0**	0	0	-	-	0	0	0	-/-
94	**20**	0	100	-	-	0	0	0	14/12
00	**0**	0	0	-	-	0	0	0	-/-
10	**40**	50	50	-	-	0	0	0	21/29
Symphoricarpos oreophilus									
86	**732**	45	55	0	133	0	0	0	22/24
94	**440**	27	68	5	-	9	0	5	17/24
00	**380**	16	74	11	-	11	0	5	18/24
10	**420**	19	81	0	60	0	0	0	23/39

COTTONWOOD - TREND STUDY NO. 11B-7-10

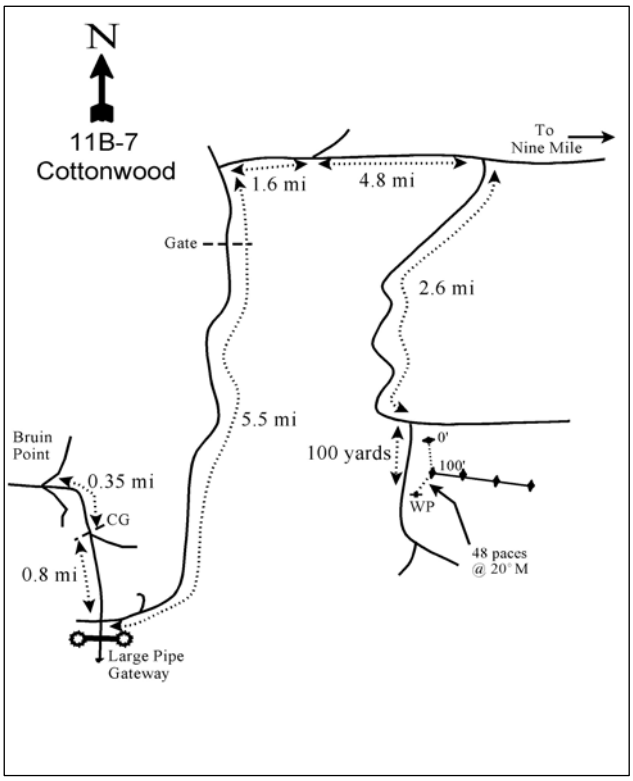
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper), R047XB326UT
Land Ownership: BLM
Elevation: 7240 ft. (2207 m)
Aspect: Southeast
Slope: 1%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

Directions:
At the Range Creek Summit (Bruin Point) take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.8 miles. Turn left at the intersection just before the large pipe gateway and proceed 0.5 miles to a fork. Stay right and go 4.2 miles to a gate. Go 0.8 miles to a fork and remain right. Go 1.6 miles to another fork and remain right. Go 4.8 miles to another fork and turn right. Go 2.6 miles to another fork. Stay right and go 100 yards to a rebar witness post on left side of the road. The 100-foot baseline stake is 48 paces at 20ºM from the witness post. All markers are rebar, and the 0-foot end of the baseline has a browse tag #7872 attached.

Map Name: Twin Hollow



Diagrammatic Sketch:



Township: 13S Range: 16E Section: 8

GPS: NAD 83, UTM 12S 573391 E 4396331 N

COTTONWOOD - TREND STUDY NO. 11B-7

Site Information

Site Description: The study samples a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat at the northeast end of Cottonwood Ridge. The extensive sagebrush opening is surrounded by mature pinyon pine (*Pinus edulis*) woodlands which gradually slopes down to steep canyons that drain east into the Green River. Grazing in the area is managed by the Bureau of Land Management as part of the Green River allotment. A pellet group transect, which runs north of the transect, was read every year until 1989 when it was suspended. During the 12 years previous to 1989, deer did not use the area during most winters. When use was sampled, utilization ranged from 1 to 9 deer days use/acre (2 to 23 ddu/ha) during any one year. Correspondingly, pellet group transect data has estimated light use by deer and elk since 2000. Estimated cattle use was minimal since 2000. A few sage grouse droppings were also sampled on the site in 2005 and 2010 (Table - Pellet Group Data).

Browse: The sagebrush flat is dominated Wyoming big sagebrush which provides almost all of the browse cover (Table - Browse Trends). The sagebrush population is overly mature with high amounts of decadence and poor vigor. Recruitment of young sagebrush plants has been mostly poor, but was good in 2010. Utilization of sagebrush has been mostly moderate with heavier use in 2000 and 2010. The plants on this site produced limited new growth in the past readings and were not very vigorous, possibly making hedging to appear more severe. Winterfat (*Ceratoides lanata*) occurs in low numbers on the site, but is heavily used. The weedy species, broom snakeweed (*Gutierrezia sarothrae*) also occurs in low numbers on the site and has steadily decreased in density since 1994 (Table - Browse Characteristics). Very few pinyon trees are found in the flat and they do not appear to be increasing. The surrounding woodland provides good thermal cover.

Herbaceous Understory: The grass component is diverse and abundant for a Wyoming big sagebrush community. Needle-and-thread (*Stipa comata*) is the dominant grass species, but western wheatgrass (*Agropyron smithii*) and Indian ricegrass (*Oryzopsis hymenoides*) are also common. Other perennial grasses that occur in lower abundance are Salina wildrye (*Elymus salina*), mutton bluegrass (*Poa fendleriana*), Sandberg bluegrass (*P. secunda*) and bottlebrush squirreltail (*Sitanion hystrix*). Cheatgrass (*Bromus tectorum*) was sampled for the first time on the site in 2005, but is only found in low frequency and cover. Forbs are diverse and were abundant from 1994 to 2005, but decreased substantially in 2010. The majority of the forbs are found growing within the protection of the sagebrush, except for the low rounded mats of desert phlox (*Phlox austromontana*). Lobeleaf groundsel (*Senecio multilobatus*), scarlet globemallow (*Sphaeralcea coccinea*) and desert phlox have been the most common species (Table - Herbaceous Trends).

Soil: The soil has a loam texture with a slightly alkaline soil reaction (pH 7.4). Phosphorus may have limited availability for plant growth and development at 4.6 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground has been moderately high with litter and cryptogam cover limited to the areas beneath the sagebrush canopy (Table - Basic Cover). There is some evidence of soil movement and soil pedestaling around sagebrush, but the flat terrain prevents severe erosion. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 to 1994 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Decadence of the primary browse species, Wyoming big sagebrush, decreased from 66% to 35% and poor vigor decreased from 32% to 14%. Decadence of sagebrush is still considered high.
- **1994 to 2000 - slightly down (-1):** There was little change in the density of sagebrush, but decadence and poor vigor returned to 1986 levels.

- **2000 to 2005 - down (-2):** The density of Wyoming big sagebrush decreased by 20% from 4,140 plants/acre to 3,320 plants/acre, and cover decreased from 16% to 13%. Decadence of sagebrush remained high at 50%, though poor vigor decreased to 13%.
- **2005 to 2010 - slightly up (+1):** Wyoming big sagebrush density increased by 17% to 3,880 plants/acre, though cover decreased to 11%. Much of the increase in density was due to an increase in the recruitment of young sagebrush plants from 2% to 15% of the population. Decadence of sagebrush remained high at 45% and poor vigor increased to 28%.

Grass:

- **1986 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though composition changed with a significant decrease in the nested frequency of bottlebrush squirreltail and a significant increase in the nested frequency of western wheatgrass.
- **1994 to 2000 - up (+2):** The sum of nested frequency of perennial grasses increased by 26% and cover increased from 6% to 16%. There was a significant increase in the nested frequency of Indian ricegrass.
- **2000 to 2005 - stable (0):** The perennial grass sum of nested frequency changed little, though cover decreased to 14%. There was a change in composition with a significant decrease in the nested frequency of western wheatgrass and Indian ricegrass, and a significant increase in the nested frequency of needle-and-thread.
- **2005 to 2010 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased to 18%. Needle-and-thread increased significantly in nested frequency and increased substantially in cover.

Forb:

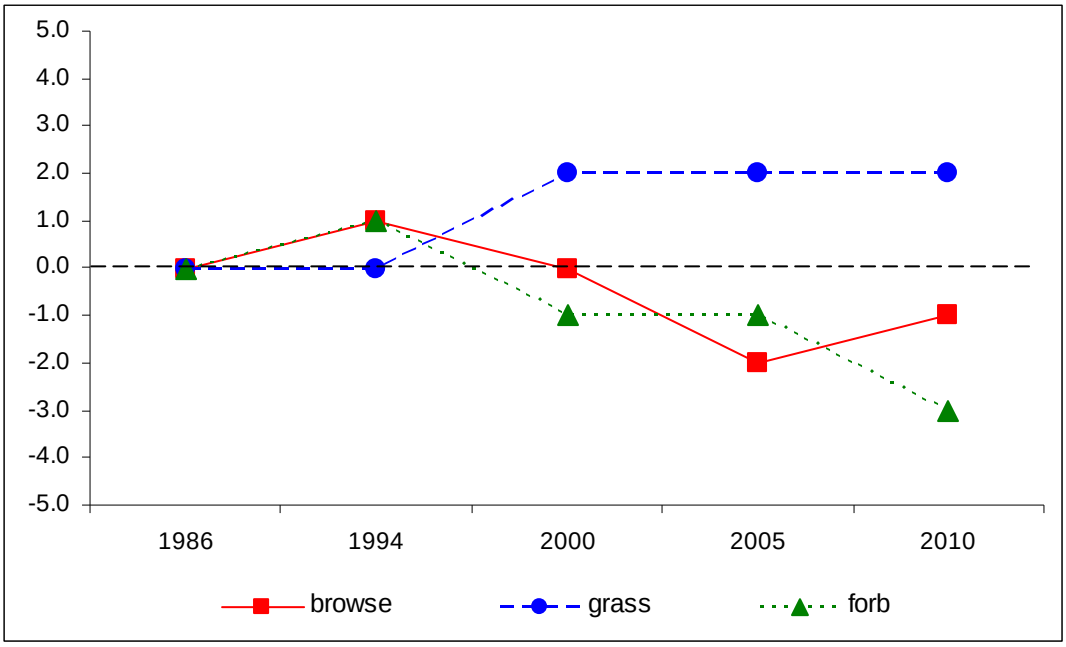
- **1986 to 1994 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 16% with a significant increase in the nested frequency of lobeleaf groundsel and desert phlox.
- **1994 to 2000 - down (-2):** There was a 41% decrease in the sum of nested frequency of perennial forbs, though cover remained similar due to a large amount of cover provided by desert phlox.
- **2000 to 2005 - stable (0):** The perennial forb sum of nested frequency remained similar and cover increased to 9% due to a large increase in the nested frequency and cover of lobeleaf groundsel.
- **2005 to 2010 - down (-2):** The sum of nested frequency of perennial forbs decreased by 41% and cover decreased to 2%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 11B, study no: 7

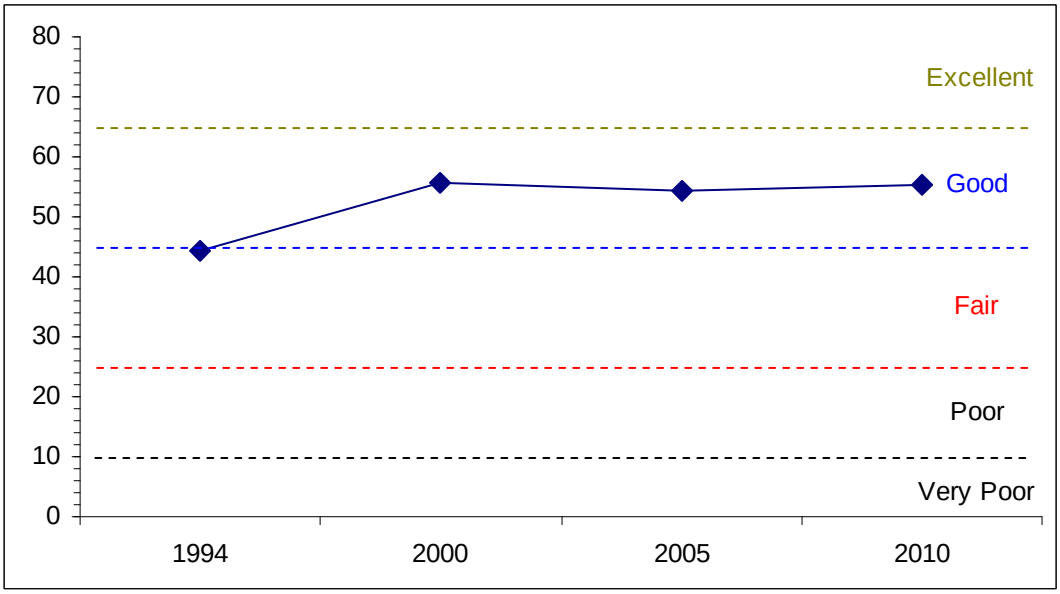
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	17.9	4.5	0.5	11.3	0.0	10.0	0.0	**44.2**	Fair-Good
00	19.9	-5.7	1.5	30.0	0.0	10.0	0.0	**55.7**	Good
05	15.8	0.0	1.0	27.7	0.0	10.0	0.0	**54.5**	Good
10	13.1	1.5	7.5	30.0	0.0	3.2	0.0	**55.3**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 7



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 11B, Study no: 7



HERBACEOUS TRENDS--
Management unit 11B, Study no: 7

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron smithii	a88	c203	c235	b141	ab107	2.58	4.73	2.31	1.88
G	Bromus tectorum (a)	-	-	-	5	2	-	-	.01	.00
G	Elymus salina	a-	ab7	ab6	a-	b15	.18	.01	-	.25
G	Oryzopsis hymenoides	a73	a65	b116	a43	a39	1.00	6.86	1.54	2.42
G	Poa fendleriana	a14	a8	a2	b30	a7	.01	.03	1.18	.06
G	Poa secunda	a-	a-	a-	b16	b13	-	-	.26	.08
G	Sitanion hystrix	c68	a26	ab30	bc44	a22	.30	.61	1.03	.21
G	Stipa comata	a116	a79	a99	b172	c231	1.57	3.81	7.49	13.06
Total for Annual Grasses		0	0	0	5	2	0	0	0.00	0.00
Total for Perennial Grasses		359	388	488	446	434	5.66	16.09	13.84	17.99
Total for Grasses		359	388	488	451	436	5.66	16.09	13.85	18.00
F	Antennaria rosea	a-	a-	ab11	b7	a-	-	.02	.02	-
F	Arabis drummondi	b20	a1	a4	a-	a-	.00	.01	-	-
F	Arabis sp.	-	7	-	5	-	.01	-	.01	-
F	Calochortus nuttallii	a-	a-	a-	a-	b8	-	-	-	.03
F	Castilleja chromosa	5	1	-	-	9	.00	-	-	.21
F	Chaenactis douglasii	-	1	-	-	1	.00	-	-	.00
F	Chenopodium leptophyllum(a)	-	a-	a-	a-	b35	-	-	-	.08
F	Cryptantha fulvocanescens	bc48	c73	a-	a7	ab26	.65	-	.04	.49
F	Erigeron eatonii	6	1	4	-	-	.00	.01	-	-
F	Eriogonum racemosum	-	4	-	-	2	.01	-	-	.00
F	Hymenoxys acaulis	a-	a7	b18	a6	ab10	.01	.10	.01	.04
F	Lesquerella sp.	b19	ab18	a7	a2	a-	.03	.01	.04	-
F	Machaeranthera canescens	-	1	-	-	-	.00	-	-	-
F	Machaeranthera grindelioides	-	-	-	-	3	-	-	-	.00
F	Orobanche sp.	-	-	-	1	7	-	-	.03	.02
F	Penstemon sp.	-	-	-	-	2	-	-	-	.01
F	Phlox austromontana	b144	c203	c199	a22	a29	4.51	5.32	.25	.29
F	Phlox longifolia	-	-	-	1	-	-	-	.00	-
F	Polygonum douglasii (a)	-	-	-	4	1	-	-	.01	.00
F	Schoencrambe linifolia	a-	a-	a-	a-	b23	-	-	.00	.07
F	Senecio multilobatus	b71	c107	a3	d200	a18	.49	.01	8.01	.09
F	Sphaeralcea coccinea	34	21	30	30	28	.11	.11	.18	.27
F	Townsendia incana	b54	b32	a5	a8	a5	.08	.02	.03	.04
F	Unknown forb-perennial	9	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	0	4	36	0	0	0.00	0.08
Total for Perennial Forbs		410	477	281	289	171	5.95	5.63	8.65	1.59
Total for Forbs		410	477	281	293	207	5.95	5.63	8.67	1.67

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

BROWSE TRENDS--
Management unit 11B, Study no: 7

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Artemisia tridentata wyomingensis	85	84	77	83	14.30	15.89	12.63	10.47
B	Ceratoides lanata	3	1	1	4	-	-	.00	.00
B	Gutierrezia sarothrae	39	27	15	7	.59	.29	.04	.00
B	Opuntia sp.	3	3	2	4	-	.00	.00	-
B	Pinus edulis	0	2	2	2	.00	.00	-	.00
Total for Browse		130	117	97	100	14.90	16.20	12.68	10.49

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 7

Species	Percent Cover	
	'05	'10
Artemisia tridentata wyomingensis	14.26	14.96
Gutierrezia sarothrae	.20	.20
Pinus edulis	.23	.23

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 7

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	1.3	1.3

BASIC COVER--
Management unit 11B, Study no: 7

Cover Type	Average Cover %				
	'86	'94	'00	'05	'10
Vegetation	4.25	25.72	38.57	30.60	34.25
Rock	.75	2.25	1.16	1.72	1.29
Pavement	9.00	1.00	1.81	2.21	2.15
Litter	25.75	16.70	24.78	21.45	26.29
Cryptogams	1.25	2.92	8.11	4.07	11.79
Bare Ground	59.00	43.98	40.79	48.02	35.30

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 7, Study Name: Cottonwood

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.9	7.4	42.0	31.4	26.6	2.3	4.6	208.0	0.8

PELLET GROUP DATA--
Management unit 11B, Study no: 7

Type	Quadrat Frequency			
	'94	'00	'05	'10
Rabbit	43	40	47	4
Grouse	-	-	1	-
Elk	10	6	24	1
Deer	10	1	1	5
Cattle	-	-	1	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	17/acre	9/acre
24 (58)	15 (38)	2 (5)
2 (4)	5 (13)	2 (5)
-	2 (5)	-

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 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)
Artemisia tridentata wyomingensis									
86	**5131**	9	25	66	1533	44	12	32	24/25
94	**4020**	1	64	35	20	22	19	14	22/31
00	**4140**	3	28	69	20	29	32	31	21/32
05	**3320**	2	48	50	80	22	3	13	24/32
10	**3880**	15	39	45	40	36	29	28	22/34
Ceratoides lanata									
86	**598**	33	44	22	-	11	33	11	9/6
94	**80**	25	75	0	-	0	0	0	6/5
00	**20**	0	100	0	-	0	100	0	-/-
05	**20**	0	100	0	-	0	100	0	4/4
10	**80**	25	75	0	-	25	25	25	6/5
Chrysothamnus depressus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**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	6/11
Gutierrezia sarothrae									
86	**599**	44	56	0	399	0	0	0	7/3
94	**2620**	2	92	6	20	0	.76	5	5/7
00	**1680**	12	88	0	-	0	0	0	3/4
05	**440**	5	95	0	-	0	0	0	8/9
10	**220**	9	91	0	20	18	0	0	7/9
Opuntia sp.									
86	**199**	100	0	0	-	0	0	0	-/-
94	**140**	0	71	29	20	0	57	57	2/5
00	**60**	33	67	0	-	0	0	0	3/6
05	**60**	0	100	0	-	0	0	0	3/9
10	**80**	0	100	0	-	0	0	0	3/9

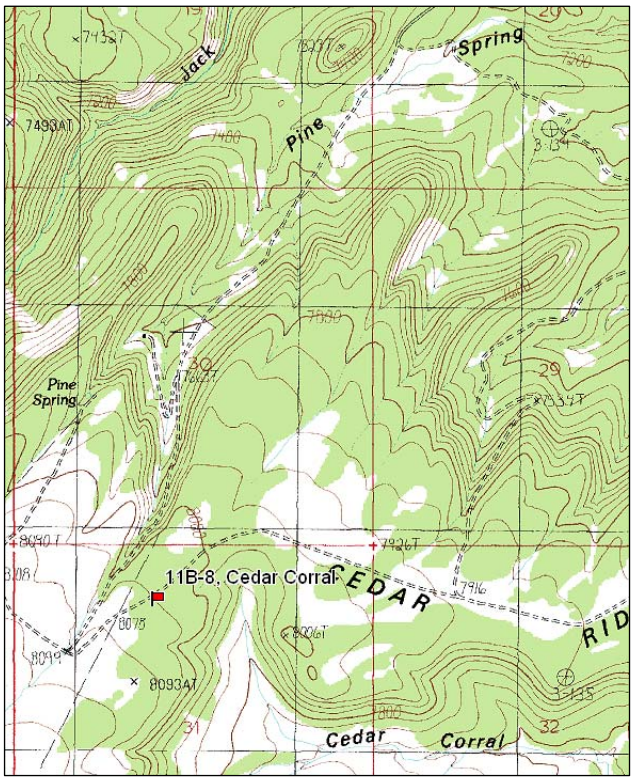
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pinus edulis									
86	**66**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**40**	100	0	-	-	0	0	0	-/-
05	**40**	100	0	-	-	0	0	0	-/-
10	**40**	100	0	-	20	0	0	50	-/-

CEDAR CORRAL - TREND STUDY NO. 11B-8-10

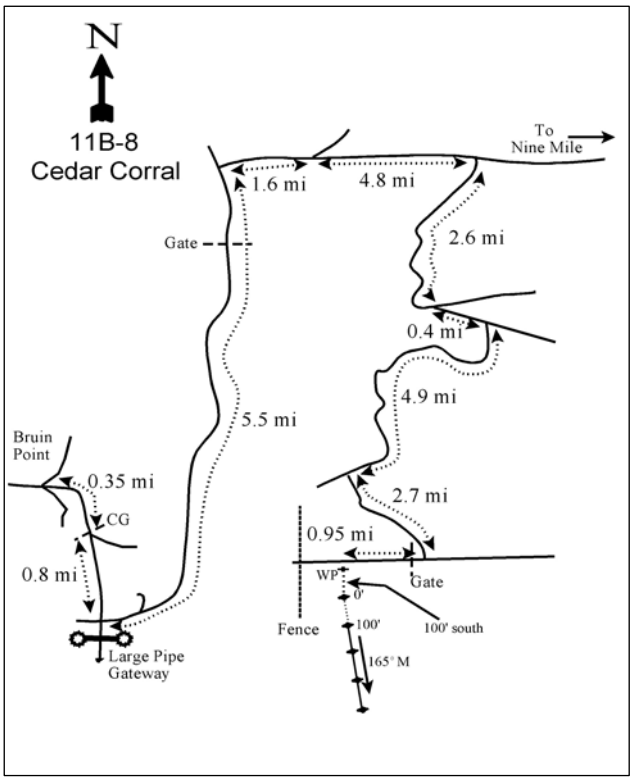
Vegetation Type: Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper), R047XB326UT
Land Ownership: Private
Elevation: 8060 ft. (2457 m)
Aspect: Northeast
Slope: 5%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 2 rebar @ 5ft.

Directions:
From Bruin Point take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.9 miles. Turn left at the intersection just before the large pipe gateway and proceed 0.5 miles to a fork. Stay right and go 4.2 miles to a gate. Go 0.8 miles to a fork and remain right. Go 1.6 miles to another fork and remain right. Go 4.8 miles to another fork and turn right. Go 2.6 miles to another fork. Stay right and go 0.4 miles (passing 11B-7) to a fork. Stay right on the main road and go 4.8 miles to a junction. Turn left and go 2.7 miles to a "T" intersection. Turn right and go through the steel gate (You will need the combo to the lock). Proceed 0.95 miles to a witness post (fence post surrounded by pile of rocks) on the left side of the road. The 0-foot end of the baseline (marked by a fence post tagged #7801) is 100 feet south of the witness post. There is a fence crossing the road approximately 200 yards southwest of the witness post.

Map Name: Twin Hollow



Diagrammatic Sketch:



Township: 13S Range: 16E Section: 31

GPS: NAD 83, UTM 12S 571288 E 4389857 N

CEDAR CORRAL - TREND STUDY NO. 11B-8

Site Information

Site Description: The study is located on the southern part of the West Tavaputs Plateau. The study was originally on state land, but was sold to Nutter Ranch between the readings of 2000 and 2005. Cattle grazed the area in the past as part of the Green River allotment; however, there had been no cattle grazing on this allotment from 1994 until Nutter Ranch purchased the land. The grasses are rather depleted, with better elk forage found in the intermittent openings. Large pinyon pine (*Pinus edulis*) trees provide excellent hiding and thermal cover, but the high elevation of the site would limit its use in some winters. The Range Creek unit is used by an estimated 213 wild horses which reside in two groups. One group frequents the Cottonwood and Cold ridge area, while the other group primarily uses the Cedar ridge area. Pellet group transect data estimated light use by deer and elk since 2000. Estimated use by cattle and horses has also been light since 2000 (Table - Pellet Group Data). In addition, some sage grouse sign has also been encountered on the site.

Browse: Valuable browse species include true mountain mahogany (*Cercocarpus montanus*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), black sagebrush (*A. nova*) and Utah serviceberry (*Amelanchier utahensis*). These four key species combined have provided the majority of browse cover on the site in each sample year (Table - Browse Trends). It appears that there may be some hybridization occurring between mountain big sagebrush and black sagebrush. Most of the preferred browse has had light to moderate use, but serviceberry displayed heavier use in 2005 and 2010. Vigor was generally good and percent decadence low. Pinyon pine is the dominant overstory tree species and occurs at moderately high density (Table - Point-Quarter Tree Data) and cover (Table - Browse Trends). Utah juniper (*Juniperus osteosperma*) and Rocky Mountain juniper (*J. scopulorum*) are also found on the site, but are less common.

Herbaceous Understory: Several desirable forage grasses occur on the site, but overall abundance is limited. Common species include thickspike wheatgrass (*Agropyron dasystachyum*), bluebunch wheatgrass (*A. spicatum*), mutton bluegrass (*Poa fendleriana*) and Sandberg bluegrass (*P. secunda*). Utilization of grasses is light. Cheatgrass (*Bromus tectorum*) was sampled on the site for the first time during the 2005 reading. A variety of forbs are present with the majority being small, low-growing species. Forbs, however, do produce more cover than grasses. The most abundant species are the succulent species lanceleaved sedum or stonecrop (*Sedum lanceolatum*) and the low growing species rose pussytoes (*Antennaria rosea*). Other common species include hairy goldaster (*Heterotheca villosa*) and desert phlox (*Phlox austromontana*) (Table - Herbaceous Trends).

Soil: The soil has a sandy clay loam to sandy loam texture with a marginally neutral soil reaction (pH 6.6). Organic matter is low at 1.9 % and phosphorus may have limited availability for plant growth and development at 4.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately low with a build-up of soil, litter and cryptogams under the scattered shrubs (Table - Basic Cover). The soil erosion condition was classified as stable in 2005, but was slight in 2010 due to pedestaling, flow patterns and soil movement.

Trend Assessments

Browse:

- **1986 to 1994 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Decadence of serviceberry decreased substantially from 100% to 6%. Decadence of black sagebrush and true mountain mahogany also decreased slightly.
- **1994 to 2000 - stable (0):** Density remained similar in serviceberry, increased slightly in mountain big sagebrush and true mountain mahogany, and decreased in black sagebrush. Combined cover of the preferred species increased from 16% to 22%. Recruitment of young plants increased in serviceberry and mahogany, but decreased in the two sagebrush species.

- **2000 to 2005 - slightly down (-1):** The density of mountain big sagebrush decreased by 23% and cover decreased from 10% to 4%. Decadence increased in mountain big sagebrush from 18% to 26% and increased from 10% to 34% in black sagebrush. There was a slight increase in the density of true mountain mahogany, and the serviceberry population remained similar.
- **2005 to 2010 - slightly up (+1):** The two sagebrush species increased in density due to a large increase in the recruitment of young plants, and decadence decreased. There was a slight decrease in the density of serviceberry and true mountain mahogany.

Grass:

- **1986 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 21%.
- **1994 to 2000 - stable (0):** The perennial grass sum of nested frequency remained similar, though cover increased slightly from 4% to 6%.
- **2000 to 2005 - slightly down (-1):** There was a 16% decrease in the sum of nested frequency of perennial grasses and cover decreased to 3%. Cheatgrass was sampled for the first time at low frequency and cover.
- **2005 to 2010 - stable (0):** There was little change in the perennial grass sum of nested frequency or cover.

Forb:

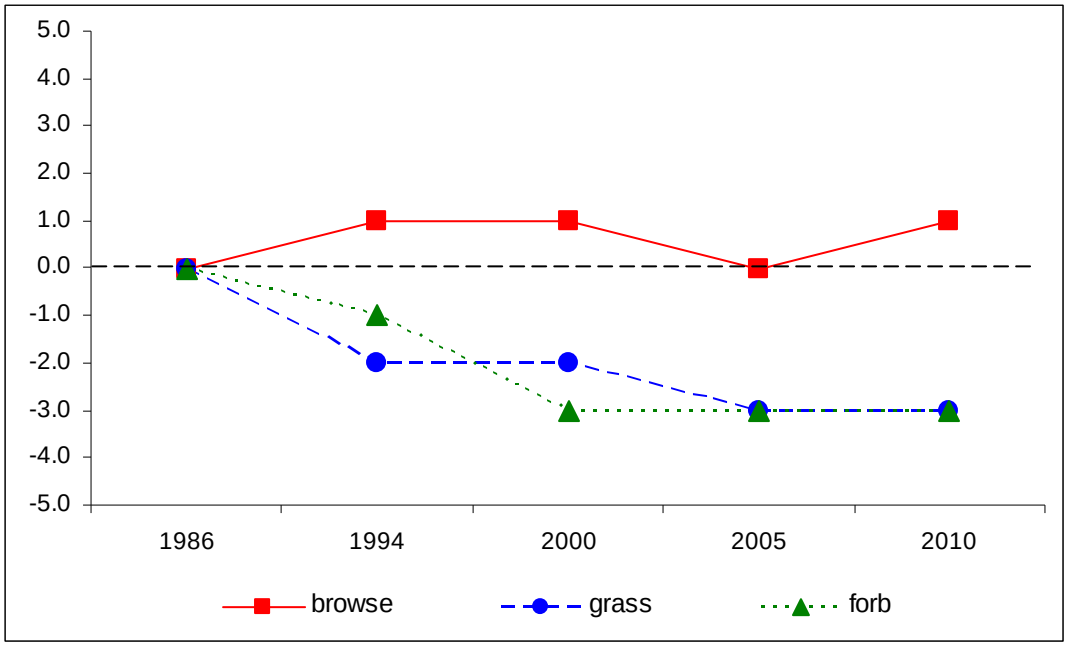
- **1986 to 1994 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 14%.
- **1994 to 2000 - down (-2):** There was a 24% decrease in the sum of nested frequency of perennial forbs, though cover remained similar. There was a significant decrease in the nested frequency of lanceleaved sedum.
- **2000 to 2005 - stable (0):** The perennial forb sum of nested frequency changed little, though cover decreased from 8% to 6%.
- **2005 to 2010 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover increased slightly to 7%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 11B, study no: 8

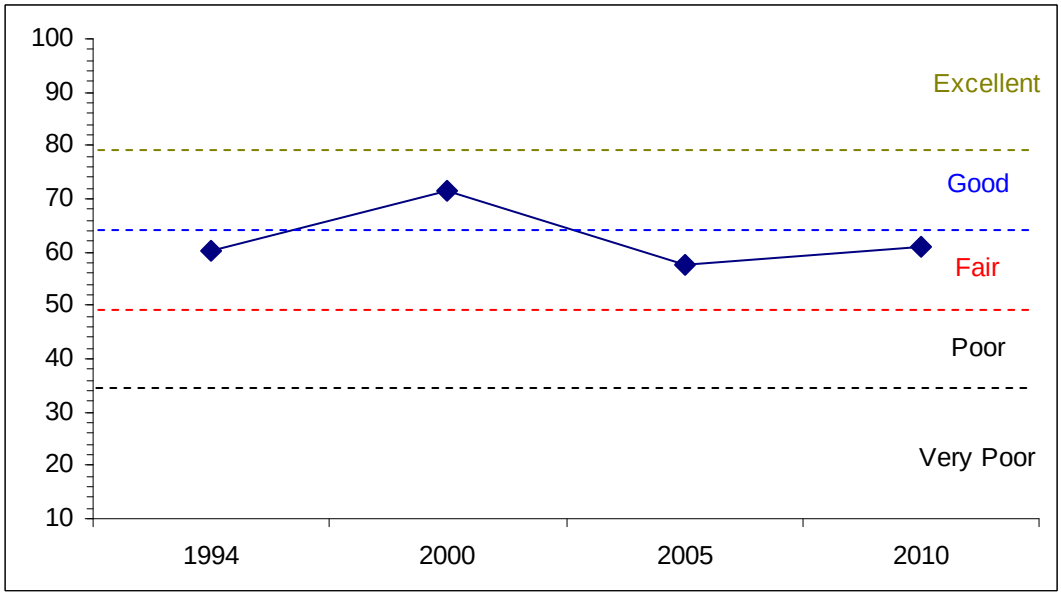
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	22.2	13.3	7.6	7.1	0.0	10.0	0.0	**60.2**	Fair
00	30.0	11.1	8.9	11.5	0.0	10.0	0.0	**71.5**	Good
05	19.5	8.8	13.7	6.3	-0.5	10.0	0.0	**57.7**	Fair
10	18.1	12.0	15.0	6.0	0.0	10.0	0.0	**61.1**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 8



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 11B, Study no: 8



HERBACEOUS TRENDS--
Management unit 11B, Study no: 8

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron dasystachyum	bc43	bc59	c66	ab32	a4	.22	.42	.49	.01
G	Agropyron spicatum	c163	a41	a42	a34	b83	.41	1.81	.90	1.77
G	Bromus tectorum (a)	-	a-	a-	c53	b12	-	-	.67	.03
G	Koeleria cristata	b23	a7	a-	ab12	a3	.16	-	.13	.00
G	Oryzopsis hymenoides	ab13	a2	ab17	b22	ab3	.03	.28	.24	.21
G	Poa fendleriana	a18	c79	bc65	ab33	abc50	1.65	1.75	.36	.55
G	Poa secunda	b85	a45	a56	ab70	ab57	.50	1.25	.85	.42
G	Sitanion hystrix	a1	b21	a-	a5	a6	.39	-	.01	.04
G	Stipa comata	-	4	10	3	-	.03	.21	.15	-
G	Stipa lettermani	a-	b15	a-	ab5	a-	.12	-	.01	-
Total for Annual Grasses		0	0	0	53	12	0	0	0.67	0.03
Total for Perennial Grasses		346	273	256	216	206	3.54	5.75	3.15	3.02
Total for Grasses		346	273	256	269	218	3.54	5.75	3.83	3.05
F	Allium sp.	a-	b26	a2	ab12	b31	.06	.06	.04	.11
F	Antennaria rosea	57	60	61	50	61	2.25	2.48	1.68	2.75
F	Arabis drummondi	b41	a3	a-	a4	a7	.00	-	.04	.01
F	Arabis perennans	b21	b14	a-	a-	a-	.02	-	-	-
F	Astragalus argophyllus	8	5	1	-	3	.03	.00	-	.03
F	Calochortus nuttallii	1	2	-	3	-	.00	-	.00	-
F	Castilleja flava	2	-	-	-	1	-	-	-	.00
F	Castilleja linariaefolia	-	-	3	-	-	-	.00	-	-
F	Chaenactis douglasii	a-	ab5	a-	b14	b10	.01	-	.10	.02
F	Chenopodium album (a)	-	-	-	3	2	-	-	.00	.00
F	Chenopodium fremontii (a)	-	-	-	-	3	-	-	-	.00
F	Collinsia parviflora (a)	-	1	-	5	5	.00	-	.01	.01
F	Comandra pallida	-	-	-	-	6	-	-	-	.04
F	Crepis acuminata	b21	a-	a2	ab13	ab21	-	.01	.03	.09
F	Cryptantha sp.	-	-	1	-	6	-	.03	-	.01
F	Erigeron eatonii	b100	a27	a13	a7	a4	.12	.06	.04	.04
F	Erigeron flagellaris	a12	b37	ab21	a11	a9	.13	.18	.22	.19
F	Eriogonum alatum	b11	a-	a-	a-	ab5	-	-	-	.03
F	Eriogonum racemosum	a-	b11	a-	a-	a-	.19	-	-	-
F	Eriogonum umbellatum	b59	a21	ab43	ab31	a28	.20	.27	.27	.64
F	Euphorbia sp.	-	-	-	1	-	-	-	.03	-
F	Gayophytum ramosissimum(a)	-	a-	a-	b10	a-	-	-	.02	-
F	Heterotheca villosa	a7	bc30	c37	ab16	a9	.82	1.79	.60	.60
F	Ipomopsis aggregata	11	10	3	1	2	.02	.00	.00	.01
F	Lappula occidentalis (a)	-	-	-	3	-	-	-	.03	-
F	Linum lewisii	-	4	-	-	-	.01	-	-	-
F	Lomatium triternatum	b29	a-	a3	ab13	a3	-	.01	.04	.00
F	Machaeranthera grindelioides	4	2	-	5	3	.03	-	.01	.00
F	Penstemon sp.	-	3	4	3	1	.00	.01	.03	.00
F	Phlox austromontana	31	15	28	10	12	.43	.91	.25	.66

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
F	Phlox longifolia	-	-	3	-	-	-	.01	-	-
F	Polygonum douglasii (a)	-	$_{a}$35	$_{a}$4	$_{c}$146	$_{b}$88	.06	.00	.45	.38
F	Sedum lanceolatum	$_{a}$135	$_{b}$210	$_{a}$152	$_{a}$152	$_{a}$120	3.44	2.44	2.52	1.24
F	Senecio multilobatus	-	1	-	1	-	.00	-	.01	-
F	Sphaeralcea coccinea	-	9	-	-	-	.04	-	-	-
F	Taraxacum officinale	-	3	-	1	-	.04	-	.00	-
F	Trifolium sp.	$_{b}$32	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$9	-	-	-	.04
Total for Annual Forbs		0	36	4	167	98	0.07	0.00	0.51	0.40
Total for Perennial Forbs		582	498	377	348	351	7.91	8.30	5.97	6.60
Total for Forbs		582	534	381	515	449	7.98	8.31	6.49	7.00

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

BROWSE TRENDS--
Management unit 11B, Study no: 8

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Amelanchier utahensis	25	23	26	22	4.46	6.61	4.22	4.92
B	Artemisia nova	49	40	44	45	3.44	2.45	3.55	2.59
B	Artemisia tridentata vaseyana	57	66	52	58	6.50	9.81	4.00	4.06
B	Cercocarpus montanus	12	19	14	16	1.87	3.09	2.16	1.41
B	Chrysothamnus depressus	31	23	28	25	.25	.25	.34	.22
B	Chrysothamnus nauseosus	0	0	0	1	-	.63	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	34	28	19	20	.50	.13	.51	.15
B	Gutierrezia sarothrae	18	12	15	12	.03	.04	.36	.04
B	Opuntia sp.	11	7	5	9	.05	.00	.03	.07
B	Pediocactus simpsonii	0	1	1	1	-	-	-	.00
B	Pinus edulis	0	7	7	8	3.29	4.76	10.07	6.19
B	Purshia tridentata	0	0	1	0	-	-	.03	-
B	Symphoricarpos oreophilus	17	19	17	17	.18	1.66	1.22	2.67
Total for Browse		254	245	229	234	20.60	29.47	26.54	22.37

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 8

Species	Percent Cover		
	'00	'05	'10
Amelanchier utahensis	1.39	10.23	11.31
Artemisia nova	-	4.30	4.55
Artemisia tridentata vaseyana	-	6.15	11.00
Cercocarpus montanus	-	5.06	5.55
Chrysothamnus depressus	-	.36	.68
Chrysothamnus viscidiflorus viscidiflorus	-	.40	1.03
Gutierrezia sarothrae	-	.35	.21
Opuntia sp.	-	.03	.20
Pinus edulis	14.60	16.10	14.58
Symphoricarpos oreophilus	-	.70	2.31

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 8

Species	Average leader growth (in)	
	'05	'10
Amelanchier utahensis	3.0	2.2
Artemisia tridentata vaseyana	2.3	2.1
Cercocarpus montanus	4.2	2.5

POINT-QUARTER TREE DATA--
Management unit 11B, Study no: 8

Species	Trees per Acre			
	'94	'00	'05	'10
Juniperus osteosperma	6	8	31	26
Pinus edulis	88	127	104	117

Average diameter (in)			
'94	'00	'05	'10
6.3	7.7	3.1	5.3
13.0	5.0	5.6	4.5

BASIC COVER--
Management unit 11B, Study no: 8

Cover Type	Average Cover %				
	'86	'94	'00	'05	'10
Vegetation	4.50	32.50	37.30	30.22	34.66
Rock	8.50	6.57	8.14	7.78	9.42
Pavement	1.00	.14	.72	.62	.43
Litter	50.75	40.25	52.41	47.20	51.89
Cryptogams	3.50	.38	1.94	2.16	.02
Bare Ground	31.75	29.77	22.95	27.28	28.00

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 8, Study Name: Cedar Corral

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
9.5	6.6	54.0	25.4	20.6	1.9	4.5	198.4	0.8

PELLET GROUP DATA--
Management unit 11B, Study no: 8

Type	Quadrat Frequency			
	'94	'00	'05	'10
Rabbit	29	14	40	1
Horse	2	4	2	-
Elk	8	8	5	2
Deer	16	7	2	3
Cattle	-	-	-	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	8 (19)	1 (3)
10 (25)	5 (12)	5 (12)
8 (20)	2 (5)	5 (12)
-	1 (2)	-

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 8

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
86	**133**	0	0	100	-	0	0	0	-/-
94	**680**	12	82	6	60	21	0	3	47/59
00	**700**	31	57	11	120	34	0	6	46/56
05	**680**	32	53	15	40	18	38	6	52/60
10	**600**	37	57	7	80	13	33	0	46/50
Artemisia nova									
86	**2398**	64	19	17	599	17	0	0	9/10
94	**2540**	9	81	9	-	31	8	2	11/17
00	**1780**	4	85	10	40	30	2	3	10/18
05	**1920**	6	59	34	2620	0	0	6	11/22
10	**2600**	23	65	12	20	24	12	10	11/20
Artemisia tridentata vaseyana									
86	**1399**	76	24	0	1733	0	0	0	13/16
94	**3280**	21	73	5	120	21	0	2	21/31
00	**3620**	8	75	18	120	13	0	10	17/26
05	**2780**	18	56	26	1100	22	15	14	18/27
10	**3980**	38	48	14	260	17	7	14	18/28
Cercocarpus montanus									
86	**664**	60	30	10	66	30	0	0	15/15
94	**260**	15	85	0	-	15	8	0	51/51
00	**420**	33	62	5	100	33	5	5	56/68
05	**520**	73	27	0	200	15	15	0	52/58
10	**440**	55	41	5	20	14	18	0	45/54
Chrysothamnus depressus									
86	**3331**	12	74	14	133	0	0	0	4/6
94	**1420**	6	87	7	-	6	0	3	4/8
00	**1000**	4	86	10	-	16	2	8	4/6
05	**900**	16	69	16	80	20	18	7	5/8
10	**880**	2	93	5	-	2	0	5	5/10

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**20**	0	100	-	-	0	0	0	-/-
Chrysothamnus viscidiflorus viscidiflorus									
86	**731**	9	64	27	-	0	0	0	10/7
94	**1160**	10	88	2	20	0	0	2	9/8
00	**760**	16	76	8	-	0	0	0	10/9
05	**520**	35	54	12	-	23	8	4	14/16
10	**540**	0	100	0	-	0	0	0	12/15
Echinocactus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**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	5/6
Gutierrezia sarothrae									
86	**532**	25	75	0	-	0	0	0	5/6
94	**480**	13	83	4	20	4	0	0	5/6
00	**400**	10	90	0	-	0	0	0	5/6
05	**800**	20	78	3	-	0	0	3	7/10
10	**360**	0	100	0	-	0	0	0	6/7
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
94	**320**	31	38	31	-	25	0	6	3/7
00	**160**	25	63	13	-	0	0	0	2/4
05	**160**	25	75	0	-	0	0	0	2/8
10	**280**	29	71	0	-	0	0	0	2/9
Pediocactus simpsonii									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	0	0	0	3/4
05	**40**	50	50	-	-	0	0	0	2/6
10	**20**	0	100	-	-	0	0	0	2/4
Pinus edulis									
86	**0**	0	0	-	133	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**140**	29	71	-	20	0	0	0	-/-
05	**140**	43	57	-	-	0	0	0	-/-
10	**160**	50	50	-	20	0	0	0	-/-

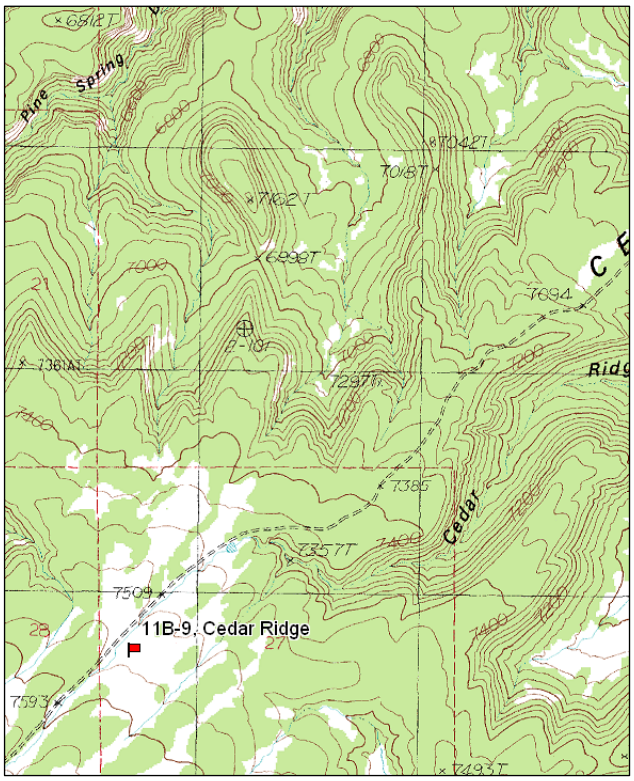
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Purshia tridentata									
86	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
00	**0**	0	0	0	-	0	0	0	-/-
05	**20**	0	0	100	-	0	0	100	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Rosa woodsii									
86	**0**	0	0	-	-	0	0	0	-/-
94	**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	18/18
Symphoricarpos oreophilus									
86	**199**	0	100	0	-	33	0	0	18/25
94	**700**	9	89	3	20	3	3	0	15/27
00	**980**	14	73	12	-	4	0	0	8/14
05	**880**	23	77	0	20	0	0	0	14/20
10	**800**	25	75	0	-	0	0	0	11/20

CEDAR RIDGE - TREND STUDY NO. 11B-9-10

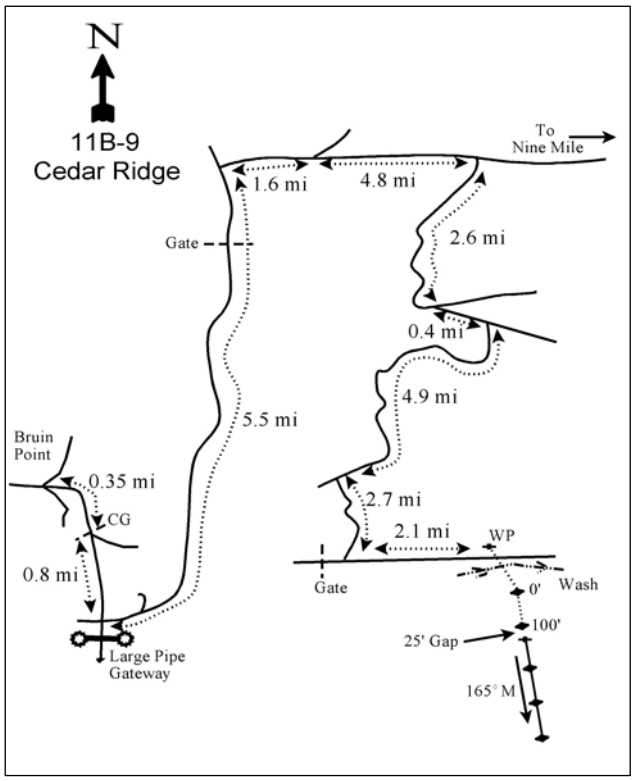
Vegetation Type: Black Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Mountain Shallow Loam (Black Sagebrush)), R047XA438UT
Land Ownership: BLM
Elevation: 7543 ft. (2300 m)
Aspect: Northeast
Slope: 3%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From Sunnyside, go up Water Canyon to the summit (Bruin Point). At the summit take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.9 miles. Turn left at the intersection just before the large pipe gateway and proceed 0.5 miles to a fork. Stay right and go 4.2 miles to a gate. Go 0.8 miles to a fork and remain right. Go 1.6 miles to another fork and remain right. Go 4.8 miles to another fork and turn right. Go 2.6 miles to another fork. Stay right and keep going 0.4 miles (passing Cottonwood 11B-7) to another fork. Stay on the main road (right) and go 4.8 miles to a junction. Turn left and go 2.7 miles to a "T" intersection. Turn left and go 2.1 miles to a witness post on the left side of the road. The transect starts 280 feet southeast of the witness post across the wash in the sage flat. There is a 25 foot break in the baseline between the end of line 1 and 2. The end of line 1 is marked by partially buried rebar. The rest of the stakes, including the witness post, are green fence posts.

Map Name: Twin Hollow



Diagrammatic Sketch:



Township: 13S Range: 16E Section: 28

GPS: NAD 83, UTM 12S 575634 E 4390909 N

CEDAR RIDGE - TREND STUDY NO. 11B-9

Site Information

Site Description: This study is located on the wide southwest portion of Cedar Ridge within an extensive black sagebrush (*Artemisia nova*) park about six miles east of the Green River. Cedar Ridge is an important concentration area for wintering mule deer, although much of the use occurs on the lower limits of the ridge. The area is basically level, but is dissected by numerous deep, intermittent drainages, which drain to the northeast. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Green River allotment. The area is used by deer, elk, and a large number of wild horses with a well worn trail passing through the flat. Several deer antler drops were found in 1986. Both cattle and horse droppings were common in 1994, but significant use was not evident. There was also light elk sign observed in 1994. Pellet group data has estimated deer use to be light since 2000. Estimated elk use was moderate in 2000 and 2005, but was light in 2010. Estimated horse use was light in 2000 and 2010, but was more moderate in 2005. Sage grouse pellets were also sampled at low rates in 2000 and 2005 (Table - Pellet Group Data).

Browse: The dominant browse species is black sagebrush, which has provided the majority of the browse cover since 1994 (Table - Browse Trends). The black sagebrush is a very dense, mostly mature population with low decadence and light use. Recruitment of young plants has been good to excellent over the sample years. Other shrubs present include dwarf rabbitbrush (*Chrysothamnus depressus*), rubber rabbitbrush (*Chrysothamnus nauseosus*), broom snakeweed (*Gutierrezia sarothrae*) and gray horsebrush (*Tetradymia canescens*). These species make up only a small percent of the browse composition (Table - Browse Characteristics). This open sagebrush park is surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands. Juniper appears to be slowly invading the flat, but is not common within the sample area. The surrounding pinyon-juniper stand provides good cover and still maintains a good shrub understory.

Herbaceous Understory: Grasses are diverse and are moderately abundant, providing valuable forage and excellent protective ground cover. The most abundant species of grass is needle-and-thread (*Stipa comata*) with other common grasses including bluebunch wheatgrass (*Agropyron spicatum*), mutton bluegrass (*Poa fendleriana*), Sandberg bluegrass (*P. secunda*) and prairie junegrass (*Koeleria cristata*). Forb composition is relatively diverse and abundant for this type of community. Common species include the low growing forbs littleleaf pussytoes (*Antennaria parvifolia*), sulfur eriogonum (*Eriogonum umbellatum*), mat penstemon (*Penstemon caespitosus*) and long-leaf phlox (*Phlox longifolia*) (Table - Herbaceous Trends).

Soil: The soil has a loam texture with a neutral soil reaction (pH 7.0). Phosphorus may have limited availability for plant growth and development at 5.3 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The soil is fairly rocky, but there is little concentration of erosion, pavement, or rocks on the soil surface. Bare ground cover is moderately high, but litter and vegetation cover are evenly dispersed and appear to provide adequate soil protection (Table - Basic Cover). Some small rills are evident, with an old gully north of the transect, along the road. The soil erosion condition was classified as slight in 2005 due to moderate pedestaling around the shrubs and perennial grasses, but was stable in 2010.

Trend Assessments

Browse:

- **1986 to 1994 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1994; therefore trend was determined using other parameters. Decadence of the primary browse species, black sagebrush, decreased from 24% to 5%. Recruitment of young plants increased slightly and young plants comprise half of the population.
- **1994 to 2000 - slightly up (+1):** The density of black sagebrush increased 10% from 22,840 plants/acre to 25,200 plants/acre, and cover increased from 12% to 21%. Recruitment of young plants decreased to 8% of the population, but is still considered good.

- **2000 to 2005 - slightly down (-1):** The black sagebrush appeared to be going through a period of self thinning with a large decrease in density to 15,740 plants/acre, but cover increased to 24%. Decadence of black sagebrush increased slightly to 11%, but is still considered low.
- **2005 to 2010 - slightly up (+1):** There was a 23% increase in the density of black sagebrush to 19,380 plants/acre due to a large increase in the recruitment of young plants. The density of mature black sagebrush remained similar and cover decreased slightly to 22%.

Grass:

- **1986 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 26% with a significant decrease in the nested frequency of mutton bluegrass.
- **1994 to 2000 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though composition changed slightly with a significant decrease in needle-and-thread.
- **2000 to 2005 - up (+2):** The perennial grass sum of nested frequency increased by 23% with a significant increase in the nested frequency of prairie junegrass.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 15% with a significant decrease in the nested frequency of Sandberg bluegrass.

Forb:

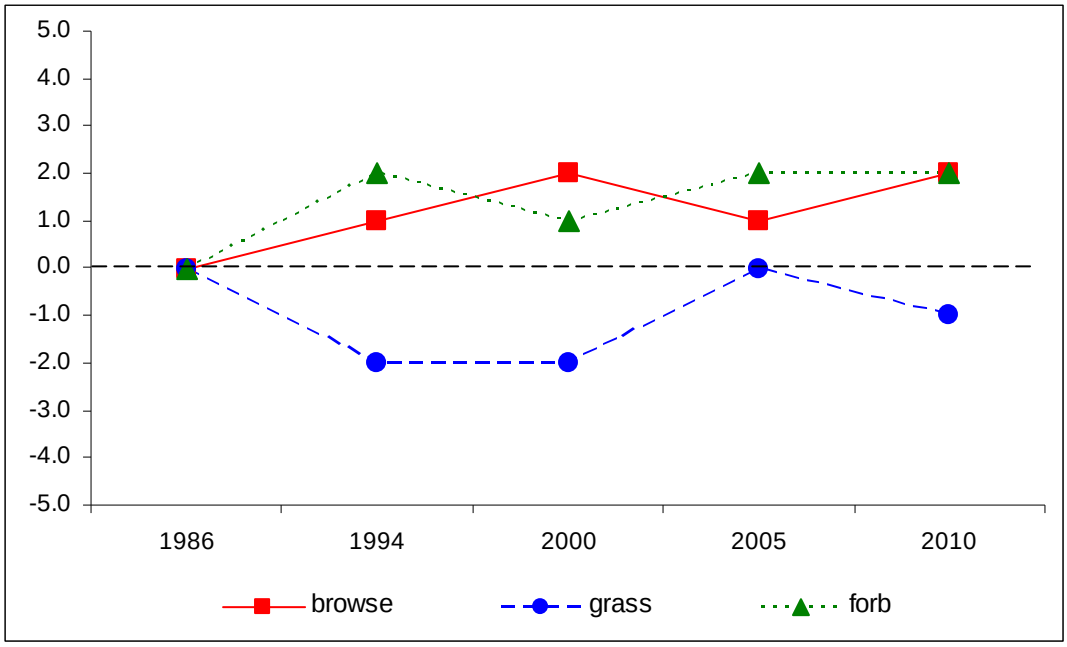
- **1986 to 1994 - up (+2):** The perennial forb sum of nested frequency increased by 34%.
- **1994 to 2000 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 8%, and cover decreased slightly from 7% to 6%.
- **2000 to 2005 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 11% and cover increased to 7%.
- **2005 to 2010 - stable (0):** There was little change in the perennial forb sum of nested frequency, but cover decreased to 6%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 11B, study no: 9

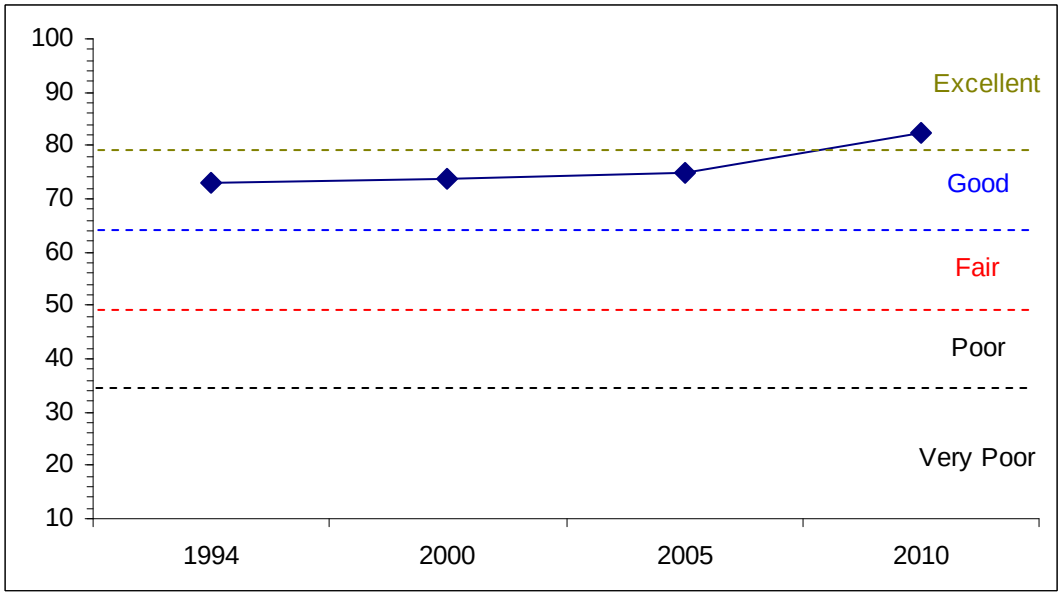
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	16	13.5	15	18.4	0	10	0	**73**	Good
00	27	12.7	3.9	20	0	10	0	**73.6**	Good
05	30	11.7	4	19.1	-0.1	10	0	**74.7**	Good
10	29.8	12.3	11.7	18.6	0	10	0	**82.4**	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 9



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 11B, Study no: 9



HERBACEOUS TRENDS--
Management unit 11B, Study no: 9

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron dasystachyum	a10	a8	b66	a15	a20	.02	.81	.09	.24
G	Agropyron spicatum	66	49	61	40	59	.86	.51	1.25	1.13
G	Bouteloua gracilis	30	43	30	29	33	2.12	.91	.21	.50
G	Bromus tectorum (a)	-	a-	a2	b16	a-	-	.00	.09	-
G	Koeleria cristata	a-	b25	a-	c101	c107	.29	-	.85	1.87
G	Oryzopsis hymenoides	-	3	7	-	-	.00	.09	-	-
G	Poa fendleriana	c190	ab57	b87	a37	ab59	.43	2.38	.47	.53
G	Poa secunda	b70	a8	b92	b172	a67	.01	.62	1.83	.50
G	Sitanion hystrix	b40	ab21	a4	b33	ab18	.06	.03	.53	.31
G	Stipa comata	b246	b269	a160	a194	a164	5.36	4.62	4.27	4.19
Total for Annual Grasses		0	0	2	16	0	0	0.00	0.08	0
Total for Perennial Grasses		652	483	507	621	527	9.21	9.99	9.53	9.30
Total for Grasses		652	483	509	637	527	9.21	10.00	9.62	9.30
F	Agoseris glauca	-	-	3	1	3	-	.00	.03	.01
F	Antennaria parvifolia	ab65	b87	b98	a37	a31	2.59	2.63	.32	.68
F	Arabis perennans	ab10	a3	a-	b16	a3	.01	-	.07	.01
F	Arenaria fendleri	-	-	1	-	5	-	.00	-	.01
F	Astragalus convallarius	b12	a3	ab10	a-	a-	.00	.12	-	-
F	Astragalus tenellus	a-	ab12	b18	a-	b14	.03	.37	.00	.16
F	Astragalus utahensis	-	3	2	6	2	.00	.00	.01	.03
F	Calochortus nuttallii	a3	cd42	ab7	bc25	d64	.11	.01	.08	.26
F	Castilleja flava	-	-	9	4	3	-	.07	.03	.04
F	Castilleja linariaefolia	b23	a4	ab12	a1	a6	.03	.10	.00	.01
F	Chenopodium fremontii (a)	-	-	-	-	5	-	-	-	.09
F	Cryptantha sp.	ab23	ab18	b30	a12	ab22	.15	.28	.13	.43
F	Delphinium nuttallianum	b12	a-	ab2	ab5	a-	-	.01	.04	-
F	Erigeron eatonii	-	2	1	-	8	.03	.00	.00	.01
F	Eriogonum alatum	-	2	2	3	5	.03	.03	.00	.41
F	Eriogonum umbellatum	29	29	33	39	44	.28	.45	1.02	1.14
F	Hedysarum boreale	a-	b33	a11	ab25	ab15	.95	.07	1.50	.25
F	Heterotheca villosa	-	-	3	-	-	-	.00	-	-
F	Ipomopsis aggregata	-	-	3	-	-	-	.00	-	-
F	Lappula occidentalis (a)	-	a-	a-	b14	ab8	-	-	.03	.01
F	Lesquerella sp.	-	4	-	-	-	.03	-	-	-
F	Linum lewisii	-	-	2	5	7	-	.03	.02	.04
F	Machaeranthera canescens	-	3	5	7	4	.00	.01	.36	.04
F	Machaeranthera grindelioides	5	5	-	6	1	.01	-	.04	.03
F	Penstemon caespitosus	ab35	c70	abc47	a23	bc55	1.65	.92	.09	.85
F	Penstemon strictus	a6	a12	a11	a13	b42	.05	.03	.11	.43
F	Phlox hoodii	2	4	5	-	-	.03	.16	-	-
F	Phlox longifolia	ab60	a65	a57	b103	ab100	.21	.29	.64	.42
F	Polygonum douglasii (a)	-	a-	a-	b135	c175	-	-	.39	.51
F	Sedum lanceolatum	-	-	-	5	5	-	-	.01	.03

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'00	'05	'10	'94	'00	'05	'10
F	Senecio multilobatus	a46	a45	a50	b149	a20	.27	.30	2.41	.15
F	Sphaeralcea coccinea	a19	b62	a27	a19	a16	.50	.11	.09	.07
F	Townsendia incana	a-	a-	b16	a-	a3	-	.05	-	.00
F	Tragopogon dubius	-	-	-	-	1	-	-	-	.00
F	Trifolium sp.	ab11	a-	a6	ab18	b23	-	.02	.11	.10
F	Unknown forb-perennial	b20	a-	a-	a-	a-	-	-	-	-
F	Vicia sp.	-	1	-	-	-	.00	-	-	-
F	Zigadenus paniculatus	-	-	-	-	1	-	-	-	.00
Total for Annual Forbs		0	0	0	149	188	0	0	0.42	0.61
Total for Perennial Forbs		381	509	471	522	503	7.03	6.14	7.17	5.69
Total for Forbs		381	509	471	671	691	7.03	6.14	7.60	6.31

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

BROWSE TRENDS--
Management unit 11B, Study no: 9

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Amelanchier utahensis	0	0	1	1	-	-	.03	.15
B	Artemisia nova	100	100	100	100	11.60	20.80	23.76	21.50
B	Artemisia tridentata vaseyana	0	0	0	1	-	-	.15	.03
B	Chrysothamnus depressus	34	41	38	44	1.23	.81	1.75	2.15
B	Chrysothamnus viscidiflorus	2	0	2	2	-	-	-	-
B	Ephedra viridis	0	0	0	1	-	-	-	-
B	Gutierrezia sarothrae	16	10	16	10	.06	.01	.25	.16
B	Juniperus osteosperma	0	1	4	3	-	.18	1.00	.66
B	Opuntia sp.	2	0	0	0	.03	-	-	-
B	Pediocactus simpsonii	0	0	2	1	-	-	-	-
B	Pinus edulis	0	2	1	1	-	.03	.15	-
B	Tetradymia canescens	5	5	8	7	-	.03	-	-
Total for Browse		159	159	172	171	12.93	21.87	27.11	24.66

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 9

Species	Percent Cover		
	'00	'05	'10
Artemisia nova	-	25.63	27.11
Chrysothamnus depressus	-	1.63	2.41
Chrysothamnus viscidiflorus	-	.28	.25
Gutierrezia sarothrae	-	.10	.21
Juniperus osteosperma	.60	.96	1.46
Pinus edulis	.20	.28	.01
Tetradymia canescens	-	.15	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 9

Species	Average leader growth (in)	
	'05	'10
Artemisia nova	1.3	0.9

BASIC COVER--
Management unit 11B, Study no: 9

Cover Type	Average Cover %				
	'86	'94	'00	'05	'10
Vegetation	7.75	29.64	36.77	37.77	41.87
Rock	0	.58	.28	.59	.10
Pavement	.75	.28	1.68	.48	.79
Litter	44.50	25.51	43.31	36.57	43.83
Cryptogams	.75	.56	2.74	1.91	.25
Bare Ground	46.25	33.27	31.65	35.69	33.40

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 9, Study Name: Cedar Ridge

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.9	7.0	47.3	32.2	20.6	2.4	5.3	243.2	0.7

PELLET GROUP DATA--
Management unit 11B, Study no: 9

Type	Quadrat Frequency			
	'94	'00	'05	'10
Rabbit	12	8	17	1
Grouse	-	-	-	-
Horse	12	3	11	7
Elk	5	20	19	9
Deer	9	4	10	13
Cattle	1	-	-	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
9/acre	9/acre	-
16 (40)	30 (75)	13 (33)
29 (71)	38 (94)	12 (30)
-	17 (43)	19 (46)
-	1 (2)	-

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 9

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**20**	100	0	-	-	0	0	0	6/10
Artemisia nova									
86	**5731**	41	35	24	15799	42	7	0	17/17
94	**22840**	50	45	5	1920	6	.43	2	14/21
00	**25200**	8	84	8	4780	8	.55	4	9/15
05	**15740**	8	81	11	36900	3	0	3	13/19
10	**19380**	25	65	10	4080	17	17	8	9/18
Artemisia tridentata vaseyana									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**20**	0	100	-	-	0	0	0	14/22
Chrysothamnus depressus									
86	**1331**	30	65	5	-	0	0	0	4/7
94	**3840**	3	93	4	-	0	0	2	4/7
00	**4400**	5	93	2	40	0	0	2	3/8
05	**4540**	7	82	10	360	33	36	3	5/9
10	**4020**	2	97	0	40	7	0	.49	5/9
Chrysothamnus nauseosus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	19/24
00	**0**	0	0	-	-	0	0	0	20/21
05	**0**	0	0	-	-	0	0	0	23/26
10	**0**	0	0	-	-	0	0	0	30/44
Chrysothamnus viscidiflorus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**40**	50	50	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**40**	0	100	-	-	0	0	0	13/14
10	**40**	0	100	-	-	0	0	0	15/19

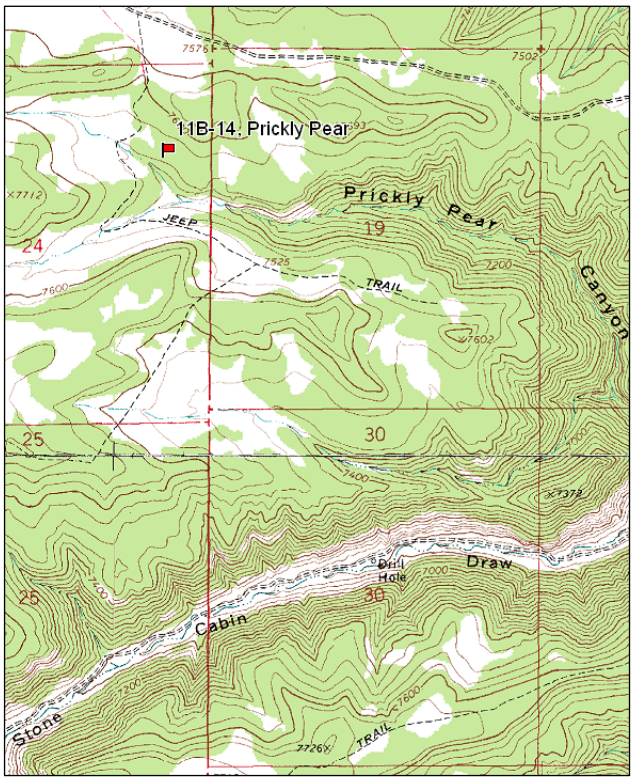
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Ephedra viridis									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**20**	100	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
86	**1532**	22	74	4	66	0	0	0	6/4
94	**540**	11	89	0	-	0	0	0	6/7
00	**300**	13	87	0	-	0	0	0	4/4
05	**400**	10	90	0	-	0	0	0	9/9
10	**320**	13	88	0	-	0	0	0	8/9
Juniperus osteosperma									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	0	0	0	-/-
05	**80**	100	0	-	-	0	0	0	-/-
10	**80**	25	75	-	20	0	0	0	-/-
Opuntia sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**80**	0	100	-	-	0	0	0	4/4
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Pediocactus simpsonii									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**40**	0	100	-	-	0	50	0	1/2
10	**20**	0	100	-	-	0	0	0	3/6
Pinus edulis									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
00	**40**	50	50	-	-	0	0	0	-/-
05	**20**	100	0	-	-	0	0	0	-/-
10	**20**	0	100	-	-	0	0	0	-/-
Tetradymia canescens									
86	**133**	0	100	0	-	100	0	0	11/11
94	**140**	0	86	14	-	0	0	0	6/9
00	**120**	17	50	33	-	33	0	0	5/7
05	**200**	20	80	0	-	0	0	0	9/13
10	**180**	0	100	0	-	0	0	0	7/10

PRICKLY PEAR - TREND STUDY NO. 11B-14-10

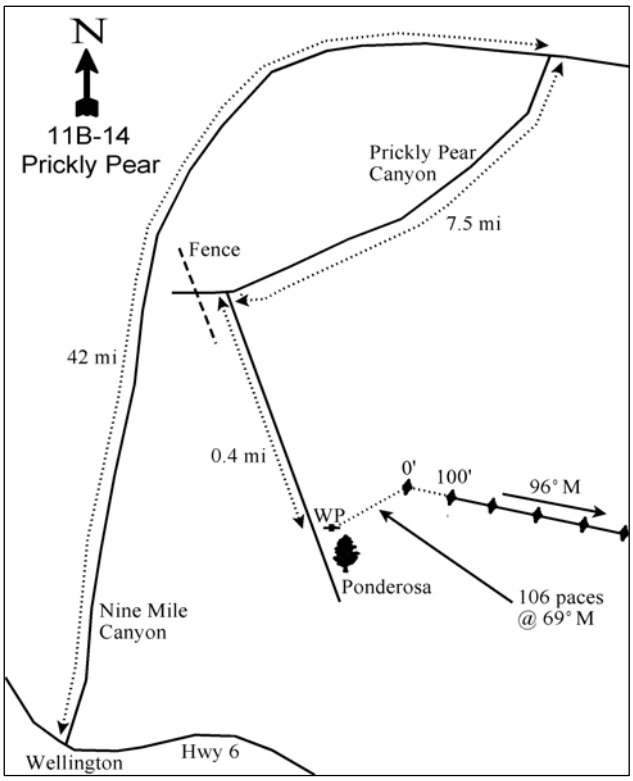
Vegetation Type: Chained Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper), R047XB326UT
Land Ownership: BLM
Elevation: 7570 ft. (2308 m)
Aspect: South
Slope: 12%
Transect bearing: 96° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

Directions:
In Wellington at the intersection of Highway 6 and Nine Mile Canyon Road drive 42 miles northeast down Nine Mile Canyon to the Prickly Pear turnoff. Turn right (south) and travel up Prickly Pear Canyon 7.5 miles to a fork just before a fence. Turn left (south) and travel 0.4 miles to a large Ponderosa pine tree on the east side of the road. A witness post is just north of the tree. From the witness post walk 106 paces at 69ºM crossing the fence to the 0 foot base line post. It is marked by browse tag #9148.

Map Name: Currant Canyon



Diagrammatic Sketch:



Township: 12S Range: 14E Section: 24

GPS: NAD 83, UTM 12S 560837 E 4401723 N

PRICKLY PEAR - TREND STUDY NO. 11B-14

Site Information

Site Description: The study is located at the head of Prickly Pear Canyon on a slightly sloping, flat, narrow ridge that runs west to east into Nine-Mile Canyon. Oil and gas exploration has expanded throughout the Nine Mile Canyon area. A new drill pad had been established just 500 feet beyond the end of the baseline between 2000 and 2005. New roads associated with the oil exploration have also been established. The area was chained and seeded in the mid-1970's and is currently grazed by livestock and horses as part of the Bureau of Land Management (BLM) Stone Cabin allotment. The study site was selected for anticipated increases in elk winter use, but pellet group transect data has estimated decreasing use by elk from moderately light in 2000 to light use in 2010. Estimated deer, cattle and horse use has been light since 2000 (Table - Pellet Group Data).

Browse: Browse is very limited on this site and is primarily comprised of a few true mountain mahogany (*Cercocarpus montanus*) and corymbed eriogonum (*Eriogonum corymbosum*). The true mountain mahogany consists of a small population of mostly mature plants with low decadence and good vigor. Recruitment of young mahogany plants has been limited over the course of the study. Utilization of mahogany has fluctuated between moderate and heavy use. Corymbed eriogonum is the most common browse on the site, but has had little use over the sample years. Other browse species that occur in low numbers on the site include rubber rabbitbrush (*Chrysothamnus nauseosus*), green ephedra (*Ephedra viridis*) and broom snakeweed (*Gutierrezia sarothrae*) (Table - Browse Characteristics). Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees are growing back within the chaining and appear to be increasing slowly in density (Table - Point-Quarter Tree Data) and cover (Table - Browse Trends), but most trees are still relatively small.

Herbaceous Understory: Grasses are neither diverse nor abundant on the site. The dominant grass species is Salina wildrye (*Elymus salina*). Indian ricegrass (*Oryzopsis hymenoides*) increased substantially and crested wheatgrass (*Agropyron cristatum*) decreased substantially in 2005. Forbs are diverse but are not overly abundant. The most common forbs are mostly low growing species that produce little useful forage (Table - Herbaceous Trends).

Soil: The soil has a clay loam texture with slightly alkaline soil reaction (pH 7.6). Phosphorus may have limited availability for plant growth and development at 2 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is high despite a large amount of small shale fragments and larger flat pieces of sandstone that are common on the surface. Vegetation and litter cover a sparse on the site (Table - Basic Cover). The soil erosion condition was classified as slight in 2005 and 2010 due to moderate pedestaling, moderate litter and soil movement, and small rills and flow patterns on the sites.

Trend Assessments

Browse:

- **1994 to 2000 - stable (0):** The primary browse species, true mountain mahogany, increased slightly in density, but density remained low. Cover of mahogany increased slightly from 1% to 2%.
- **2000 to 2005 - stable (0):** The density of true mountain mahogany decreased slightly, but cover increased to 3%.
- **2005 to 2010 - stable (0):** There was little change in the density of true mountain mahogany and cover remained similar.

Grass:

- **1994 to 2000 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 11%, though cover remained similar.
- **2000 to 2005 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 13%, but cover increased from 5% to 7%. There was a slight change in composition with a significant

decrease in the nested frequency of crested wheatgrass and a significant increase in the nested frequency of Indian ricegrass.

- **2005 to 2010 - slightly down (-1):** There was an 11% decrease in the sum of nested frequency of perennial grasses and cover decreased to 5%. The nested frequency of Salina wildrye has decreased significantly since 1994.

Forb:

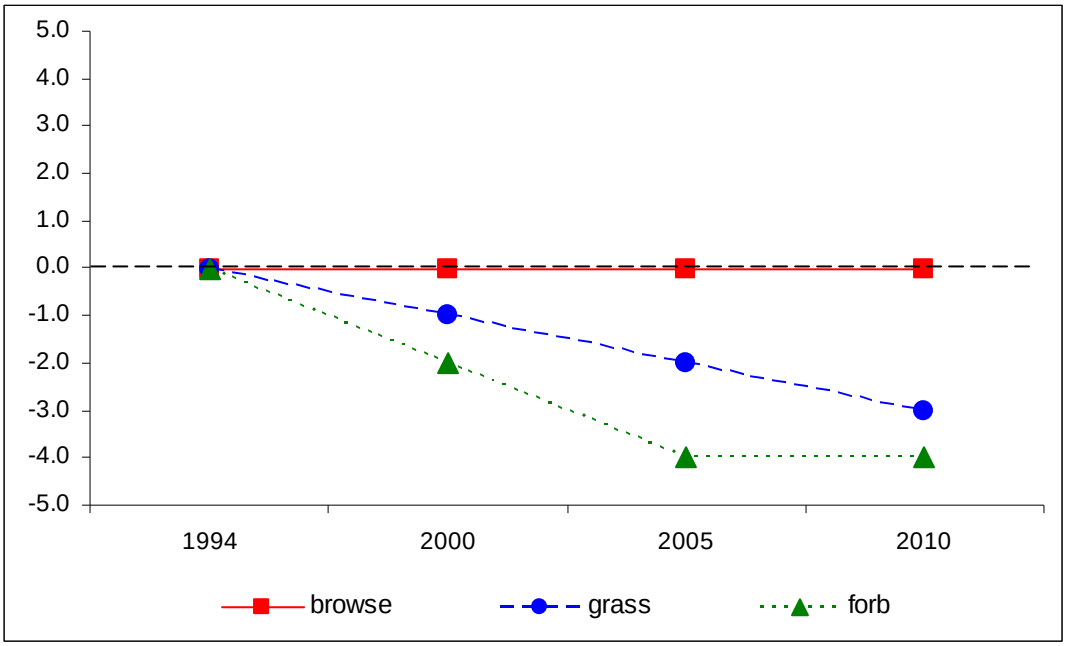
- **1994 to 2000 - down (-2):** The sum of nested frequency of perennial forbs decreased by 35%, though cover remained similar.
- **2000 to 2005 - down (-2):** The perennial forb sum of nested frequency decreased by 23%, though there was little change in cover.
- **2005 to 2010 - stable (0):** There was little change in the perennial forb sum of nested frequency or cover.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 11B, study no: 14

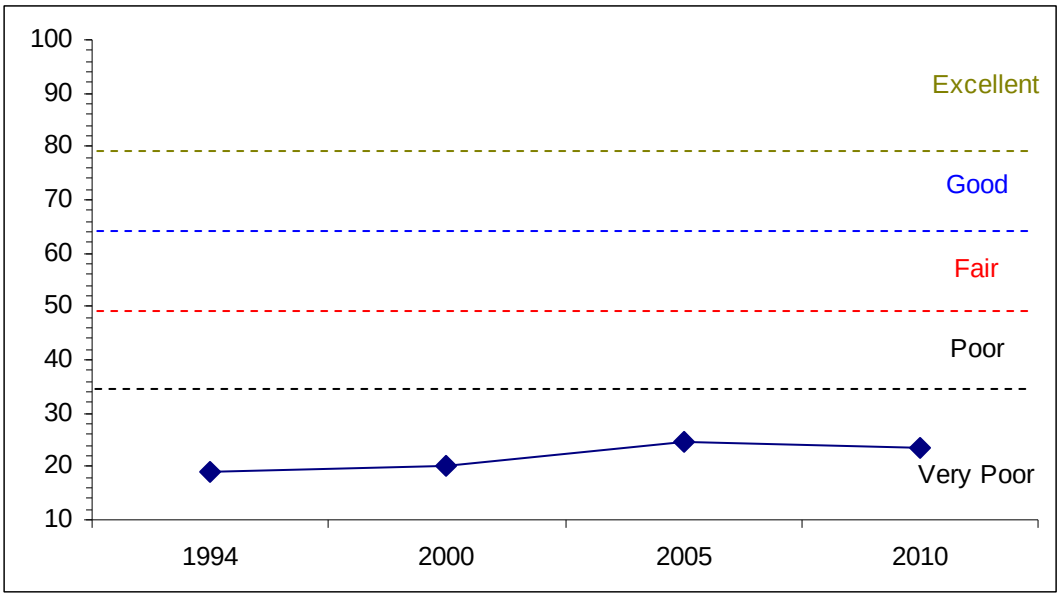
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	1.0	0.0	0.0	10.1	0.0	8.0	0.0	**19.1**	Very Poor
00	2.3	0.0	0.0	9.9	0.0	8.0	0.0	**20.2**	Very Poor
05	4.1	0.0	0.0	13.1	0.0	7.5	0.0	**24.7**	Very Poor
10	5.0	0.0	0.0	10.6	0.0	7.9	0.0	**23.5**	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 14



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 11B, Study no: 14



HERBACEOUS TRENDS--
Management unit 11B, Study no: 14

Type	Species	Nested Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron cristatum	b69	b62	a15	a4	1.30	1.31	.20	.18
G	Agropyron spicatum	-	9	-	-	-	.33	-	-
G	Bromus inermis	5	-	-	-	.01	-	-	-
G	Carex sp.	13	11	6	8	.25	.45	.04	.19
G	Elymus salina	b128	ab118	ab104	a86	3.40	2.82	4.48	2.92
G	Oryzopsis hymenoides	a2	a2	b50	b53	.00	.03	1.80	1.81
G	Stipa comata	7	-	1	6	.01	-	.03	.19
G	Stipa lettermani	3	-	-	-	.03	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		227	202	176	157	5.03	4.96	6.55	5.30
Total for Grasses		227	202	176	157	5.03	4.96	6.55	5.30
F	Antennaria rosea	a-	ab5	a-	b16	-	.01	-	.02
F	Arenaria fendleri	3	-	-	1	.03	-	-	.00
F	Castilleja chromosa	2	-	10	6	.00	-	.02	.03
F	Draba sp. (a)	-	3	-	-	-	.00	-	-
F	Euphorbia fendleri	10	-	6	-	.02	-	.04	-
F	Haplopappus acaulis	a27	b50	ab35	ab36	.50	1.36	.52	.45
F	Helianthella microcephala	a-	a-	a-	b23	-	-	-	.76
F	Helianthella uniflora	b20	b15	b18	a-	.12	.08	.61	-
F	Hymenopappus filifolius	54	30	34	52	1.20	.32	.68	.96
F	Hymenoxys acaulis	b56	a15	a9	a7	.24	.10	.05	.03
F	Lesquerella sp.	b135	a37	a19	a14	.45	.13	.07	.06
F	Lomatium sp.	-	-	1	-	-	-	.03	-
F	Lygodesmia sp.	-	-	1	-	-	-	.00	-

Type	Species	Nested Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
F	Machaeranthera grindelioides	$_{b}$67	$_{ab}$68	$_{ab}$43	$_{a}$34	.31	.74	.80	.64
F	Pedicularis centranthera	-	-	7	-	-	-	.03	-
F	Penstemon palmeri	$_{b}$13	$_{b}$13	$_{a}$-	$_{a}$-	.06	.04	.00	-
F	Penstemon sp.	-	-	-	1	-	-	-	.00
F	Phlox hoodii	$_{b}$150	$_{b}$123	$_{a}$85	$_{a}$77	.80	1.13	.54	.81
F	Physaria acutifolia	$_{a}$2	$_{b}$14	$_{a}$-	$_{a}$-	.00	.03	-	-
F	Physaria sp.	-	-	-	1	-	-	-	.00
F	Schoencrambe linifolia	-	-	2	-	-	-	.00	-
F	Stanleya pinnata	-	-	-	-	-	-	.00	-
F	Townsendia incana	13	12	13	1	.05	.05	.05	.03
F	Unknown forb-perennial	$_{c}$37	$_{a}$-	$_{b}$12	$_{b}$12	.16	-	.25	.10
Total for Annual Forbs		0	3	0	0	0	0.00	0	0
Total for Perennial Forbs		589	382	295	281	3.99	4.02	3.73	3.94
Total for Forbs		589	385	295	281	3.99	4.02	3.73	3.94

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

BROWSE TRENDS--
Management unit 11B, Study no: 14

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Cercocarpus montanus	8	7	7	10	.69	1.50	2.75	3.32
B	Chrysothamnus nauseosus	13	10	11	10	.28	.15	.23	.56
B	Chrysothamnus viscidiflorus	2	3	1	1	.00	-	-	.15
B	Ephedra viridis	3	1	2	3	-	-	-	-
B	Eriogonum corymbosum	37	45	61	58	.85	1.22	2.59	2.03
B	Gutierrezia sarothrae	15	12	14	18	.10	.08	.07	.09
B	Juniperus osteosperma	0	1	0	2	-	.03	.15	.30
B	Pinus edulis	0	4	5	6	1.26	1.52	2.64	2.76
Total for Browse		78	83	101	108	3.21	4.50	8.46	9.23

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 14

Species	Percent Cover		
	'00	'05	'10
Cercocarpus montanus	-	3.29	5.30
Chrysothamnus nauseosus	-	.86	1.20
Eriogonum corymbosum	-	2.29	2.28
Gutierrezia sarothrae	-	.33	.10
Pinus edulis	.80	3.08	3.88

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 14

Species	Average leader growth (in)	
	'05	'10
Cercocarpus montanus	5.9	3.4

POINT-QUARTER TREE DATA--
Management unit 11B, Study no: 14

Species	Trees per Acre		
	'00	'05	'10
Juniperus osteosperma	31	37	43
Pinus edulis	92	140	140

Average diameter (in)		
'00	'05	'10
3.6	2.7	3.3
3.3	2.3	3

BASIC COVER--
Management unit 11B, Study no: 14

Cover Type	Average Cover %			
	'94	'00	'05	'10
Vegetation	12.62	13.89	17.20	19.88
Rock	15.38	13.51	9.51	10.94
Pavement	6.16	16.37	22.53	21.68
Litter	19.67	23.13	21.88	22.63
Cryptogams	.00	.06	0	0
Bare Ground	34.38	42.35	40.68	32.57

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 14, Study Name: Prickly Pear

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.2	7.6	31.6	36.8	31.6	3.5	2.0	201.6	0.6

PELLET GROUP DATA--
Management unit 11B, Study no: 14

Type	Quadrat Frequency			
	'94	'00	'05	'10
Rabbit	10	8	31	1
Horse	-	2	-	-
Elk	21	7	6	6
Deer	8	1	2	9
Cattle	-	-	1	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
8 (20)	4 (9)	-
23 (57)	15 (38)	8 (20)
-	2 (5)	17 (43)
10 (25)	7 (16)	1 (2)

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 14

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
94	**0**	0	0	-	-	0	0	0	45/61
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	38/30
Artemisia nova									
94	**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	7/12
Artemisia tridentata tridentata									
94	**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	48/37
Cercocarpus montanus									
94	**180**	0	100	0	-	44	22	0	29/36
00	**220**	0	100	0	100	18	36	0	32/47
05	**160**	0	100	0	40	13	75	0	42/52
10	**200**	10	80	10	-	30	10	20	43/54
Chrysothamnus nauseosus									
94	**480**	4	75	21	-	4	21	17	22/24
00	**320**	6	75	19	-	13	0	6	20/23
05	**260**	8	62	31	-	0	0	15	24/25
10	**320**	13	69	19	-	0	0	25	25/29
Chrysothamnus viscidiflorus									
94	**40**	0	100	0	-	0	0	0	5/8
00	**60**	0	67	33	-	0	0	33	4/7
05	**20**	0	100	0	-	0	100	0	-/-
10	**20**	0	100	0	-	0	0	0	4/8
Ephedra viridis									
94	**60**	33	33	33	-	33	0	0	16/19
00	**20**	0	100	0	-	0	100	0	16/10
05	**40**	50	50	0	-	50	0	0	21/19
10	**60**	0	100	0	-	33	0	0	24/26
Eriogonum corymbosum									
94	**1880**	35	64	1	40	13	0	0	11/16
00	**2180**	27	56	17	180	4	0	5	9/13
05	**3140**	42	56	2	1160	5	0	.63	12/18
10	**3660**	27	70	3	160	14	3	7	10/13

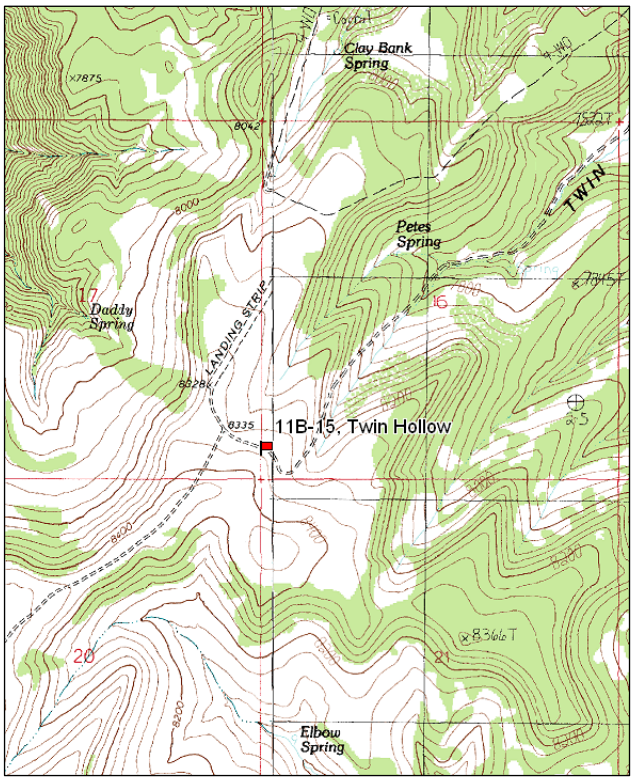
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
94	**760**	16	79	5	-	0	0	3	5/6
00	**480**	0	100	0	-	0	0	0	4/6
05	**320**	6	94	0	20	0	0	0	7/9
10	**600**	0	97	3	-	0	0	0	7/7
Juniperus osteosperma									
94	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	20	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**40**	100	0	-	-	0	0	0	-/-
Pinus edulis									
94	**0**	0	0	-	-	0	0	0	-/-
00	**80**	75	25	-	60	0	0	0	-/-
05	**120**	83	17	-	-	0	17	0	-/-
10	**120**	67	33	-	-	0	0	0	-/-

TWIN HOLLOW - TREND STUDY NO. 11B-15-10

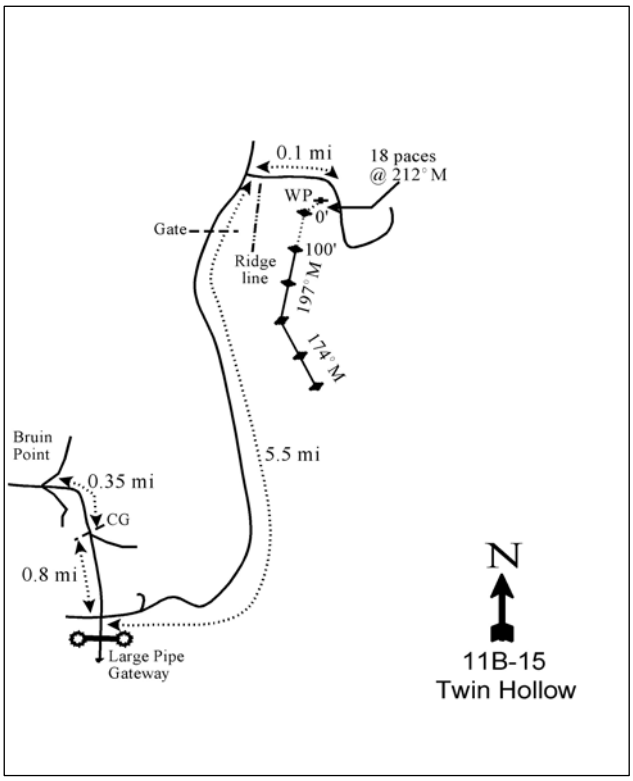
Vegetation Type: Mountain Brush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Mountain Shallow Loam (Black Sagebrush)), R047XA438UT
Land Ownership: SITLA
Elevation: 8000 ft. (2439 m)
Aspect: Southeast
Slope: 20%-25%
Transect bearing: 0'-300': 197° magnetic, 300'-500': 174° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

Directions:
From Sunnyside, go up Water Canyon to the summit (Bruin Point). At the summit take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.9 miles. Turn left at the intersection just before the large pipe gateway and proceed 0.5 miles to a fork. Stay right and go 4.2 miles to a gate. Go 0.8 miles to a fork and remain right. Continue on the main road another 0.1 mile to a witness post on the right side of the road. The 0 foot stake is 18 paces away at a bearing of 212ºM.

Map Name: Flat Canyon



Diagrammatic Sketch:



Township: 13S Range: 15E Section: 15

GPS: NAD 83, UTM 12S 564219 E 4393387 N

TWIN HOLLOW - TREND STUDY NO. 11B-15

Site Information

Site Description: The study samples a mountain brush community at the head of Twin Hollow and was established to monitor crucial winter range for elk and a transitional range for deer in most winters. The study is within a section of Utah State Institutional Trust Land (SITLA), but grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Green River allotment. Pellet group transect data estimated moderate use by elk in 2000 and 2005, but lighter use in 2010. Estimated deer use was light in 2000 and 2005, but was more moderate in 2010. The area is also utilized by wild horses and estimated horse use has been light since 2000. Estimated cattle use has been minimal on the site (Table - Pellet Group Data). Sage grouse were observed on the site in 2005.

Browse: The browse composition is good with a variety of highly preferred species on the site. Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and true mountain mahogany (*Cercocarpus montanus*) provide the majority of the browse cover on the site (Table - Browse Trends). All three species have shown mostly light to moderate use, stable densities, low decadence, and generally good vigor. Poor vigor was high in serviceberry in 2000 and was likely the result of very dry conditions which caused leaves to yellow and drop off prematurely (Table - Browse Characteristics). Antelope bitterbrush (*Purshia tridentata*) and black sagebrush are also present, but at much lower cover (Table - Browse Trends). Other common understory shrubs include dwarf rabbitbrush (*Chrysothamnus depressus*), stickyleaf low rabbitbrush (*C. viscidiflorus* ssp. *viscidiflorus*), snowberry (*Symphoricarpos oreophilus*) and broom snakeweed (*Gutierrezia sarothrae*).

Herbaceous Understory: Grasses are diverse and fairly abundant on the site. Bluebunch wheatgrass (*Agropyron spicatum*) is the dominant grass on the site. Salina wildrye (*Elymus salina*) was the co-dominant grasses species at the outset of the study in 1994, but decreased substantially in 2005. There was also a large increase of needle-and-thread (*Stipa comata*) in 2005. Forbs are diverse and provide nearly as much cover as grasses. Common forbs include bastard toad flax (*Comandra pallida*), sulfur eriogonum (*Eriogonum umbellatum*), several penstemon species (*Penstemon spp.*) and desert phlox (*Phlox austromontana*) (Table - Herbaceous Trends).

Soil: The soil texture is a loam with sandstone parent material and a neutral soil reaction (pH 7.0). Phosphorus may have limited availability for plant growth and development at 3.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is low with plentiful vegetation and litter cover. There is little rock cover on the surface except for some gravel and large flat rocks predominately at the end of the baseline (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1994 to 2000 - stable (0):** Density of serviceberry and true mountain mahogany remained similar, but density of mountain big sagebrush decreased by 13% from 7,300 plants/acre to 6,380 plants/acre. However, cover of serviceberry and mountain big sagebrush both increased substantially.
- **2000 to 2005 - stable (0):** Serviceberry density decreased slightly, true mountain mahogany density increased slightly, and mountain big sagebrush density decreased substantially to 4,760 plants/acre. However, cover of all three species increased, and decadence and vigor remained good.
- **2005 to 2010 - stable (0):** Density of mountain big sagebrush and true mountain mahogany remained similar. Density of serviceberry increased, but cover decreased slightly. Mountain big sagebrush cover also decreased slightly.

Grass:

- **1994 to 2000 - slightly down (-1):** There was a 20% decrease in the sum of nested frequency of perennial grasses, though cover increased from 9% to 13%.
- **2000 to 2005 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 11% and cover increased to 15%. There was a slight change in composition with a significant decrease in the nested frequency of Salina wildrye and a significant increase in the nested frequency of needle-and-thread.
- **2005 to 2010 - slightly down (-1):** The perennial grass sum of nested frequency only decreased by 8%, but cover decreased from 15% to 11%.

Forb:

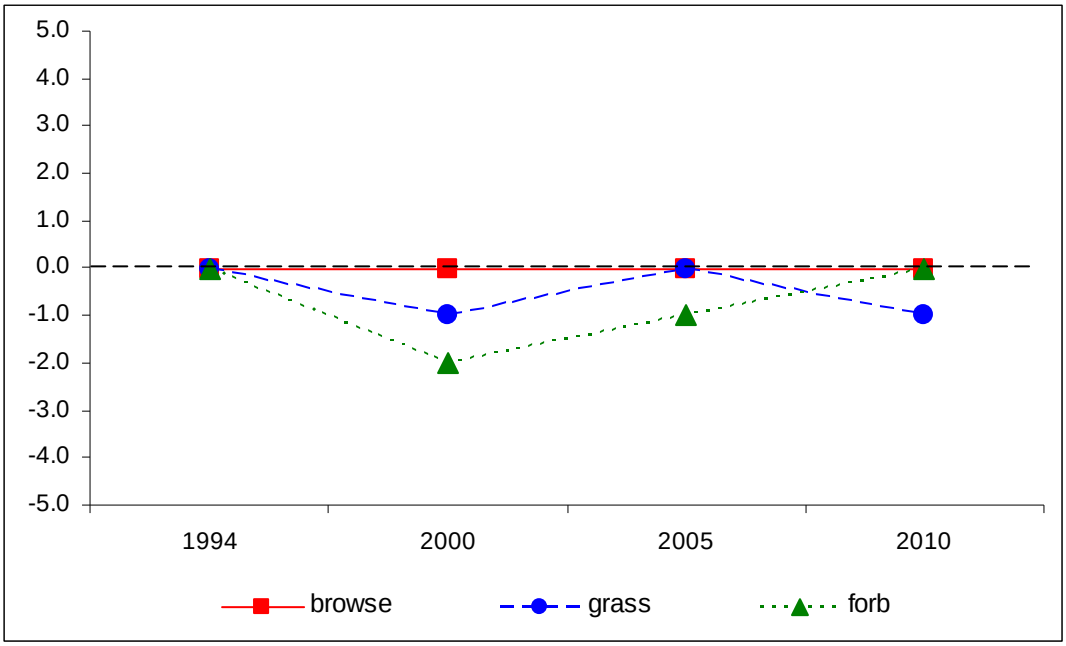
- **1994 to 2000 - down (-2):** The sum of nested frequency of perennial forbs decreased by 42% and cover decreased from 11% to 8%.
- **2000 to 2005 - slightly up (+1):** The perennial forb sum of nested frequency increased by 18% and cover increased to 10%.
- **2005 to 2010 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 17%, though cover remained similar.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 11B, study no: 15

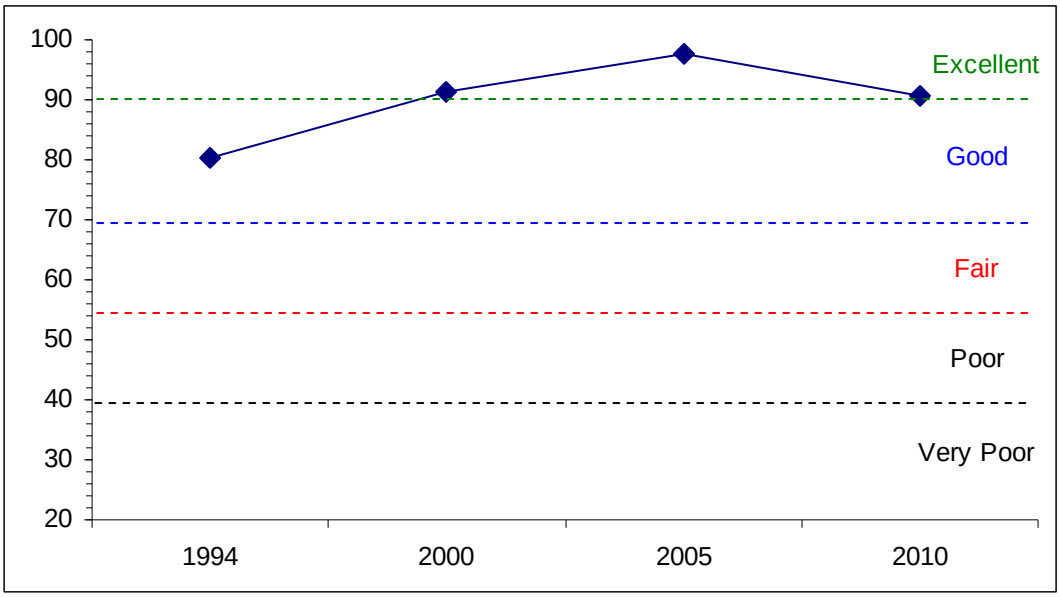
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	27.4	13.6	10.8	18.6	0.0	10.0	0.0	**80.4**	Good
00	30.0	13.4	11.7	26.1	0.0	10.0	0.0	**91.2**	Good-Excellent
05	30.0	13.3	14.7	29.8	0.0	10.0	0.0	**97.7**	Excellent
10	30.0	13.7	15.0	22.0	0.0	10.0	0.0	**90.7**	Good-Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 15



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL--
Management unit 11B, Study no: 15



HERBACEOUS TRENDS--
Management unit 11B, Study no: 15

Type	Species	Nested Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron spicatum	a159	ab178	b232	ab218	1.77	6.01	9.63	6.83
G	Bromus carinatus	a-	a-	ab5	b10	-	-	.04	.06
G	Carex sp.	9	5	15	19	.02	.15	.40	.45
G	Elymus salina	b142	b128	a5	a2	4.34	4.93	.03	.00
G	Koeleria cristata	b24	a2	ab20	ab13	.19	.06	.39	.33
G	Oryzopsis hymenoides	ab7	a-	b15	b17	.07	-	.41	.25
G	Poa fendleriana	62	58	48	49	1.33	.77	.80	.83
G	Sitanion hystrix	bc26	a3	c39	ab15	.26	.04	.62	.22
G	Stipa columbiana	b23	b15	a-	ab4	.57	.40	.03	.06
G	Stipa comata	a-	a-	b61	b53	-	-	2.15	1.89
G	Stipa lettermani	b257	a16	a10	a15	.74	.65	.36	.05
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		509	405	450	415	9.32	13.03	14.88	11.02
Total for Grasses		509	405	450	415	9.32	13.03	14.88	11.02
F	Androsace septentrionalis (a)	4	5	14	11	.01	.00	.02	.09
F	Arabis sp.	3	1	6	-	.00	.00	.01	-
F	Arenaria fendleri	9	5	2	3	.06	.04	.06	.01
F	Aster sp.	b24	a8	a2	a7	.18	.04	.00	.06
F	Astragalus convallarius	b18	a1	a2	a1	.07	.00	.03	.00
F	Astragalus miser	1	-	3	10	.00	-	.00	.12
F	Astragalus sp.	b11	a2	ab4	ab2	.03	.03	.01	.01
F	Balsamorhiza sagittata	-	-	5	11	-	.03	.07	.39
F	Calochortus nuttallii	-	-	-	4	-	-	-	.03
F	Castilleja flava	b36	a11	ab22	ab23	.15	.05	.34	.15

Type	Species	Nested Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
F	Castilleja linariaefolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$29	-	-	-	.15
F	Chaenactis douglasii	$_{b}$15	$_{a}$-	$_{a}$-	$_{ab}$5	.04	-	-	.01
F	Chenopodium fremontii (a)	9	-	-	3	.04	-	-	.03
F	Chenopodium leptophyllum(a)	$_{ab}$5	$_{a}$-	$_{b}$18	$_{a}$1	.01	-	.03	.00
F	Collinsia parviflora (a)	$_{c}$65	$_{b}$10	$_{a}$-	$_{a}$-	.38	.08	-	-
F	Comandra pallida	$_{a}$150	$_{b}$201	$_{a}$118	$_{b}$196	2.10	3.40	2.03	2.41
F	Crepis acuminata	$_{a}$-	$_{a}$3	$_{c}$76	$_{b}$36	-	.03	.91	.26
F	Cryptantha sp.	-	1	-	1	-	.00	-	.00
F	Erigeron eatonii	$_{b}$110	$_{a}$23	$_{a}$22	$_{a}$10	.44	.13	.30	.03
F	Erigeron flagellaris	16	14	4	9	.18	.08	.03	.02
F	Eriogonum alatum	$_{a}$-	$_{a}$-	$_{ab}$11	$_{b}$8	-	-	.07	.21
F	Eriogonum racemosum	$_{b}$54	$_{a}$9	$_{a}$2	$_{a}$5	1.12	.07	.06	.03
F	Eriogonum umbellatum	150	115	154	128	2.83	1.30	2.17	2.09
F	Hymenoxys acaulis	$_{a}$-	$_{a}$1	$_{ab}$6	$_{b}$18	-	.03	.01	.06
F	Hymenoxys richardsonii	5	-	-	1	.06	-	-	.03
F	Ipomopsis aggregata	$_{ab}$15	$_{ab}$2	$_{b}$13	$_{a}$1	.07	.01	.03	.00
F	Linum lewisii	$_{b}$30	$_{a}$-	$_{ab}$10	$_{a}$3	.06	-	.02	.03
F	Lithospermum sp.	$_{ab}$16	$_{a}$8	$_{b}$40	$_{b}$42	.32	.18	1.21	.60
F	Machaeranthera canescens	$_{b}$12	$_{a}$-	$_{a}$2	$_{ab}$10	.08	-	.03	.05
F	Machaeranthera grindelioides	$_{b}$30	$_{a}$2	$_{a}$6	$_{a}$-	.18	.03	.03	-
F	Microsteris gracilis (a)	-	-	-	-	-	-	-	-
F	Oenothera sp.	$_{c}$33	$_{a}$-	$_{b}$17	$_{a}$-	.36	-	.66	-
F	Penstemon caespitosus	$_{b}$90	$_{a}$38	$_{a}$34	$_{a}$48	.91	.15	.39	1.19
F	Penstemon palmeri	3	-	4	-	.01	-	.03	-
F	Penstemon watsonii	$_{a}$29	$_{a}$22	$_{ab}$33	$_{b}$51	.25	.70	1.11	.55
F	Petradoria pumila	$_{a}$-	$_{a}$-	$_{a}$2	$_{b}$16	-	-	.03	.24
F	Phlox austromontana	$_{b}$50	$_{b}$58	$_{a}$19	$_{ab}$36	1.11	1.65	.13	.68
F	Phlox longifolia	58	27	35	48	.11	.21	.21	.57
F	Polygonum douglasii (a)	$_{b}$41	$_{a}$-	$_{c}$99	$_{b}$54	.07	-	.34	.14
F	Taraxacum officinale	4	8	4	9	.03	.04	.06	.19
F	Tragopogon dubius	-	-	-	1	-	-	-	.00
Total for Annual Forbs		124	15	131	69	0.51	0.08	0.40	0.26
Total for Perennial Forbs		972	560	658	772	10.82	8.26	10.14	10.28
Total for Forbs		1096	575	789	841	11.33	8.35	10.54	10.55

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

BROWSE TRENDS--
Management unit 11B, Study no: 15

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Amelanchier utahensis	25	35	38	38	4.98	7.68	9.42	7.75
B	Artemisia frigida	1	0	0	0	-	-	-	-
B	Artemisia nova	23	24	15	20	1.37	.73	.42	.87
B	Artemisia tridentata vaseyana	71	68	64	67	6.51	10.85	13.11	9.36
B	Cercocarpus montanus	41	41	42	48	6.06	6.55	7.96	7.33
B	Chrysothamnus depressus	16	20	21	14	.80	.19	.91	.44
B	Chrysothamnus viscidiflorus viscidiflorus	84	47	50	57	1.26	.67	1.43	1.51
B	Gutierrezia sarothrae	27	14	19	13	.48	.12	.21	.16
B	Opuntia sp.	2	1	2	0	-	-	-	.03
B	Purshia tridentata	2	2	5	6	-	.38	.78	.63
B	Symphoricarpos oreophilus	52	45	39	38	2.41	2.78	3.74	4.39
B	Tetradymia canescens	2	0	0	3	.03	-	-	-
Total for Browse		346	297	295	304	23.93	30.00	38.00	32.49

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 15

Species	Percent Cover	
	'05	'10
Amelanchier utahensis	13.58	16.01
Artemisia nova	.76	1.29
Artemisia tridentata vaseyana	15.18	12.93
Cercocarpus montanus	9.96	11.85
Chrysothamnus depressus	.46	.50
Chrysothamnus viscidiflorus viscidiflorus	1.33	2.51
Gutierrezia sarothrae	.30	.25
Purshia tridentata	.41	1.39
Symphoricarpos oreophilus	5.15	5.91
Tetradymia canescens	-	.06

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 15

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	2.5	1.5
Cercocarpus montanus	4.3	3.2

BASIC COVER--
Management unit 11B, Study no: 15

Cover Type	Average Cover %			
	'94	'00	'05	'10
Vegetation	42.89	48.85	54.02	54.09
Rock	2.13	1.44	2.12	.85
Pavement	.41	2.82	2.56	2.86
Litter	44.90	62.65	43.07	47.44
Cryptogams	.00	0	0	.03
Bare Ground	21.18	17.28	15.23	14.25

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 15, Study Name: Twin Hollow

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.1	7.0	44.0	31.4	24.6	4.6	3.5	291.2	0.7

PELLET GROUP DATA--
Management unit 11B, Study no: 15

Type	Quadrat Frequency			
	'94	'00	'05	'10
Rabbit	5	1	5	-
Moose	-	-	1	-
Horse	4	4	5	-
Elk	11	13	20	2
Deer	5	5	13	7
Cattle	-	-	1	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	-
9 (23)	8 (20)	2 (6)
69 (169)	46 (114)	13 (31)
5 (12)	5 (13)	27 (68)
-	4 (9)	-

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 15

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
94	**1180**	5	93	2	20	10	0	0	42/49
00	**1160**	17	81	2	60	34	0	50	44/51
05	**1000**	28	70	2	-	24	40	0	46/56
10	**1660**	41	57	2	120	35	14	2	44/53
Artemisia frigida									
94	**20**	0	100	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Artemisia nova									
94	**820**	22	76	2	20	15	0	0	11/13
00	**1180**	7	93	0	-	2	0	0	10/14
05	**600**	7	90	3	1500	10	0	0	10/13
10	**1740**	62	38	0	100	24	8	0	9/15

		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									
94	**7300**	10	87	3	80	3	.82	1	16/17
00	**6380**	10	81	10	80	11	0	2	16/22
05	**4740**	4	85	11	240	22	23	3	21/27
10	**4620**	11	79	10	120	45	8	13	18/28
Cercocarpus montanus									
94	**2540**	50	39	10	340	24	0	8	44/48
00	**2520**	57	40	2	3560	32	2	2	46/47
05	**2980**	76	21	3	2180	36	23	2	53/56
10	**2720**	44	54	1	1760	14	17	.73	49/49
Chrysothamnus depressus									
94	**1700**	4	96	0	-	0	0	0	5/6
00	**1300**	0	97	3	-	2	0	3	3/5
05	**1360**	3	96	1	-	22	26	1	5/8
10	**740**	0	100	0	-	0	0	0	5/8
Chrysothamnus viscidiflorus viscidiflorus									
94	**5560**	6	94	0	-	0	0	0	8/7
00	**1580**	0	95	5	-	0	0	5	11/10
05	**2140**	21	79	0	-	9	.93	0	12/10
10	**3120**	0	100	0	-	3	0	0	11/12
Gutierrezia sarothrae									
94	**1340**	12	88	0	-	0	0	0	6/5
00	**780**	0	100	0	-	0	0	0	4/4
05	**640**	9	88	3	40	0	0	0	9/8
10	**600**	0	100	0	-	0	0	0	7/7
Opuntia sp.									
94	**40**	50	50	0	-	0	0	0	2/11
00	**20**	0	0	100	-	0	0	0	-/-
05	**60**	0	100	0	-	0	0	0	4/8
10	**0**	0	0	0	-	0	0	0	4/9
Purshia tridentata									
94	**40**	50	50	-	-	0	0	0	-/-
00	**40**	0	100	-	-	0	0	0	18/40
05	**100**	40	60	-	-	60	0	0	19/28
10	**120**	0	100	-	-	67	17	0	21/39
Symphoricarpos oreophilus									
94	**2420**	7	93	1	-	3	0	2	12/19
00	**1560**	15	79	5	-	0	0	8	10/18
05	**1440**	17	83	0	-	0	0	0	13/22
10	**1720**	21	79	0	80	0	0	0	10/17

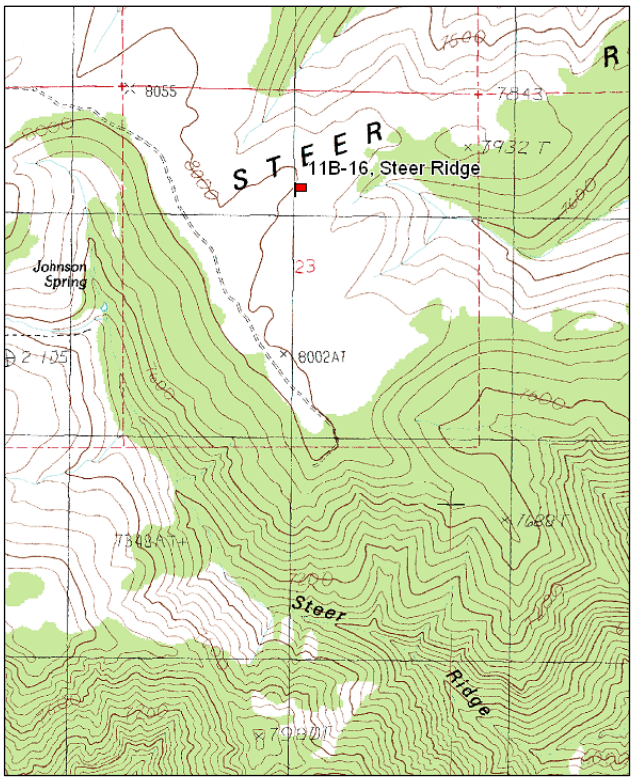
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Tetradymia canescens									
94	**40**	0	100	-	-	0	0	0	7/7
00	**0**	0	0	-	-	0	0	0	6/10
05	**0**	0	0	-	-	0	0	0	14/11
10	**100**	20	80	-	-	0	0	0	9/9

STEER RIDGE - TREND STUDY NO. 11B-16-10

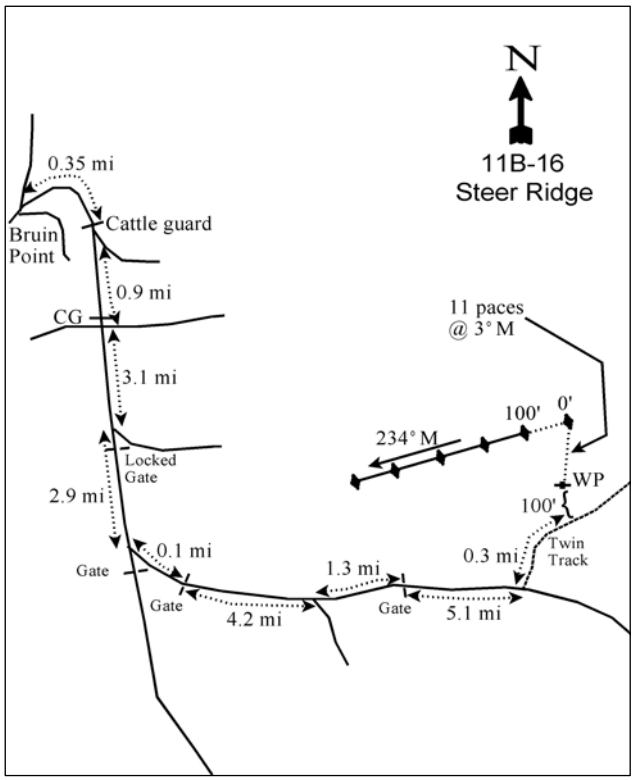
Vegetation Type: Mountain Brush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Mountain Shallow Loam (Black Sagebrush)), R047XA438UT
Land Ownership: BLM
Elevation: 7970 ft. (2430 m)
Aspect: East
Slope: 4%
Transect bearing: 234° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

Directions:
From Sunnyside, go up Water Canyon to the summit (Bruin Point). At the summit take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.9 miles. Go through an intersection beyond another cattle guard and go 3.1 miles to a locked gate just after a fork. Go through the gate and travel another 2.9 miles to a fork and turn left just before a gate. Proceed 0.1 miles to a gate. Continue 4.2 miles to a fork. Stay left and continue an additional 1.3 miles to another gate. Continue 5.1 miles and turn left on a twin track road. Drive north 0.3 miles to a witness post 100 ft off the left side of the road. The 0 ft stake is 11 paces away at 3ºM and is marked with browse tag number 32.

Map Name: Steer Ridge Canyon



Diagrammatic Sketch:



Township: 14S Range: 16E Section: 15

GPS: NAD 83, UTM 12S 577946 E 4383285 N

STEER RIDGE - TREND STUDY NO. 11B-16

Site Information

Site Description: The study samples a mountain shrub community near the end of Steer Ridge, just before it drops off into the Green River. The mountain brush community type here is noticeably shorter in stature than that of the Twin Hollow (11B-15) study. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the large Green River allotment. The area is used heavily by wintering elk and deer. Deer are forced to move to lower elevations when snows get deeper, but elk are often seen in the area all winter. Multiple elk antler sheds were found on the site in 2000. Pellet group data has estimated heavy use by elk since 2000. Estimated deer use was light in 2000 and 2005, but was more moderate in 2010. There has been some sign of cattle and horses, but use is very limited (Table - Pellet Group Data).

Browse: Key browse on this site consists of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*) and Utah serviceberry (*Amelanchier utahensis*), which provide the majority of the browse cover on the site (Table - Browse Trends). Mountain big sagebrush increased substantially in density in 2010 due to a large recruitment of young plants, but use of big sagebrush is mostly light. Very high abundance of ants, associated with the presence of aphids, also appears to be affecting the vigor of some sagebrush plants. The bitterbrush population consists of mature plants with moderate to heavy use, good vigor and low decadence. The serviceberry is a small population of heavily used plants. Other common shrubs include dwarf rabbitbrush (*Chrysothamnus depressus*) and mountain low rabbitbrush (*C. viscidiflorus* ssp. *lanceolatus*). There are also a few scattered rubber rabbitbrush (*C. nauseosus hololeucus*), true mountain mahogany (*Cercocarpus montanus*), snowberry (*Symphoricarpos oreophilus*) and gray horsebrush (*Tetradymia canescens*) (Table - Browse Characteristics).

Herbaceous Understory: Grasses are diverse and abundant with the dominant grass species being needle-and-thread (*Stipa comata*). Needle-and-thread has steadily increased in frequency and cover since 1994. Other prevalent grasses include bluebunch wheatgrass (*Agropyron spicatum*), thickspike wheatgrass (*A. dasystachyum*), mutton bluegrass (*Poa fendleriana*) and Sandberg bluegrass (*P. secunda*). The abundance of grass species is advantageous for elk winter use. Forbs are diverse, but do not provide very much forage with no one forb species being dominant (Table - Herbaceous Trends).

Soil: The soil texture is a sandy clay loam with a sandstone parent material and a neutral soil reaction (pH 7.2). Phosphorus may have limited availability for plant growth and development at 5.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is low with good vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2005, but was slight in 2010 due to pedestaling of plants, flow patterns, and surface movement of soil, litter and rock.

Trend Assessments

Browse:

- **1994 to 2000 - slightly down (-1):** The densities of mountain big sagebrush and bitterbrush both decreased, but cover increased for both species. Decadence of mountain big sagebrush increased from 13% to 22%.
- **2000 to 2005 - up (+2):** The density of mountain big sagebrush increased by 70% from 2,160 plants/acre to 3,680 plants/acre, and cover increased from 6% to 7%. Decadence of sagebrush decreased to 8%. There was little change in the density of bitterbrush, but cover increased from 7% to 11%.
- **2005 to 2010 - up (+2):** Mountain big sagebrush and bitterbrush increased substantially in density with the largest increase in sagebrush. Most of the increase in sagebrush density was due to a marked increase in the recruitment of young sagebrush plants. Cover of sagebrush increased to 10%, but bitterbrush cover decreased to 7%.

Grass:

- **1994 to 2000 - stable (0):** The sum of nested frequency of perennial forbs remained similar, though cover increased from 14% to 18%. There was a significant increase in the nested frequency of mutton bluegrass and a significant decrease in the nested frequency of prairie junegrass (*Koeleria cristata*), Indian ricegrass (*Oryzopsis hymenoides*) and Letterman needlegrass (*Stipa lettermani*).
- **2000 to 2005 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 12%, though cover remained similar. The nested frequency of thickspike wheatgrass decreased significantly.
- **2005 to 2010 - stable (0):** There was a 10% increase in the sum of nested frequency, but cover decreased to 16% with a significant decrease in the nested frequency of thickspike wheatgrass.

Forb:

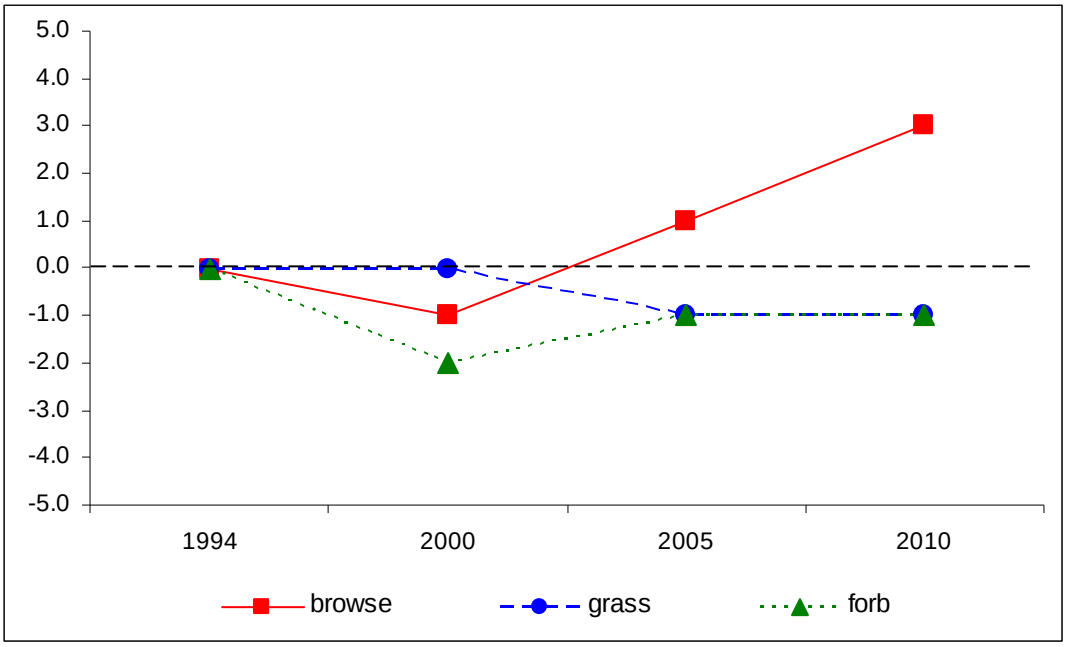
- **1994 to 2000 - down (-2):** The sum of nested frequency of perennial forbs decreased by 25%, though cover changed little.
- **2000 to 2005 - slightly up (+1):** The perennial forb sum of nested frequency increased by 13% and cover increased from 3% to 6%.
- **2005 to 2010 - stable (0):** There was little change in the perennial forb sum of nested frequency, though cover decreased to 3%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 11B, study no: 16

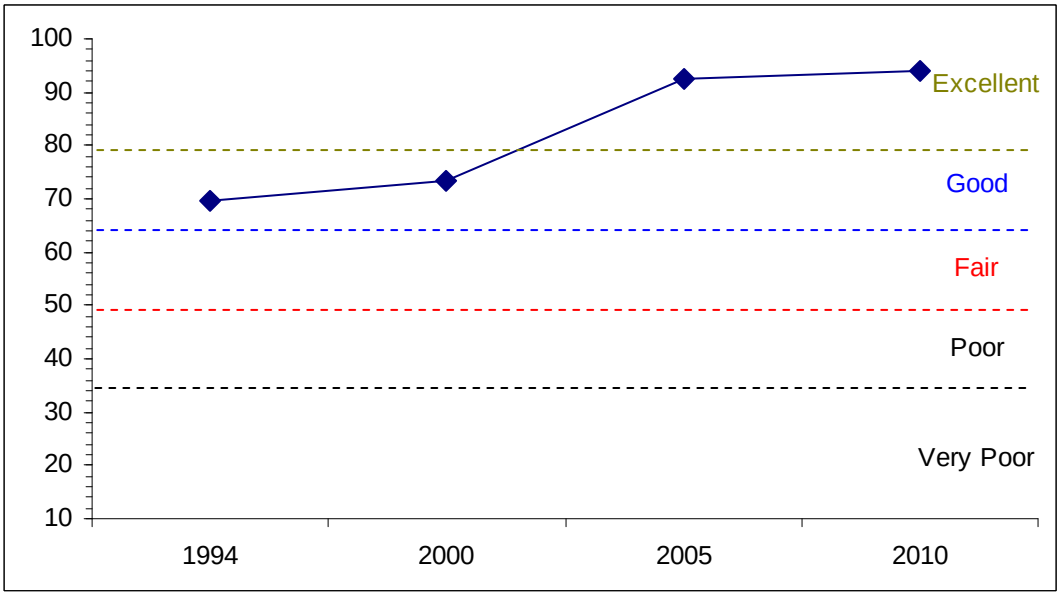
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	16.3	12.0	5.9	28.5	0.0	7.0	0.0	**69.7**	Good
00	20.7	10.8	5.2	30.0	0.0	6.6	0.0	**73.3**	Good
05	29.8	13.5	9.7	30.0	-0.5	10.0	0.0	**92.5**	Excellent
10	27.7	14.7	15.0	30.0	-0.3	6.7	0.0	**93.9**	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 16



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 11B, Study no: 16



HERBACEOUS TRENDS--
Management unit 11B, Study no: 16

Type	Species	Nested Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
G	Agropyron dasystachyum	bc146	c160	ab108	a71	1.61	3.76	2.34	.72
G	Agropyron spicatum	151	147	131	123	4.19	4.91	3.67	3.22
G	Bouteloua gracilis	-	4	6	4	-	.18	.33	.30
G	Bromus tectorum (a)	a-	a1	c71	b23	-	.00	.62	.37
G	Carex sp.	-	-	2	-	-	-	.00	-
G	Elymus salina	69	25	42	50	2.32	.63	2.34	1.86
G	Koeleria cristata	b86	a5	b41	b49	1.81	.03	.67	.78
G	Oryzopsis hymenoides	b32	a9	ab19	ab11	.28	.19	.60	.54
G	Poa fendleriana	a72	b187	a53	a82	1.15	4.67	.76	1.22
G	Poa secunda	a27	ab39	bc57	c77	.17	.24	1.02	.55
G	Sitanion hystrix	1	1	-	-	.00	.03	-	-
G	Stipa comata	a67	ab78	b111	c170	1.95	3.06	6.06	6.69
G	Stipa lettermani	b27	a-	ab10	a-	.72	.00	.07	-
Total for Annual Grasses		0	1	71	23	0	0.00	0.62	0.37
Total for Perennial Grasses		678	655	580	637	14.25	17.73	17.91	15.89
Total for Grasses		678	656	651	660	14.25	17.73	18.53	16.27
F	Agoseris glauca	12	6	9	4	.06	.05	.04	.01
F	Allium sp.	-	-	3	2	-	-	.01	.00
F	Antennaria rosea	b14	ab8	ab8	a-	.13	.15	.21	-
F	Arabis sp.	3	-	2	2	.00	-	.03	.00
F	Arenaria fendleri	10	-	1	-	.18	-	.00	-
F	Aster sp.	-	5	-	-	-	.01	-	.00
F	Astragalus convallarius	-	3	3	2	-	.00	.00	.03
F	Astragalus sp.	3	7	-	-	.01	.34	-	-
F	Balsamorhiza sagittata	7	3	2	3	.86	.33	1.06	.39
F	Calochortus nuttallii	b17	a-	ab7	b16	.05	-	.02	.06
F	Castilleja flava	a-	a-	ab1	b15	-	-	.00	.20
F	Castilleja linariaefolia	b23	b22	a-	a-	.14	.12	-	-
F	Chenopodium fremontii (a)	1	-	6	3	.00	-	.06	.00
F	Chenopodium leptophyllum(a)	5	-	4	2	.01	-	.01	.00
F	Collinsia parviflora (a)	-	4	-	5	-	.01	-	.01
F	Comandra pallida	4	18	11	22	.03	.32	.36	.10
F	Crepis acuminata	10	9	15	13	.07	.19	.16	.23
F	Delphinium nuttallianum	a-	a-	b16	a2	-	-	.05	.00
F	Erigeron eatonii	18	15	14	27	.16	.28	.16	.15
F	Erigeron flagellaris	-	-	5	-	-	-	.21	-
F	Eriogonum alatum	13	9	7	14	.08	.09	.34	.10
F	Eriogonum umbellatum	23	14	19	25	.29	.08	.14	.44
F	Gayophytum ramosissimum(a)	a2	a4	b25	a4	.00	.01	.05	.01
F	Hedysarum boreale	-	-	4	7	-	-	.45	.09
F	Lappula occidentalis (a)	a-	a-	b58	a7	-	-	.30	.01
F	Linum lewisii	-	7	-	-	-	.02	-	-
F	Lithospermum ruderale	12	5	8	7	.19	.18	.40	.51

Type	Species	Nested Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
F	Lomatium sp.	$_{c}$33	$_{a}$1	$_{bc}$20	$_{ab}$6	.08	.00	.11	.01
F	Machaeranthera canescens	-	-	1	3	-	-	.03	.00
F	Oenothera sp.	-	3	1	1	-	.00	.00	.00
F	Penstemon caespitosus	$_{b}$10	$_{ab}$2	$_{a}$-	$_{ab}$6	.24	.04	-	.04
F	Penstemon sp.	2	2	1	-	.01	.01	.01	.00
F	Phlox longifolia	$_{ab}$58	$_{a}$53	$_{bc}$70	$_{c}$87	.11	.32	1.22	.43
F	Polygonum douglasii (a)	$_{b}$45	$_{a}$16	$_{d}$302	$_{c}$209	.10	.03	2.26	.86
F	Sphaeralcea coccinea	$_{c}$78	$_{bc}$62	$_{d}$43	$_{a}$33	.77	.67	.62	.45
F	Taraxacum officinale	-	3	-	-	-	.03	-	-
F	Tragopogon dubius	$_{a}$-	$_{a}$-	$_{b}$15	$_{a}$4	.00	-	.11	.01
F	Trifolium sp.	$_{a}$-	$_{ab}$6	$_{b}$11	$_{b}$9	-	.01	.05	.02
Total for Annual Forbs		53	24	395	230	0.12	0.05	2.69	0.91
Total for Perennial Forbs		350	263	297	310	3.50	3.29	5.89	3.36
Total for Forbs		403	287	692	540	3.63	3.34	8.59	4.28

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

BROWSE TRENDS--
Management unit 11B, Study no: 16

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Amelanchier utahensis	4	5	4	4	.03	1.19	1.75	2.07
B	Artemisia tridentata vaseyana	78	62	81	97	3.79	6.40	7.29	10.30
B	Cercocarpus montanus	0	0	0	0	-	-	-	-
B	Chrysothamnus depressus	52	33	44	46	1.45	.74	1.27	.84
B	Chrysothamnus viscidiflorus lanceolatus	16	15	12	20	.29	.18	.09	.06
B	Gutierrezia sarothrae	3	1	6	5	.00	-	.00	-
B	Mahonia repens	0	0	0	1	-	-	-	-
B	Opuntia sp.	1	0	2	3	.00	-	.03	-
B	Purshia tridentata	43	41	42	53	6.48	6.65	10.98	7.09
B	Symphoricarpos oreophilus	2	2	1	3	.03	.00	.18	.03
B	Tetradymia canescens	7	4	7	6	.03	.18	.18	.38
Total for Browse		206	163	199	238	12.13	15.35	21.80	20.79

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 16

Species	Percent Cover	
	'05	'10
Amelanchier utahensis	.95	1.31
Artemisia tridentata vaseyana	8.78	16.78
Chrysothamnus depressus	.90	.91
Chrysothamnus viscidiflorus lanceolatus	.20	.05
Gutierrezia sarothrae	.06	-
Purshia tridentata	15.19	14.00
Symphoricarpos oreophilus	-	.23
Tetradymia canescens	.25	.21

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 16

Species	Average leader growth (in)	
	'05	'10
Amelanchier utahensis	5.2	2.7
Artemisia tridentata vaseyana	3.7	2.5
Purshia tridentata	4.2	2.7

BASIC COVER--
Management unit 11B, Study no: 16

Cover Type	Average Cover %			
	'94	'00	'05	'10
Vegetation	38.01	41.91	43.37	44.50
Rock	6.60	6.08	5.86	5.39
Pavement	2.01	9.07	8.09	6.80
Litter	20.10	46.68	31.25	39.47
Cryptogams	.06	.30	1.00	0
Bare Ground	20.32	18.44	25.35	22.98

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 16, Study Name: Steer Ridge

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10.8	7.2	52.0	25.4	22.6	3.3	5.5	176.0	0.7

PELLET GROUP DATA--
Management unit 11B, Study no: 16

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'00	'05	'10	'00	'05	'10
Rabbit	7	7	9	2	-	-	-
Moose	-	-	3	-	-	-	-
Horse	1	-	-	-	-	-	-
Grouse	-	-	2	-	-	-	-
Elk	44	53	78	27	82 (202)	76 (187)	63 (155)
Deer	37	21	29	45	20 (48)	13 (31)	44 (107)
Cattle	2	-	-	-	-	-	2 (4)

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 16

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
94	**100**	40	60	-	-	20	0	0	30/42
00	**160**	13	88	-	-	50	0	25	31/46
05	**80**	0	100	-	-	0	100	0	41/65
10	**80**	50	50	-	-	0	50	0	40/55
Artemisia frigida									
94	**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	42/55
Artemisia tridentata vaseyana									
94	**2740**	19	68	13	40	18	4	2	19/26
00	**2160**	16	62	22	60	26	2	8	17/26
05	**3680**	53	40	8	71680	15	8	3	23/29
10	**16580**	72	28	1	460	17	6	.36	18/27
Cercocarpus montanus									
94	**0**	0	0	-	-	0	0	0	38/38
00	**0**	0	0	-	-	0	0	0	37/44
05	**0**	0	0	-	-	0	0	0	43/53
10	**0**	0	0	-	-	0	0	0	38/50
Chrysothamnus depressus									
94	**3440**	0	98	2	-	8	0	2	6/9
00	**1780**	6	82	12	-	1	0	4	4/7
05	**2260**	5	89	5	380	42	6	6	7/10
10	**2320**	9	91	0	-	5	6	0	6/9
Chrysothamnus nauseosus hololeucus									
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	11/24
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus viscidiflorus lanceolatus									
94	**500**	4	96	0	-	4	0	0	10/12
00	**460**	0	96	4	-	0	0	0	10/10
05	**380**	11	84	5	-	53	11	5	12/16
10	**600**	10	90	0	-	0	0	0	12/16
Gutierrezia sarothrae									
94	**60**	0	100	0	-	0	0	0	6/8
00	**20**	0	0	100	-	0	0	0	4/7
05	**160**	0	100	0	-	0	0	0	8/12
10	**140**	0	100	0	-	0	0	0	8/10

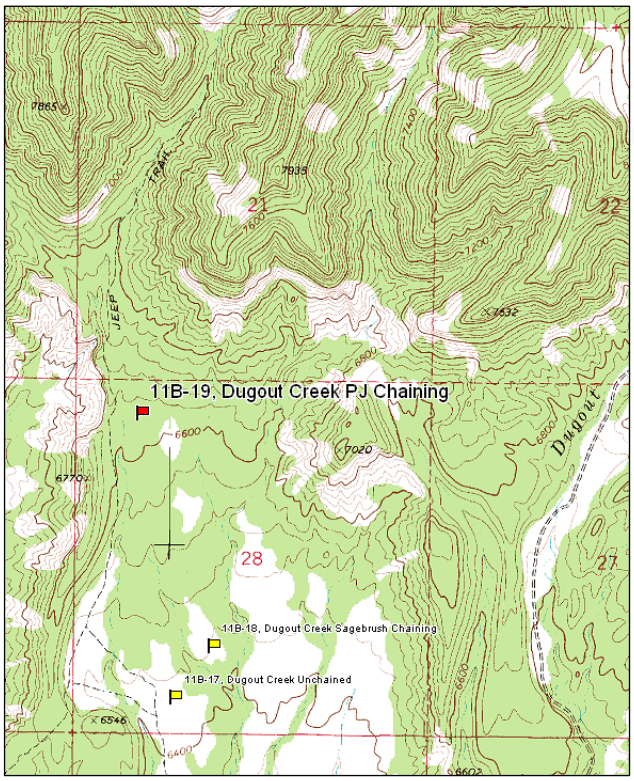
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Mahonia repens									
94	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**40**	0	100	-	-	0	0	0	-/-
Opuntia sp.									
94	**20**	0	100	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	3/23
05	**40**	0	100	-	-	0	0	0	5/18
10	**60**	0	100	-	-	0	0	0	4/21
Purshia tridentata									
94	**1400**	10	80	10	-	31	3	0	20/51
00	**1120**	5	86	9	-	43	2	5	26/56
05	**1080**	2	94	4	-	28	72	0	28/63
10	**1640**	10	89	1	-	40	34	0	24/52
Symphoricarpos oreophilus									
94	**60**	0	100	-	-	0	0	0	20/41
00	**40**	0	100	-	-	0	0	0	15/29
05	**20**	0	100	-	-	0	0	0	23/48
10	**80**	0	100	-	-	0	0	0	20/44
Tetradymia canescens									
94	**160**	13	88	0	-	13	0	0	8/12
00	**80**	0	75	25	-	25	0	0	8/13
05	**140**	0	100	0	-	71	0	0	9/16
10	**120**	17	83	0	-	17	17	0	11/15

DUGOUT CREEK PJ CHAINING - TREND STUDY NO. 11B-19-10

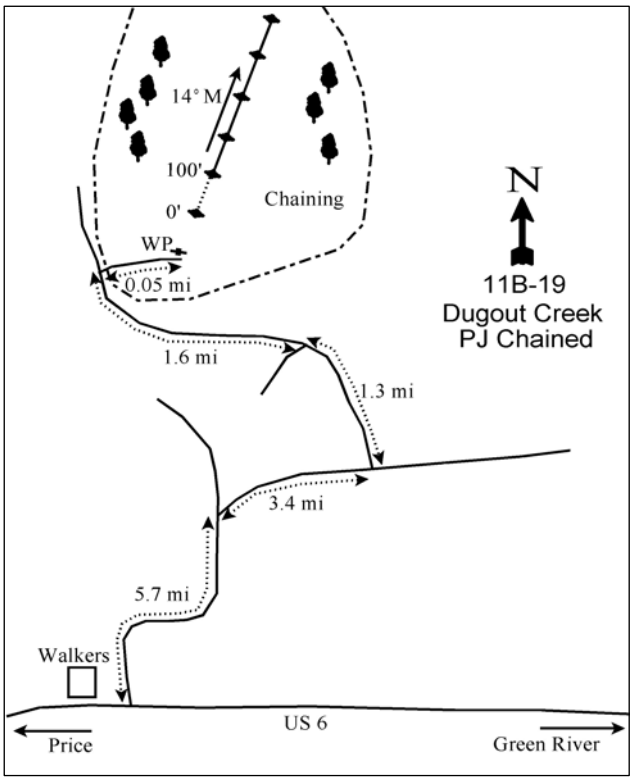
Vegetation Type: Chained Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Year-Long
NRCS Ecological Site Description: Upland Stony Loam (Pinyon-Utah Juniper), R034XY330UT
Land Ownership: BLM
Elevation: 6600 ft. (2012 m)
Aspect: Southeast
Slope: 1%-12%
Transect bearing: 14° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

Directions:
From US 6 just outside of Price turn north by the Walkers up Ninemile Canyon. Drive 5.7 miles to a main fork in the road. Take the right fork towards the Dugout Mine and go 3.2 miles to a faint dirt road on the left. Turn left and go 1.3 miles to another fork. Stay right and drive 1.6 miles to a faint road on the right. Go 0.05 miles into the chaining to a witness post on the left side of the road. From the witness post walk 42 paces at 14°M to the 0-foot stake, which is marked by browse tag #70.

Map Name: Pine Canyon



Diagrammatic Sketch:



Township: 13S Range: 12E Section: 21

GPS: NAD 83, UTM 12S 535530 E 4391399 N

DUGOUT CREEK PJ CHAINING - TREND STUDY NO. 11B-19

Site Information

Site Description: The study is located at the base of the plateau in a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) chaining that was done in the fall of 1996. No seed mix data is available, but several seeded grass species have been sampled on the site. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Soldier Canyon allotment. Pellet group data estimated light deer use in 1997, but more moderate use since 2005. Estimated elk and cattle use has been light since 1997 (Table - Pellet Group Data). It was noted in 2010 that many of the sampled pellet groups appeared to be from fawns as they were small and relatively fresh.

Browse: Preferred browse species on the site include black sagebrush (*Artemisia nova*), Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*), true mountain mahogany (*Cercocarpus montanus*), Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*), antelope bitterbrush (*Purshia tridentata*), fourwing saltbush (*Atriplex canescens*) and Utah serviceberry (*Amelanchier utahensis*). Black sagebrush is the key browse species on the site as the other preferred browse species are relatively few in number. Utilization of black sagebrush has been mostly light, while use of the other preferred browse has been mostly moderate to heavy (Table - Browse Characteristics). Pinyon and juniper trees still grow on the site, despite the chaining treatment, but density is relatively low and the population does not seem to be increasing substantially (Table - Point-Quarter Tree Data).

Herbaceous Understory: The grass component is diverse, but is dominated by the seeded species crested wheatgrass (*Agropyron cristatum*) and is not particularly abundant. Bottlebrush squirreltail (*Sitanion hystrix*) co-dominated the site in 2005, but decreased substantially in 2010 and is now rare on the site. Slender wheatgrass (*Agropyron trachycaulum*) is fairly common on the site. Forbs are also diverse, but not particularly abundant. Milkvetch (*Astragalus sp.*), timber poisonvetch (*A. convallarius*) and Palmer penstemon (*Penstemon palmeri*) are the dominant forb species. The seeded species blue flax (*Linum lewisii*), alfalfa (*Medicago sativa*), yellow sweetclover (*Melilotus officinalis*) and small burnet (*Sanguisorba minor*) were sampled at the outset of the study in low numbers, but none of the species was sampled in 2010 (Table - Herbaceous Trends).

Soil: The soil on the site is sandy clay loam texture with a neutral soil reaction (pH 7.2) (Table - Soil Analysis Data). Bare ground cover is low with a high amount of litter cover from the remains of the chaining treatment, as well as a high amount of rock and pavement cover (Table - Basic Cover). Several fairly active large gullies cross the site. The soil erosion condition was classified as slight in 2005 because of moderate pedestaling around the base of shrubs and perennial grasses, minor soil and litter movement, some small flow patterns, and large gullies. The soil erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **1997 to 2005 - up (+2):** The density of black sagebrush increased by 71% from 1,720 plants/acre to 2,940 plants/acre and cover increased from 2% to 7%. Wyoming big sagebrush was sampled in the density strip for the first time at a low density of 120 plants/acre.
- **2005 to 2010 - up (+2):** Black sagebrush density increased by 51% to 4,440 plants/acre, though cover remained similar. Wyoming big sagebrush density more than doubled to 300 plants/acre and cover increased to over 1%.

Grass:

- **1997 to 2005 - up (+2):** The sum of nested frequency of perennial grasses increased more than two-fold, and cover increased from 1% to 10%. There was a significant increase in the nested frequency of crested wheatgrass and bottlebrush squirreltail.

- **2005 to 2010 - down (-2):** The perennial grass sum of nested frequency decreased by 33% and cover decreased to 6%. There was a significant decreased in the nested frequency of bottlebrush squirreltail, but crested wheatgrass increased significantly in nested frequency and became the dominant grass on the site.

Forb:

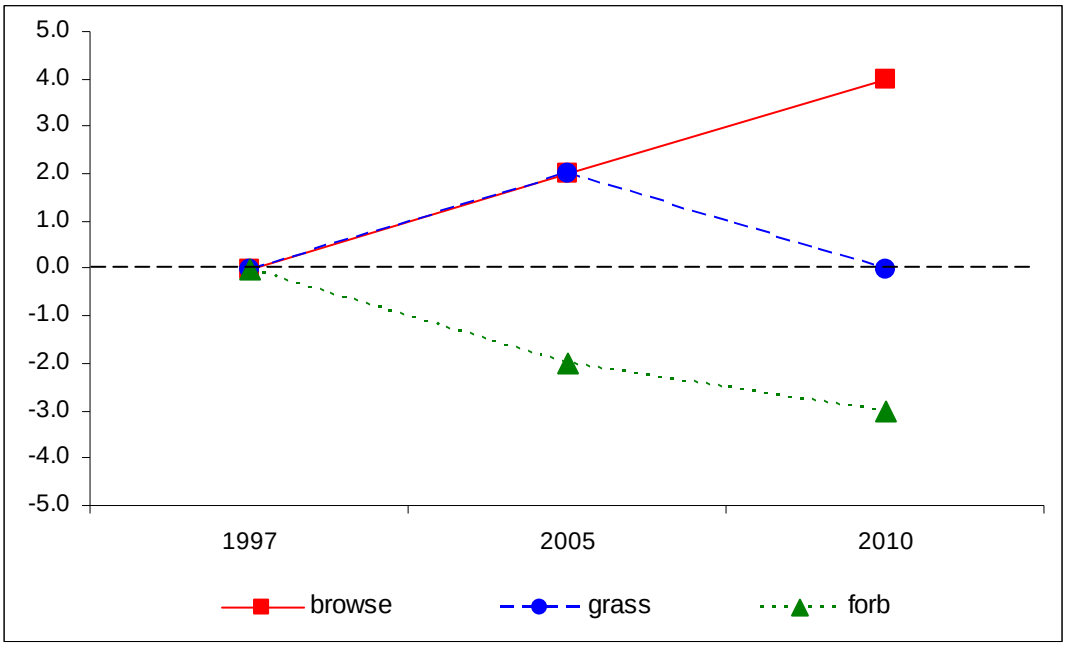
- **1997 to 2005 - down (-2):** The perennial forb sum of nested frequency decreased by 40%, though cover increased slightly from 5% to 6%.
- **2005 to 2010 - slightly down (-1):** There was a 10% decrease in the perennial forb sum of nested frequency and cover decreased to 3%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 11B, study no: 19

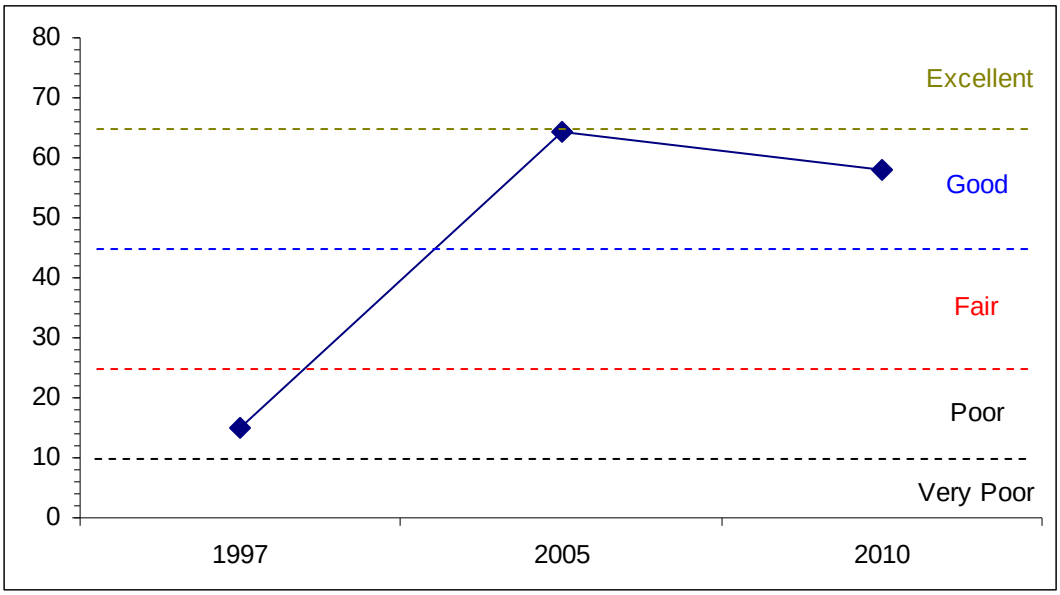
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
97	3.6	0.0	0.0	1.9	0.0	9.5	0.0	**15.0**	Poor
05	12.2	13.5	9.3	19.3	0.0	10.0	0.0	**64.2**	Good-Excellent
10	11.9	14.5	14.5	12.4	-0.3	5.0	0.0	**58.1**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 19



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 11B, Study no: 19



HERBACEOUS TRENDS--
Management unit 11B, Study no: 19

Type	Species	Nested Frequency			Average Cover %		
		'97	'05	'10	'97	'05	'10
G	Agropyron cristatum	a50	b112	c159	.30	4.65	5.34
G	Agropyron trachycaulum	44	49	23	.28	1.14	.72
G	Bromus tectorum (a)	a-	b11	b20	-	.05	.37
G	Dactylis glomerata	b16	a3	a-	.13	.01	-
G	Oryzopsis hymenoides	-	3	2	-	.06	.03
G	Poa fendleriana	2	3	5	.03	.03	.01
G	Poa secunda	-	-	5	-	.00	.01
G	Sitanion hystrix	a27	b140	a15	.19	3.73	.09
Total for Annual Grasses		0	11	20	0	0.05	0.37
Total for Perennial Grasses		139	310	209	0.94	9.63	6.21
Total for Grasses		139	321	229	0.94	9.68	6.59
F	Arabis sp.	2	1	-	.00	.03	-
F	Astragalus convallarius	b52	ab41	a24	.62	1.27	.45
F	Astragalus sp.	b92	a51	a40	2.47	2.19	.81
F	Castilleja linariaefolia	-	-	7	-	-	.30
F	Chenopodium fremontii (a)	a5	ab18	b27	.04	.23	.21
F	Collinsia parviflora (a)	-	-	11	-	-	.02
F	Cryptantha sp.	9	6	5	.05	.06	.00
F	Descurainia pinnata (a)	c109	b28	a-	2.29	.31	-
F	Eriogonum cernuum (a)	a-	ab5	b13	-	.01	.02
F	Euphorbia sp.	15	18	2	.24	.66	.00
F	Gilia hutchinifolia (a)	5	-	5	.04	-	.01
F	Helianthus annuus (a)	1	-	-	.00	-	-
F	Lactuca serriola	b9	ab4	a-	.09	.18	-

Type	Species	Nested Frequency			Average Cover %		
		'97	'05	'10	'97	'05	'10
F	Lappula occidentalis (a)	$_{a}$-	$_{b}$15	$_{c}$61	-	.11	.34
F	Lesquerella sp.	2	-	3	.03	-	.00
F	Linum lewisii	$_{b}$20	$_{a}$-	$_{a}$-	.10	-	-
F	Lychnis drummondii	-	-	2	-	-	.00
F	Machaeranthera canescens	$_{a}$-	$_{b}$9	$_{b}$13	-	.13	.18
F	Medicago sativa	3	6	-	.03	.06	-
F	Melilotus officinalis	2	-	-	.04	-	-
F	Penstemon palmeri	$_{b}$34	$_{ab}$20	$_{a}$19	.59	1.00	.30
F	Penstemon sp.	$_{a}$-	$_{a}$-	$_{b}$20	-	-	.40
F	Phlox longifolia	-	1	-	-	.00	-
F	Physaria sp.	-	-	1	-	-	.00
F	Plantago patagonica (a)	-	-	2	-	-	.00
F	Sanguisorba minor	$_{b}$19	$_{a}$-	$_{a}$-	.45	-	-
F	Tragopogon dubius	-	-	5	-	-	.00
F	Trifolium sp.	3	1	2	.00	.00	.00
Total for Annual Forbs		120	66	119	2.38	0.67	0.61
Total for Perennial Forbs		262	158	143	4.75	5.61	2.49
Total for Forbs		382	224	262	7.13	6.29	3.10

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

BROWSE TRENDS--
Management unit 11B, Study no: 19

Type	Species	Strip Frequency			Average Cover %		
		'97	'05	'10	'97	'05	'10
B	Artemisia nova	37	50	52	1.64	7.40	6.88
B	Artemisia tridentata wyomingensis	0	4	10	.59	.15	1.09
B	Cercocarpus montanus	12	10	5	.21	.79	.06
B	Cowania mexicana stansburiana	0	2	2	-	1.00	.38
B	Gutierrezia sarothrae	0	1	4	-	-	.09
B	Juniperus osteosperma	5	8	10	2.02	3.72	2.77
B	Opuntia sp.	1	4	4	-	.15	-
B	Pinus edulis	10	8	9	.03	.33	.56
B	Purshia tridentata	3	3	1	.39	.18	.85
B	Symphoricarpos oreophilus	-	-	-	-	-	.03
Total for Browse		68	68	136	4.90	13.74	12.73

CANOPY COVER, LINE INTERCEPT--
Management unit 11B, Study no: 19

Species	Percent Cover	
	'05	'10
Artemisia nova	8.61	11.86
Artemisia tridentata wyomingensis	.68	.48
Cercocarpus montanus	.53	.38
Cowania mexicana stansburiana	.50	2.29
Gutierrezia sarothrae	-	.03
Juniperus osteosperma	3.33	4.31
Opuntia sp.	-	.21
Pinus edulis	.18	.78
Purshia tridentata	.88	.56

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11B, Study no: 19

Species	Average leader growth (in)	
	'05	'10
Artemisia nova	1.3	6.8
Cercocarpus montanus	5.7	1.9
Cowania mexicana stansburiana	-	4.5
Purshia tridentata	5.5	1.4

POINT-QUARTER TREE DATA--
Management unit 11B, Study no: 19

Species	Trees per Acre		
	'97	'05	'10
Juniperus osteosperma	77	85	63
Pinus edulis	72	116	112

Average diameter (in)		
'97	'05	'10
8.0	5.4	3.8
2.1	1.8	1.9

BASIC COVER--
Management unit 11B, Study no: 19

Cover Type	Average Cover %		
	'97	'05	'10
Vegetation	13.62	28.79	24.07
Rock	8.58	15.13	9.69
Pavement	6.74	4.48	3.58
Litter	50.34	39.88	49.04
Cryptogams	.87	0	.04
Bare Ground	18.39	20.82	19.77

SOIL ANALYSIS DATA --
Management unit 11B, Study no: 19, Study Name: Dugout Creek PJ Chaining

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.8	7.2	54.4	23.8	21.8	3.8	9.8	134.4	0.7

PELLET GROUP DATA--
Management unit 11B, Study no: 19

Type	Quadrat Frequency '97	'05	'10
Rabbit	6	43	20
Elk	-	2	2
Deer	6	14	20
Cattle	-	-	-

Days use per acre (ha) '00	'05	'10
-	-	-
5 (12)	13 (31)	13 (31)
15 (36)	41 (101)	28 (69)
-	7 (16)	1 (2)

BROWSE CHARACTERISTICS--
Management unit 11B, Study no: 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)
Amelanchier utahensis									
97	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	22/23
10	**0**	0	0	-	-	0	0	0	19/26
Artemisia nova									
97	**1720**	7	91	2	20	7	0	1	10/19
05	**2940**	20	78	2	120	16	13	0	17/27
10	**4440**	39	60	1	1340	12	5	1	11/21
Artemisia tridentata wyomingensis									
97	**0**	0	0	0	-	0	0	0	-/-
05	**120**	17	83	0	-	33	0	0	18/28
10	**300**	0	93	7	-	27	53	7	21/34
Atriplex canescens									
97	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	26/23
10	**0**	0	0	-	-	0	0	0	-/-
Cercocarpus montanus									
97	**320**	56	44	0	-	19	19	0	29/43
05	**240**	33	25	42	-	0	58	25	34/33
10	**120**	17	83	0	-	33	33	0	30/33
Chrysothamnus nauseosus									
97	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	27/36
10	**0**	0	0	-	-	0	0	0	25/29
Chrysothamnus viscidiflorus									
97	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	22/46
Cowania mexicana stansburiana									
97	**0**	0	0	-	-	0	0	0	40/86
05	**40**	0	100	-	-	50	0	0	33/35
10	**40**	0	100	-	-	0	50	0	36/50

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Echinocereus sp.									
97	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	2/3
10	**0**	0	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
97	**0**	0	0	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	12/19
10	**160**	13	88	-	-	0	0	0	5/6
Juniperus osteosperma									
97	**100**	60	40	-	-	0	0	0	-/-
05	**200**	40	60	-	-	0	0	0	-/-
10	**200**	60	40	-	-	0	0	0	-/-
Opuntia sp.									
97	**20**	0	100	0	-	0	0	0	5/21
05	**100**	0	80	20	-	0	0	20	4/17
10	**100**	0	100	0	-	0	0	0	4/14
Pinus edulis									
97	**200**	90	10	-	20	0	0	10	-/-
05	**180**	89	11	-	-	0	0	0	-/-
10	**200**	90	10	-	-	0	0	0	-/-
Purshia tridentata									
97	**100**	20	60	20	-	20	0	20	-/-
05	**140**	0	100	0	-	0	0	0	26/42
10	**20**	0	100	0	-	100	0	0	52/68

SUMMARY
WILDLIFE MANAGEMENT UNIT 11B - NINE MILE, RANGE CREEK

Community Types

Deer winter range within a unit is summarized into three categories based on ecological potentials which inlude low potential, mid-level potential and high potential. Low potential sites include desert shrub, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and cliffrose (*Cowania mexicana* ssp. *stansburiana*) communities. Mid-level potential sites include mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) communities. High potential sites include mountain brush communities. Black sagebrush (*A. nova*) and basin big sagebrush (*A. tridentata* ssp. *tridentata*) communities are placed within the low potential or mid-level potential scales based on precipitation and elevation. Deer summer range is summarized separately from winter range as a fourth category and typically includes aspen (*Populus tremuloides*) and high elevation mountain brush or meadow communities. Thirteen interagency range trend studies were sampled in Unit 11B during the summer of 2010. Four of the studies [Cedar Corral (11B-8), Cedar Ridge (11B-9), Prickly Pear (11B-14) and Steer Ridge (11B-16)] are categorized as mid-level potential sites for deer winter range and sample communities with a mixture of mountain big sagebrush and other mixed mountain brush. The Cedar Ridge study is dominated by black sagebrush with a small component of mountain big sagebrush and other mountain brush. All four of these studies are also considered to be elk winter range. Seven of the studies [Deadman (11B-1), Airport Bench (11B-2), Airport (11B-3), Coal Creek (11B-4), 'B' Canyon (11B-5), Cottonwood (11B-7) and Dugout Creek PJ Chaining (11B-19)] are classified as low potential deer winter

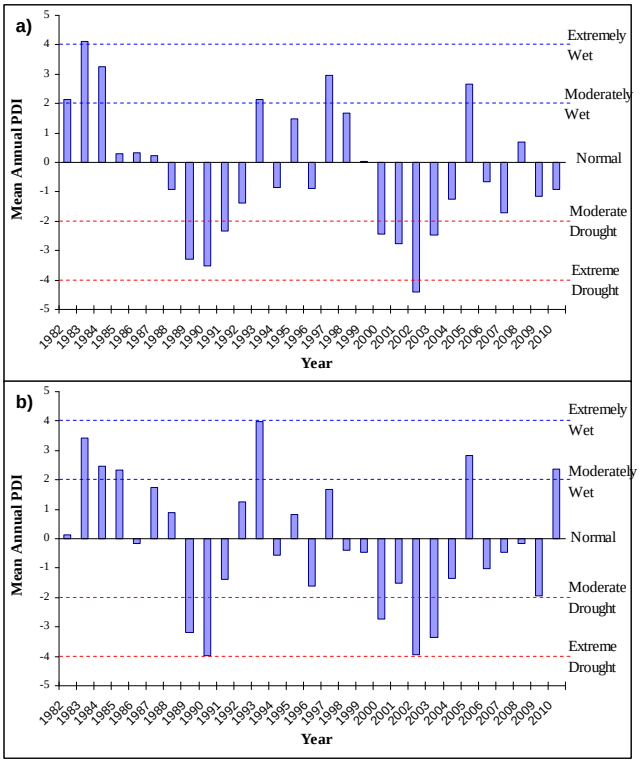


Figure 1. a) The 29 year mean annual Palmer Drought Severity Index (PDSI) for the Uinta Basin (Division 6). **b)** The 29 year mean annual PDSI for the Southeast Division (Division 7). The PDSI is based on climate data gathered from 1895 to 2010. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is ≥4.0 = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and ≤-4.0 = Extreme Drought (Time Series Data 2011).

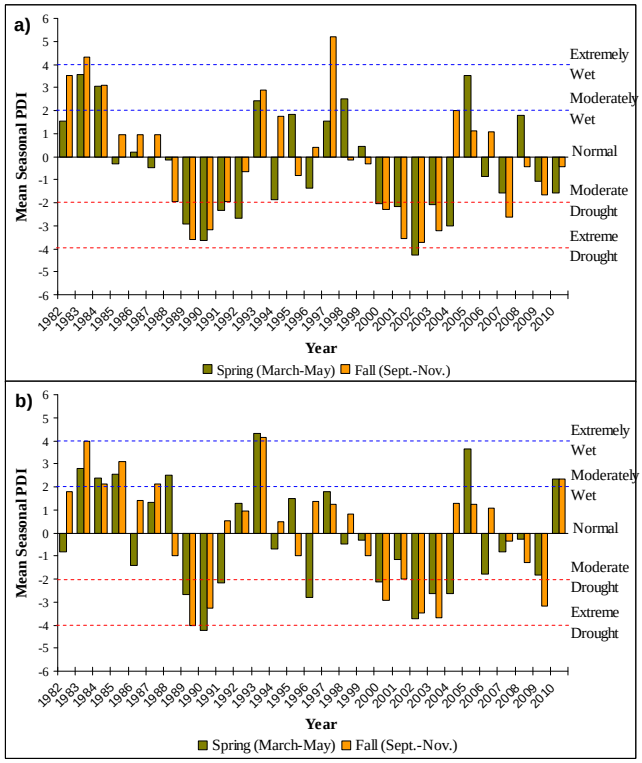


Figure 2. a) The 29 year mean spring (March-May) and fall (Sept.-Nov.) Palmer Drought Severity Index (PDSI) for the Uinta Basin (Division 6). **b)** The 29 year mean spring (March-May) and fall (Sept.-Nov.) PDSI for the Southeast Division (Division 7). The PDSI is based on climate data gathered from 1895 to 2010. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is ≥4.0 = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and ≤-4.0 = Extreme Drought (Time Series Data 2011).

range sites and sample a mixture of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) communities, and Wyoming big sagebrush communities. The 'B' Canyon and Dugout Creek PJ Chaining studies are also considered to be year-long elk range and the Cottonwood study is considered to be elk winter range. Only one of the range trend studies in the unit [Twin Hollow (11B-15)] was categorized as a high potential site for deer winter range, and one study [Upper Cottonwood Ridge (11B-6)] is categorized as summer range. Because each of these categories has only one study, they are not included in this summary. For further information on these studies, refer to the discussion section.

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation and Palmer Drought Severity Index (PDSI) data for the unit were compiled from the National Oceanic and Atmospheric Administration (NOAA) Physical Sciences Division (PSD) as part of the Uintah Basin (Division 6) and the Southeast (Division 7) Divisions. The Upper Cottonwood Ridge, Cottonwood, Cedar Corral, Cedar Ridge, Prickly Pear, Twin Hollow and Steer Ridge studies fall within the Uintah Basin, while the Deadman, Airport Bench, Airport, Coal Creek, 'B' Canyon and Dugout Creek PJ Chaining studies are within the Southeast Division. The Uintah Basin and Southeast Divisions had historic annual mean precipitation of 7.99 inches and 9.07 inches, respectively, from 1895 to 2010. Over the course of the study years in Unit 11B, the mean annual PDSI of both of the Divisions display several periods of prolonged drought. Moderate to extreme wet years in the Uintah Basin included 1982-1984, 1993, 1997 and 2005, and moderate to extreme drought years included 1989-1991 and 2000-2003 (Figure 1a and Figure 2a). Moderate to extreme wet years in the Southeast Division included 1983-1985, 1993, 2005 and 2010, and moderate to extreme drought years included 1989-1990, 2000, 2002-2003 and 2009 (Figure 1b and Figure 2b) (Time Series Data 2011).

Mountain Big Sagebrush Communities
(Mid-Level Potential Winter Range)

Browse: The mid-level potential cumulative median browse trend had a slight increase in 1994 and increased further in 2010 (Figure 8a). The browse composition on the studies is primarily a mixture of mountain big sagebrush and a mixture of other mountain brush species. The Cedar Ridge study is dominated by black sagebrush with a limited component of other browse species. The prevalent browse species on the Prickly Pear study is true mountain mahogany (*Cercocarpus montanus*), but browse is fairly limited on this study. Bitterbrush (*Purshia tridentata*) is a co-dominant browse species with mountain big sagebrush in cover on the Steer Ridge study. Serviceberry (*Amelanchier utahensis*) is also common on the Cedar Corral and Steer Ridge studies, but was not included in this summary. The density of mountain big sagebrush is moderate on the studies and the mean density increased significantly in 2010 (Figure 4a). This increase in sagebrush the mean density was due to a substantial increase in the recruitment of young plants on the Steer Ridge study. Density of mountain big sagebrush remained similar on the other studies in 2010. The mean cover of mountain big sagebrush was significantly high in 2000 and 2010 (Figure 4b). The mean decadence of mountain big sagebrush has been fairly low, though decadence was significantly higher in 2000 and 2005 at more moderate levels (Figure 4c). Black sagebrush was sampled on only two studies, Cedar Corral and Cedar Ridge. Density of black sagebrush is high on these studies, especially on the Cedar Ridge study. The mean density was significantly lower in 2005 than the other sample years (Figure 4a) and the mean decadence was significantly higher in 2005 (Figure 4c). Despite this, the mean cover of black sagebrush was higher in 2005 than in the other sample years (Figure 4b). True mountain mahogany is also sampled on only two studies, Cedar Corral and Prickly Pear. Density and cover of mahogany is low on these sites, but cover of mahogany has steadily increased on the Prickly Pear study. There was a significant increase in the mean cover of mahogany in 2000, but cover remained low (Figure 4b).

Herbaceous Understory: There was a general downward trend in the mid-level potential median cumulative grass trend since 1986 (Figure 8a). Grasses within most of these communities are diverse, but only moderatly abundant with the exception of the Steer Ridge study which has high cover of perennial grasses. The annual species cheatgrass (*Bromus tectorum*) is present, but is not overly abundant on any of the study sites. The

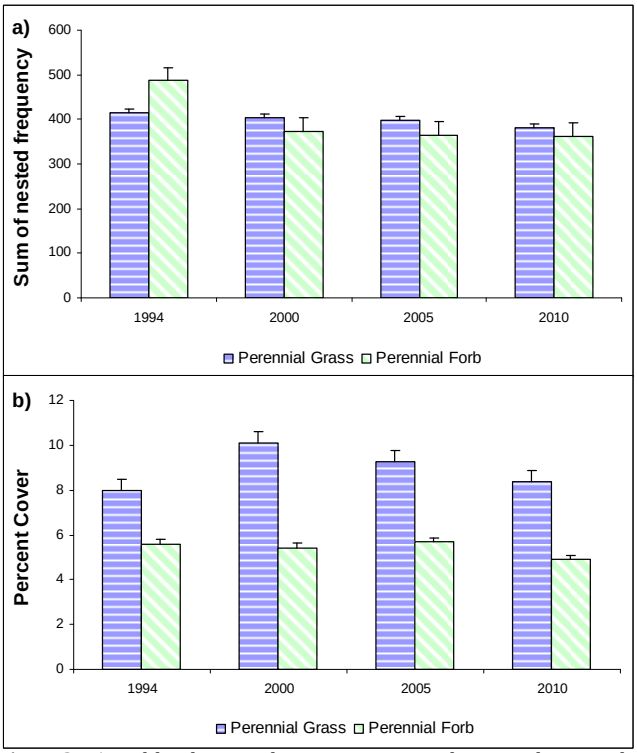


Figure 3. a) Mid-level potential sites mean perennial grass and perennial forb sum of nested frequency (n=4) by year for WMU 11B, Nine Mile, Range Creek. **b)** Mid-level potential sites mean perennial grass, perennial forb and cheatgrass cover (n=4) by year for WMU 11B.

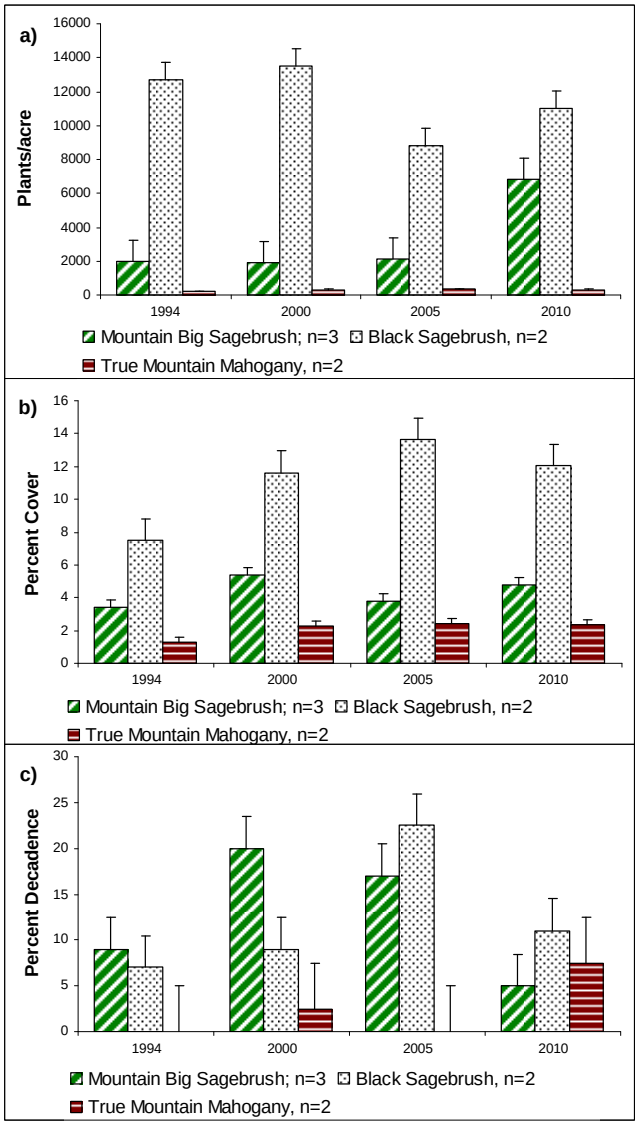


Figure 4. a) Mid-level potential sites mean density of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), blacks agebrush (*A. nova*) and true mountain mahogany (*Cercocarpus montanus*) by year for WMU 11B, Nine Mile, Range Creek. **b)** Mid-level potential sites mean cover of mountain big sagebrush, black sagebrush and true mountain mahogany by year for WMU 11B. **c)** Mid-level potential sites mean population decadence of mountain big sagebrush, black sagebrush and true mountain mahogany by year for WMU 11B.

mean sum of nested frequency of perennial grasses has remained similar throughout the sample years (Figure 3a). Mean cover of perennial grasses increased significantly in 2000, but has steadily decreased with each subsequent sample year (Figure 3b).

The mid-level potential median cumulative forb trend for the unit decreased in 1994, but has remained relatively stable in the other sample years (Figure 8a). Perennial forbs are also diverse within the sampled communities, and are typically nearly as abundant as perennial grasses. The mean sum of nested frequency of perennial forbs was higher than perennial grasses in 1994, but decreased significantly in 2000 and remained lower throughout the remained sample years (Figure 3a). Cover of perennial forbs was similar throughout the course of the study (Figure 3b).

Utilization: Pellet group transect data indicates that elk predominantly use these areas, with the highest elk use sampled on the Steer Ridge study. The mean elk days use/acre on the unit has been mostly moderate with a large decrease in 2010. The mean deer days use/acre has been mostly light, but there was a large increase in use in 2010. Cattle use appears to be minimal on these studies (Figure 9a). Use by horses has also been sampled at light rates on all of the studies.

Deer Desirable Components Index (DCI): The mid-level potential deer DCI has slightly, but steadily, increased during each sample year. Much of the increase is due to increases in recruitment of young preferred browse species. The ranking of the DCI has been fair to fair-good throughout the sample years (Table 1 and Figure 7).

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	13.9	9.7	7.1	16.0	0.0	8.7	0.0	**55.5**	Fair
97/00	20.0	8.6	4.5	17.9	0.0	8.7	0.0	**59.6**	Fair
05	20.8	8.5	6.9	17.1	-0.3	9.4	0.0	**62.4**	Fair
10	20.1	9.8	10.4	16.3	-0.1	8.7	0.0	**65.2**	Fair-Good

Table 1. Mid-level potential scale mean deer DCI scores (n=4) by year for WMU 11B, Nine Mile, Range Creek. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

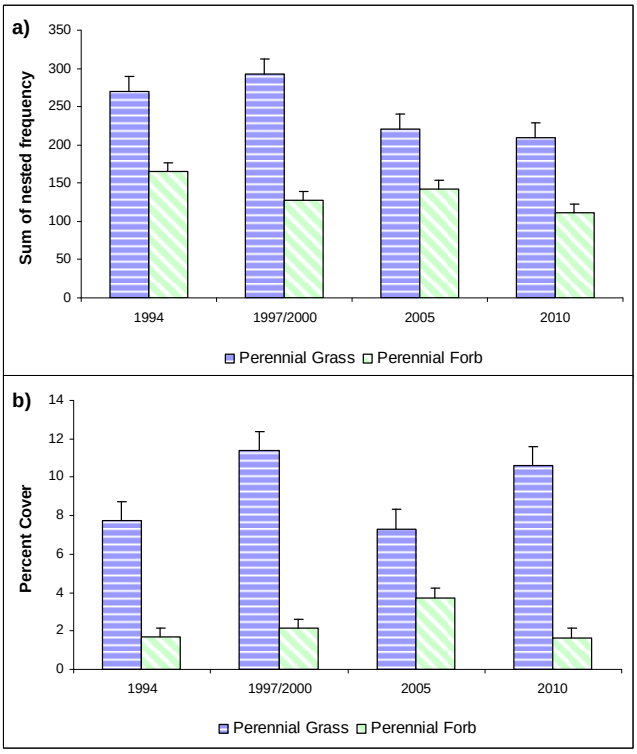


Figure 5. a) Low potential sites mean perennial grass and perennial forb sum of nested frequency (n=7) by year for WMU 11B, Nine Mile, Range Creek. **b)** Low potential sites mean perennial grass and perennial forb cover (n=7) by year for WMU 11B.

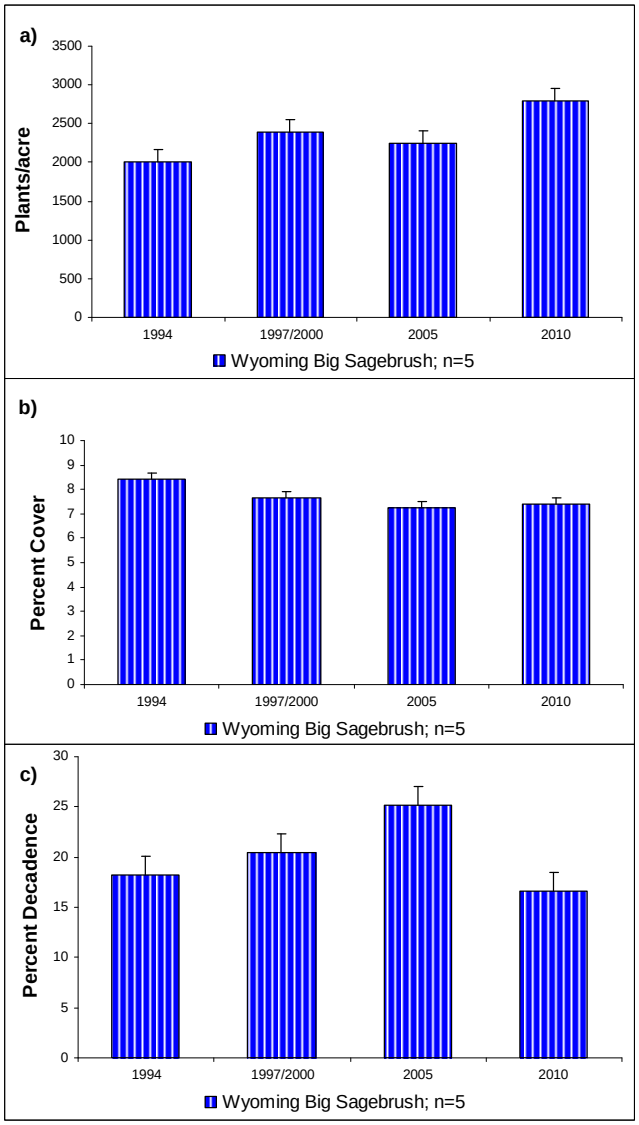


Figure 6. a) Low potential sites mean density of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) by year for WMU 11B, Nine Mile, Range Creek. **b)** Low potential sites mean cover of Wyoming big sagebrush by year for WMU 11B. **c)** Low potential sites mean population decadence of Wyoming big sagebrush by year for WMU 11B.

Wyoming Big Sagebrush Communities (Low Potential Winter Range)

Browse: The low potential studies cumulative median browse trend decreased slightly in 1997/2000, but increased again in 2010 (Figure 8b). Browse species are not common on the Deadman, Airport and 'B' Canyon studies. The Deadman study was dominated by pinyon pine and Utah juniper and then treated by a bullhog and seeding in the fall of 2007 and the 'B' Canyon study burned in a wildfire during the summer of 1996. Wyoming big sagebrush is the dominant browse species on all of the other low potential studies except for the Dugout Creek PJ Chaining, which is dominated by black sagebrush. Only Wyoming big sagebrush is summarized for this unit. For further information on the trend of black sagebrush refer to the Dugout Creek PJ Chaining discussion. The mean

density of Wyoming big sagebrush has increased since 1994 with significant increases in 1997/2000 and 2010 (Figure 6a). Despite the increases in density, mean cover decreased slightly, but significantly, in 1997/2000 and remained lower throughout the remaining sample years. Mean decadence of Wyoming big sagebrush has been moderate over the unit and was significantly higher in 2005 than the other sample years (Figure 6c).

Herbaceous Understory: The low potential median cumulative grass trend increased in 1997/2000 and remained stable throughout the subsequent sample years (Figure 8b). Grasses within these communities are not particularly diverse and are typically dominated by one species. The annual species cheatgrass (*Bromus tectorum*) was sampled on several of the studies, but is not prevalent on the sites. The mean sum of nested frequency of perennial grasses decreased significantly in 2005 and remained lower in 2010 (Figure 5a). The mean cover of perennial grasses also decreased significantly in 2005, but increased significantly in 2010, returning to 1997/2000 levels (Figure 5b).

The low potential median cumulative forb trend decreased slightly in 1997/2000, but decreased further in 2010 (Figure 8b). Perennial forbs are diverse and fairly abundant within most of the sampled communities, though perennial forbs are limited on the Coal Creek and 'B' Canyon studies. The mean sum of nested frequency of perennial forbs decreased significantly in 1997/2000 and remained lower over the remaining sample years (Figure 5a). The mean perennial forb cover was significantly higher in 2005 than the other sample years (Figure 5b).

Utilization: Pellet group transect data indicates that deer predominantly use these study areas. The mean deer days use/acre on the unit has been moderately light over the course of the study years with the highest use occurring in 2005. The mean elk days use/acre has been mostly light on the sites, with a slight increase in use in 2010. Cattle use also appears to be light on the studies (Figure 9b).

Deer Desirable Components Index (DCI): The low potential deer DCI remained fairly stable over the sample years with a ranking of fair throughout the sample years (Table 2 and Figure 7).

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	10.0	3.9	1.0	15.3	0.0	3.1	0.0	**33.3**	Fair
00	7.9	2.0	4.5	19.9	0.0	4.1	0.0	**38.3**	Fair
05	9.0	3.0	4.2	14.0	0.0	6.2	0.0	**36.3**	Fair
10	8.3	5.2	7.4	16.5	0.0	3.3	0.0	**40.8**	Fair

Table 2. Low potential scale mean deer DCI scores (n=7) by year for WMU 11B, Nine Mile, Range Creek. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

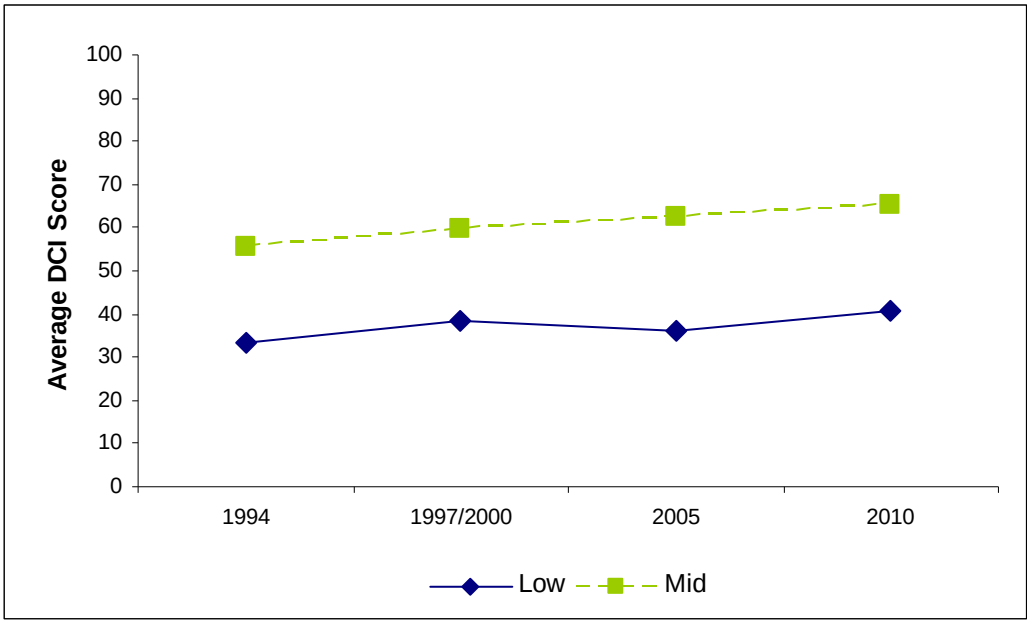


Figure 7. Mean low (n=7) and mid-level (n=4) potential scale deer DCI scores by year for WMU 11B, Nine Mile, Range Creek. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high. For further information on the DCI for the only high potential study, refer to the Twin Hollow (11B-15) discussion section.

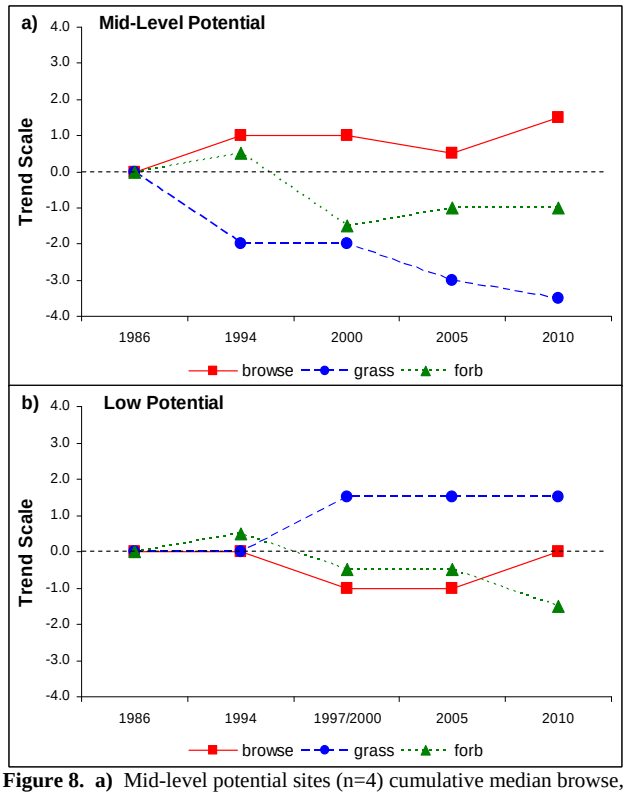


Figure 8. a) Mid-level potential sites (n=4) cumulative median browse, grass and forb trends by year for WMU 11B, Nine Mile, Range Creek. **b)** Low potential sites (n=7) cumulative median browse, grass and forb trends by year for WMU 11B. For further information on trends for the only high potential study, refer to the Twin Hollow (11B-15) discussion section.

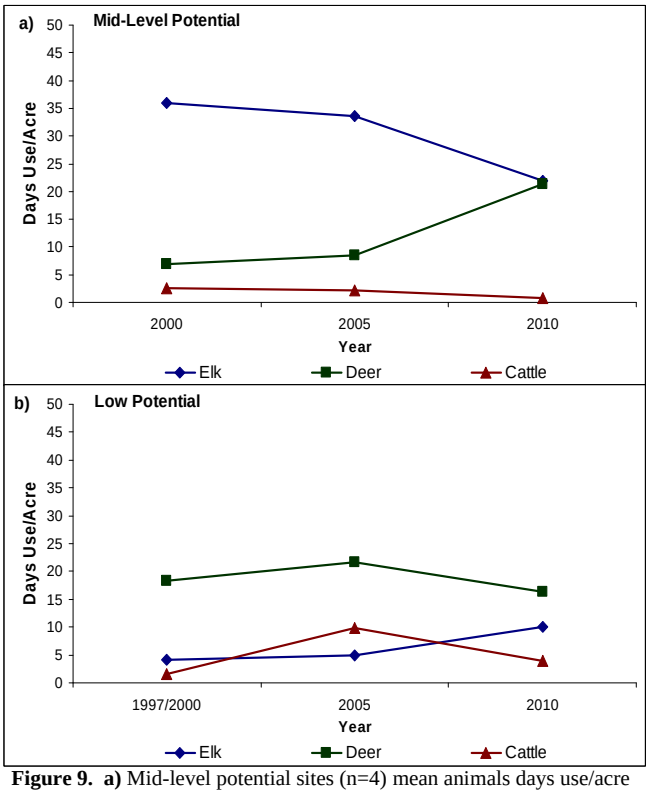
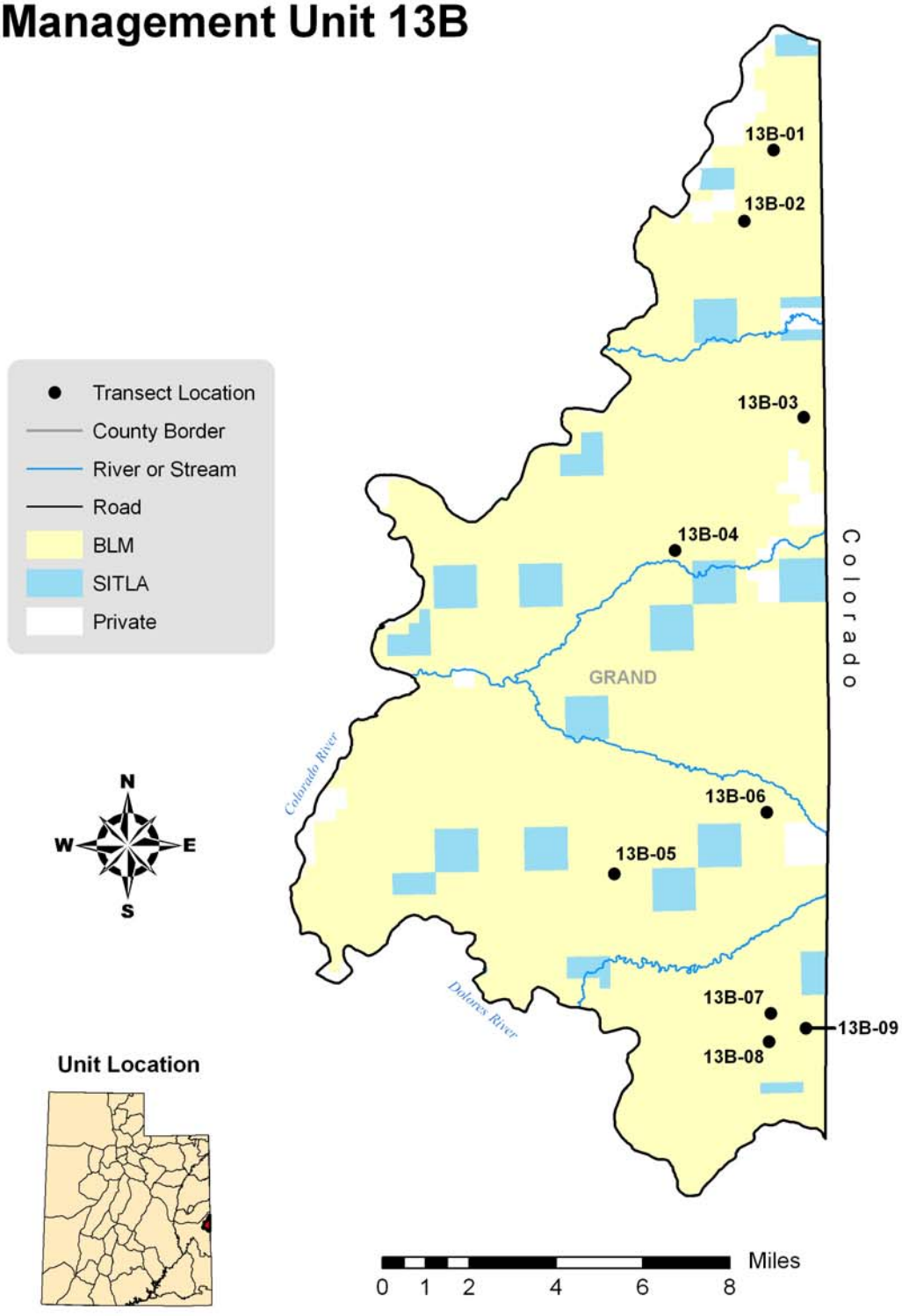


Figure 9. a) Mid-level potential sites (n=4) mean animals days use/acre by year for WMU 11B, Nine Mile, Range Creek. **b)** Low potential sites (n=7) mean animal days use/acre by year for WMU 11B. For further information on animal use for the only high potential study, refer to the Twin Hollow (11B-15) discussion section.

Management Unit 13B



WILDLIFE MANAGEMENT UNIT 13B - DOLORES TRIANGLE

Boundary Description

> **Grand County** - Boundary begins at the Colorado River and Utah-Colorado state line; then southwest along the Colorado River to the Dolores River; east along the Dolores River to the state line; north along the state line to the Colorado River and beginning point.

Management Unit Description

The Dolores Triangle unit is formed by the Colorado River, the Dolores River, and the Colorado-Utah state line. Topography is varied with relatively flat mesas above 7,000 feet, large rocky rough canyons and broken country at the middle elevations, and low desert along the Colorado River. Four drainages dominate the area. The Granite Creek flows into the Dolores Rive, and Ryan Creek, Coates Creek and Little Dolores River empty into the Colorado River. There are ranches scattered throughout the area, but Fruita and Grand Junction, Colorado are the closest municipalities. Access to the unit is through Colorado by way of Glade Park or by fording the Dolores River near its confluence with the Colorado River at Dewey, however, fluctuating water levels and undulating bottom contours make crossing the river hazardous. The unit is comprised of 100,785 acres of deer range and 69,995 acres of elk range all of which is classified as winter range. The breakdown of management of both the deer and elk ranges consists of the Bureau of Land Management (BLM) managing about 88%, Utah State Institutional Trust Lands (SITLA) manages about 9% and 3% is privately owned.

The Dolores Triangle unit serves as winter range for deer which spend the remainder of the year in Colorado's Pinon Mesa area. Few deer reside in the unit year-round, those that do are found along the Colorado River. Concentrated areas for deer during normal winters are Steamboat Mesa, Lower Steamboat Mesa, Fish Park, Big Triangle, Ryan Park, and Granite Park. Only during severe winters with abnormally heavy snowfall are deer forced to disperse into the lower desert range where forage quality is poor. Severe winter range and normal winter range are not separated into different categories because much of the land to the east is too high for normal winter range. Therefore, the whole unit could be considered crucial. The ranches with agricultural land scattered throughout the herd unit offer valuable forage to the deer in the spring and fall.

Coles and Pederson (1967) identified and described five vegetation types which make up the winter range on the unit. The desert shrub type is dominated by blackbrush which occupies the lower portions of this winter range. This type is most important during severe winters although few desirable forage species are found within it. The grass type is found in the Granite Park and Steamboat Mesa areas. These were once large sagebrush parks, but have undergone a conversion to grasses (much of it cheatgrass) after overgrazing during the wrong time of the year (fall and/or spring), wildfires (reoccurring more often after the increase in weedy species), and sagebrush treatments. These areas were formerly important deer wintering areas which now receive increased use by elk. The sagebrush type is found above the desert shrub type, up to and within the pinyon-juniper woodlands. It provides important browse to both deer and livestock. The pinyon-juniper type, like the grass type, has undergone some changes due to competition with the mature trees, extended drought, and heavy use in some years. An understory of cliffrose and black sagebrush has diminished somewhat through the years and is the least productive vegetation type on the unit. This type is common on the slopes and higher mesas. The pinyon-juniper-sagebrush type occupies the upper portions of the winter range and provides important cover and forage for wildlife. In recent years, many wildfires have burned a large number of acres of this vegetation type.

Livestock grazing is the single-most important land use in the area. Winter sheep use began in the early 1900's. Now, most of the AUM’s the BLM allocates for livestock use is for cattle, although some winter sheep use still occurs. The evolving dominance of pinyon-juniper along with excessive use by livestock and big game have led to deteriorating range conditions. Both livestock and deer numbers were reduced in the past to help improve the range. Although some problems still exist, range conditions appear to be slowly improving according to Jense et al (1986). Range conditions were in a state of improvement in the mid 1980s, but

continued drought has caused deterioration in sagebrush communities. An increase in precipitation in the autumn of 2004 and the spring of 2005 have and will likely continue to improve declining range conditions.

Range Trend Studies

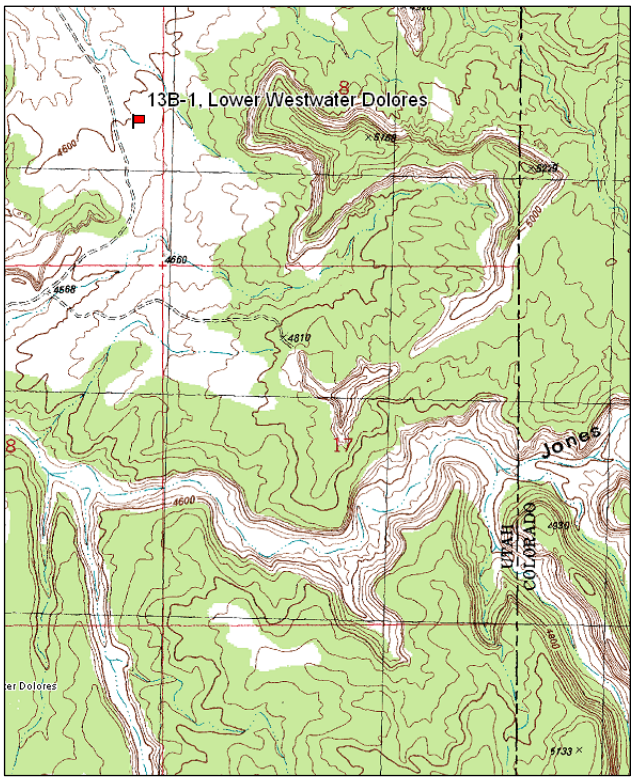
Nine interagency range trend studies were established during June 1986 and have been monitored regularly through 2010. Four of the studies [Fish Park (13B-3), Ryan Creek (13B-6), Steamboat Mesa North (13B-7) and Steamboat East Bench (13B-9)] sample chained and seeded pinyon-juniper communities. The Ryan Creek study also burned in a wildfire since establishment. Two of the studies [Buckhorn Draw (13B-5) and Steamboat Mesa South (13B-8)] sample Wyoming big sagebrush communities and two studies [Lower Westwater-Dolores (13B-1) and Upper Westwater-Dolores (13B-2)] sample former basin big sagebrush communities. The Lower Westwater-Dolores and Steamboat Mesa South studies have both burned in wildfires since study establishment. One other study [Red Cliffs (13B-4)] samples a blackbrush community.

LOWER WESTWATER-DOLORES - TREND STUDY NO. 13B-1-10

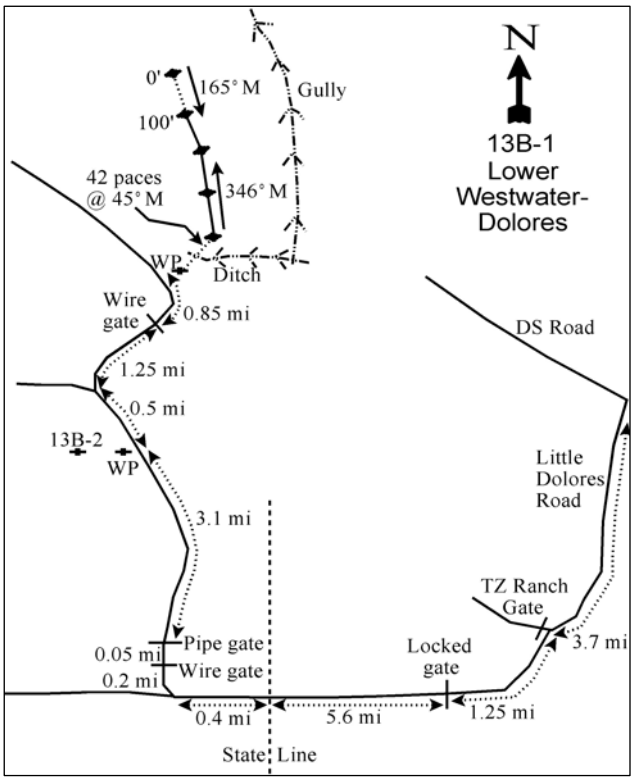
Vegetation Type: Basin Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 4600 ft. (1402 m)
Aspect: Northwest
Slope: 4%-6%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the intersection of the DS Road and Little Delores Road west of Glade Park, Colorado, go down Little Delores Road 3.7 miles to the TZ Ranch gate. Turn left and go 1.25 miles along the fence to another gate (permission and key necessary to get through gates). Continue 5.6 miles to the state line. Go another 0.4 miles to a cabin. Turn right along the edge of a field and go 0.2 miles to a wire gate and another 0.05 miles to a pipe gate. Go 3.1 miles to transect 13B-2. Continue 0.5 miles to a fork near a sheep corral. Keep right. Continue 1.25 miles to a wire gate, then another 0.85 miles to the witness post, a 2 ½ foot tall fencepost off the right side of the road on top of the road cut. From the witness post, walk 42 paces at 45ºM to the 400-foot baseline stake.

Map Name: Westwater



Diagrammatic Sketch:



Township: 20S Range: 26E Section: 7

GPS: NAD 83, UTM 12S 666761 E 4327390 N

Site Information

Site Description: The study site is in an open valley surrounded by slick rock cliffs and domes of sandstone about 2 miles from the Colorado River. At the outset of the study the area was dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) with a dense cheatgrass (*Bromus tectorum*) understory. The area is now dominated by cheatgrass with few sagebrush plants sampled. The land is administered by the Bureau of Land Management (BLM) out of the Grand Junction office in Colorado as part of the Mountain Island allotment. The pellet group data indicated heavy deer use in 2000, but more moderate use in 2005 and 2010. Estimated elk use has been light and cattle use has been moderate since 2000 (Table - Pellet Group Data).

Browse: The key browse species on this site is basin big sagebrush with some apparent Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) hybrids. At the outset of the study the stand exhibited a distinctly clumped dispersion pattern, but most plants sampled now are dead. There was a large decrease in cover (Table - Browse Trends) and density of sagebrush between the 2000 and 2005 sample years without new recruitment of young plants. This has resulted in live sagebrush plants now being rare on the site. Decadence and poor vigor of sagebrush steadily increased since 1986, with all plants considered decadent and in poor vigor in 2010. Recruitment of young sagebrush plants has been poor over the length of the study. Utilization of sagebrush in most sample years was moderate to heavy, but there was no use noted in 2010 (Table - Browse Characteristics). The decline in sagebrush is likely due to the combination of extended drought and competition with annual species. It was noted in 2010 that more live sagebrush plants were growing around the washes that are on, and surrounding, the study site.

Other browse species include broom snakeweed (*Gutierrezia sarothrae*) and spiny hopsage (*Grayia spinosa*), which are found in very low densities (Table - Browse Characteristics). Spiny hopsage has had good leader growth since 2005 (Table - Key Browse Annual Leader Growth) and it was noted in 2010 that there had been heavy browsing of the species in the past. Green ephedra (*Ephedra viridis*) was present in low numbers and was heavily hedged in 1986, but has not been sampled since. On the opposing slope, there is a vigorous stand of sand sagebrush (*Artemisia filifolia*), a few spiny hopsage, and a few scattered Utah juniper trees (*Juniperus osteosperma*).

Herbaceous Understory: The site is almost entirely dominated by annual grasses and forbs. Cheatgrass is the dominant species providing the majority of vegetation cover on the site. There was a large increase in the cover of cheatgrass between the 2000 and 2005 sample years. The most common perennial grass species are galleta (*Hilaria jamesii*) and sand dropseed (*Sporobolus cryptandrus*), but neither is overly abundant. Forbs consist primarily of annual species with storksbill (*Erodium cicutarium*) and Russian thistle (*Salsola iberica*) providing the majority of the forb cover. The perennial species small flower globemallow (*Sphaeralcea parvifolia*) has steadily increased in cover since 2000 and is the only common perennial forb on the site (Table - Herbaceous Trends).

Soil: The soil is classified as a sandy loam with a moderately alkaline pH. Phosphorus has limited availability for plant growth and development at 3.9 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The soil is protected fairly well by the combination of vegetation and litter. No rock or pavement was encountered on the surface or in the profile (Table - Basic Cover). There are no current erosion problems; however, pedestalling around the sagebrush is about 5 to 7 inches. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 to 1995 - slightly down (-1):** Differences in density may be related to the larger sample area used in 1995; therefore, trend was determined using other parameters. Decadence of basin big sagebrush increased from 12% to 32% and plants displaying poor vigor increased from 0% to 26%. Recruitment of young plants was low in both years.
- **1995 to 2000 - slightly down (-1):** There was a 16% decrease in the density of basin big sagebrush from 1,480 plants/acre to 1,240 plants/acre. Also, decadence increased to 53% and recruitment of young plants remained low. The cover of sagebrush increased slightly.
- **2000 to 2005 - down (-2):** There was a large die-off in sagebrush as density decreased 95% to just 60 plants/acre. Cover of sagebrush also decreased substantially. Decadence and plants displaying poor vigor both increased to 67%. There was no new recruitment of young plants.
- **2005 to 2010 - stable (0):** There was little change in the density of sagebrush, but all of the plants that were sampled were decadent and displayed poor vigor.

Grass:

- **1986 to 1995 - down (-2):** The sum of nested frequency of perennial grasses decreased by 47% with a significant decrease in the nested frequency of galleta. Annual grasses were not included in the sample in 1986.
- **1995 to 2000 - slightly down (-1):** There was a 13% decrease in the sum of nested frequency of perennial grasses, though cover remained similar. The nested frequency of cheatgrass decreased significantly, but cover remained similar.
- **2000 to 2005 - down (-2):** The sum of nested frequency of perennial grasses decreased by 27% and cover decreased from 3% to 1%. There was a significant increase in the annual grass six weeks fescue (*Vulpia octoflora*) nested frequency and cover increased from less than 1% to 4%. There was little change in the nested frequency of cheatgrass, but cover increased from 12% to 24%.
- **2005 to 2010 - slightly up (+1):** Perennial grass sum of nested frequency increased by 33%, though neither of the two perennial species sampled increased significantly. Both galleta and sand dropseed increased substantially in cover. The nested frequency of six weeks fescue decreased two degrees of significance, and cover decreased to a negligible amount. Cheatgrass variables remained similar, but high.

Forb:

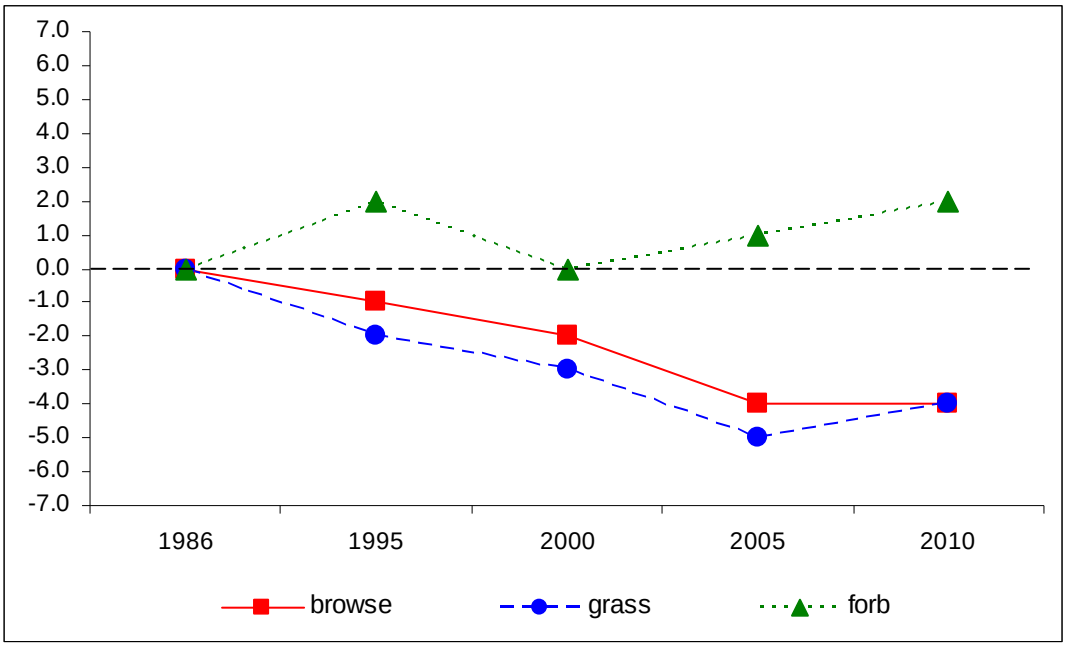
- **1986 to 1995 - up (+2):** Perennial forb sum of nested frequency increased two-fold, primarily due to a significant increase in the nested frequency of heath aster (*Leucelene ericoides*). Weedy annual species dominated the forb component on the site in 1995. Annual species were not included in the sample in 1986.
- **1995 to 2000 - down (-2):** The sum of nested frequency of perennial forbs decreased by 74% and cover decreased to a negligible amount. Heath aster decreased significantly in nested frequency.
- **2000 to 2005 - slightly up (+1):** There was an 81% increase in the sum of nested frequency of perennial forbs, but perennial forbs are so rare that any change reflects a large percentage change. Cover of perennial forbs increased to near 1%. There was a significant increase in the nested frequency of small flower globemallow.
- **2005 to 2010 - up (+1):** The sum of nested frequency of perennial forbs increased nearly four-fold due to a significant increase in the nested frequency of hoary aster (*Machaeranthera canescens*) and a *Cryptantha spp.*, though neither increased substantially in cover. The cover of small flower globemallow increased from 1% to 2%, however.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13B, study no: 1

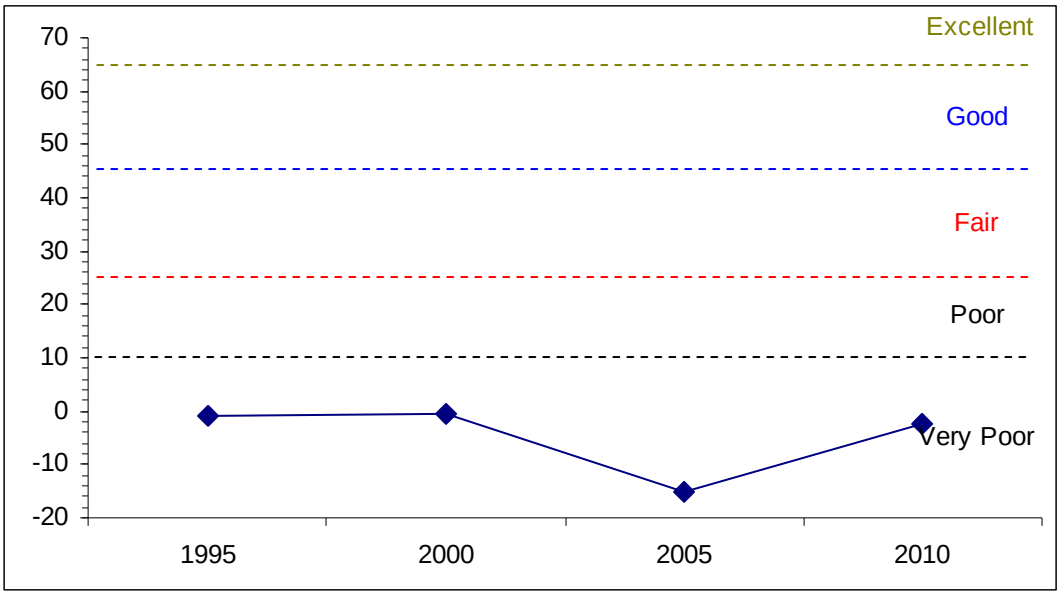
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	2.1	0.0	0.0	4.0	-9.4	2.4	0.0	**-0.9**	Very Poor
00	3.0	0.0	0.0	5.5	-9.4	0.3	0.0	**-0.6**	Very Poor
05	0.2	0.0	0.0	2.8	-20.0	1.7	0.0	**-15.3**	Very Poor
10	0.2	0.0	0.0	9.0	-17.6	5.8	0.0	**-2.5**	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13B, Study no: 1



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 13B, Study no: 1



HERBACEOUS TRENDS--
Management unit 13B, Study no: 1

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Bromus tectorum (a)	-	$_{b}$384	$_{a}$334	$_{a}$345	$_{a}$355	12.39	12.20	23.82	23.43
G	Hilaria jamesii	$_{c}$206	$_{b}$114	$_{ab}$75	$_{a}$47	$_{a}$58	1.99	1.83	.93	2.64
G	Oryzopsis hymenoides	-	-	1	-	-	-	.15	-	-
G	Sitanion hystrix	9	-	-	-	-	-	-	-	-
G	Sporobolus cryptandrus	$_{a}$1	$_{a}$-	$_{ab}$23	$_{b}$25	$_{b}$38	-	.77	.47	1.86
G	Vulpia octoflora (a)	-	$_{ab}$46	$_{b}$48	$_{c}$124	$_{a}$17	.09	.27	4.28	.03
Total for Annual Grasses		0	430	382	469	372	12.48	12.47	28.11	23.47
Total for Perennial Grasses		216	114	99	72	96	1.99	2.75	1.40	4.51
Total for Grasses		216	544	481	541	468	14.47	15.23	29.52	27.98
F	Astragalus sp.	$_{b}$12	$_{ab}$4	$_{a}$-	$_{ab}$1	$_{ab}$3	.01	-	.00	.38
F	Chaenactis stevioides	-	3	-	2	-	.00	-	.01	-
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{b}$39	$_{a}$9	$_{c}$88	-	.14	.02	.27
F	Cryptantha sp.	$_{a}$-	$_{b}$12	$_{a}$-	$_{a}$-	$_{b}$27	.03	-	-	.17
F	Draba nemorosa (a)	-	$_{a}$3	$_{b}$14	$_{a}$1	$_{a}$-	.00	.03	.00	-
F	Erodium cicutarium (a)	-	$_{a}$35	$_{b}$75	$_{c}$251	$_{c}$239	.45	1.25	10.16	3.76
F	Gilia sp. (a)	-	-	-	2	7	-	-	.00	.01
F	Lappula occidentalis (a)	-	$_{a}$1	$_{ab}$6	$_{b}$12	$_{c}$36	.00	.04	.03	.07
F	Lepidium densiflorum (a)	-	$_{c}$120	$_{a}$25	$_{c}$108	$_{b}$62	.79	.18	.82	.19
F	Leucelene ericoides	$_{a}$26	$_{b}$56	$_{a}$15	$_{a}$4	$_{a}$8	1.12	.13	.01	.33
F	Machaeranthera canescens	$_{a}$-	$_{a}$-	$_{a}$1	$_{a}$7	$_{b}$90	-	.00	.07	.49
F	Navarretia intertexta (a)	-	$_{c}$61	$_{b}$18	$_{ab}$6	$_{a}$-	.13	.07	.01	-
F	Oenothera albicaulis (a)	-	$_{ab}$9	$_{a}$-	$_{a}$3	$_{b}$14	.02	-	.00	.04
F	Plantago patagonica (a)	-	$_{c}$191	$_{a}$10	$_{c}$149	$_{b}$70	.61	.06	.55	.20
F	Salsola iberica (a)	-	$_{a}$-	$_{a}$-	$_{b}$68	$_{c}$247	-	-	.24	5.15

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
F	Sisymbrium altissimum (a)	-	$_{b}$156	$_{a}$24	$_{a}$22	$_{a}$23	.93	.24	.54	.29
F	Sphaeralcea parvifolia	$_{a}$-	$_{bc}$7	$_{ab}$5	$_{c}$24	$_{bc}$18	.02	.01	.76	1.54
Total for Annual Forbs		0	576	211	631	786	2.95	2.05	12.41	10.02
Total for Perennial Forbs		38	82	21	38	146	1.20	0.14	0.86	2.92
Total for Forbs		38	658	232	669	932	4.16	2.20	13.28	12.94

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

BROWSE TRENDS--
Management unit 13B, Study no: 1

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata tridentata	41	29	3	2	1.69	2.39	.18	.18
B	Gutierrezia sarothrae	2	1	0	1	-	-	-	.03
B	Opuntia sp.	0	0	0	0	-	-	-	-
Total for Browse		43	30	3	3	1.69	2.39	0.17	0.20

CANOPY COVER, LINE INTERCEPT--
Management unit 13B, Study no: 1

Species	Percent Cover	
	'05	'10
Artemisia tridentata tridentata	.01	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13B, Study no: 1

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata tridentata	.01	7.4
Grayia spinosa	-	38.9

BASIC COVER--
Management unit 13B, Study no: 1

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	11.50	29.78	22.89	42.96	46.90
Rock	0	0	0	0	0
Pavement	.25	0	0	0	0
Litter	50.50	51.34	34.70	31.29	39.79
Cryptogams	18.50	2.17	12.19	1.14	.91
Bare Ground	19.25	17.96	38.54	31.76	30.19

SOIL ANALYSIS DATA --

Management unit 13B, Study no: 1, Study Name: Lower Westwater Dolores

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
19.0	8.2	71.0	16.4	12.6	0.0	3.9	118.4	0.1

PELLET GROUP DATA--

Management unit 13B, Study no: 1

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	12	10	14	17
Elk	-	-	3	1
Deer	31	39	33	12
Cattle	3	4	11	4

Days use per acre (ha)		
'00	'05	'10
-	-	-
12 (30)	1 (2)	2 (5)
79 (195)	29 (73)	34 (84)
27 (68)	26 (65)	22 (54)

BROWSE CHARACTERISTICS--

Management unit 13B, Study no: 1

		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 tridentata									
86	**5132**	0	88	12	-	60	5	0	6/5
95	**1480**	1	66	32	-	15	3	26	24/30
00	**1240**	2	45	53	-	52	24	26	19/26
05	**60**	0	33	67	-	0	100	67	15/27
10	**40**	0	0	100	-	0	0	100	20/26
Atriplex canescens									
86	**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	23/13
10	**0**	0	0	-	-	0	0	0	32/55
Grayia spinosa									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	17/26
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	24/44
10	**0**	0	0	-	-	0	0	0	25/44
Gutierrezia sarothrae									
86	**0**	0	0	-	-	0	0	0	-/-
95	**40**	50	50	-	-	0	0	0	12/12
00	**20**	0	100	-	-	0	0	0	5/-
05	**0**	0	0	-	-	0	0	0	12/14
10	**20**	0	100	-	-	0	0	0	10/21

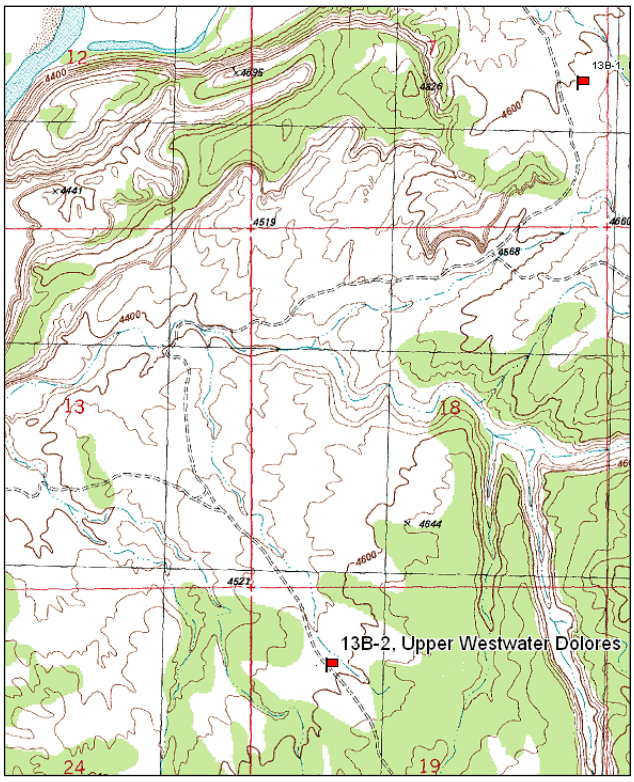
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
86	**66**	0	100	-	-	0	0	0	6/7
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	7/-
05	**0**	0	0	-	-	0	0	0	7/33
10	**0**	0	0	-	-	0	0	0	6/9

UPPER WESTWATER-DOLORES - TREND STUDY NO. 13B-2-10

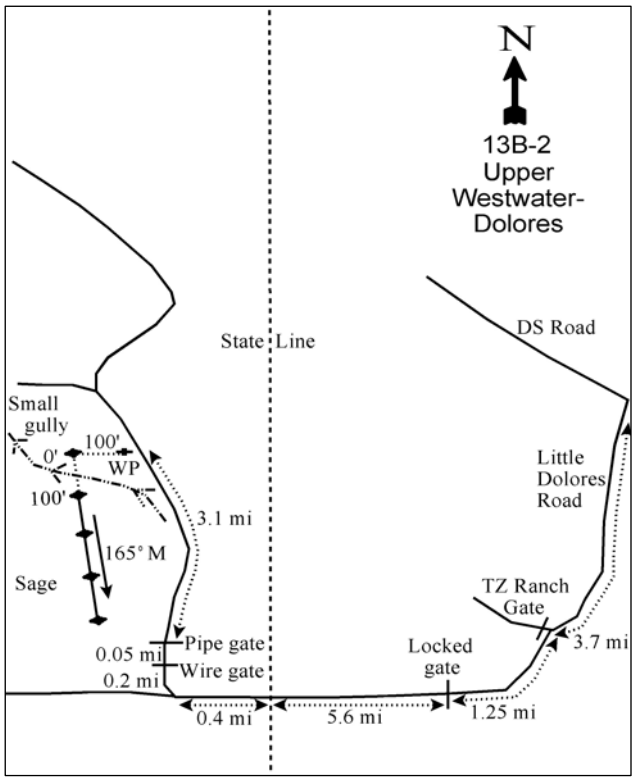
Vegetation Type: Basin Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 4600 ft. (1402 m)
Aspect: West
Slope: 4%-6%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the intersection of the DS Road and A Road west of Glade Park, Colorado, go down A Road 3.7 miles to the TZ Ranch gate. Turn left and go 1.25 miles to a locked gate (necessary to obtain permission and key). Continue 5.6 miles through the valley to the state line. Proceed 0.4 miles to a cabin, turn right and go along the edge of a field 0.2 miles to a wire gate. Go 0.05 miles to a locked pipe gate, and then 3.1 miles on the main road to the transect. There is a witness post (rebar) off the left side of the road 10-15 feet. The 0-foot baseline stake, a rebar tagged #7867, is 100 feet due west of the witness post.

Map Name: Westwater



Diagrammatic Sketch:



Township: 20S Range: 26E Section: 19

GPS: NAD 83, UTM 12S 665683 E 4324751 N

UPPER WESTWATER DOLORES - TREND STUDY NO. 13B-2

Site Information

Site Description: The study is in the northeast portion of the Dolores Triangle with the Colorado River approximately 1.5 miles to the west. When this site was established in 1986 it sampled a basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) flat surrounded by Utah juniper (*Juniperus osteosperma*) woodland. A fire burned the site between 1986 and 1995, likely as part of the Snyder 3 wildfire, which burned 1200 acres of the area in 1986. The wildfire left the site as an annual grassland. It is also likely that the site has burned again since 1995. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Buckhorn allotment. The number of deer pellet groups found at the site has been low and estimated use light since 2000. The estimated cattle use has been moderately heavy since 2000 (Table - Pellet Group Data).

Browse: At the outset of the study in 1986, basin big sagebrush was the dominant browse species on the site. Sometime between the 1986 and 1995 readings, the sagebrush population was lost to a wildfire. Annual species then dominated the site. The fire appears to have burned very hot with the fine fuels provided by annual species leaving very little sign that sagebrush once dominated the site. There is no indication that the sagebrush population is going to return in the future. Other associated browse species, fourwing saltbush (*Atriplex canescens*) and spiny hopsage (*Grayia spinosa*), were also removed, though a limited number of spiny hopsage remain around the site. Around the periphery of the site, there are juniper trees that survived the fire.

Herbaceous Understory: Annual cheatgrass dominated the understory in 1986. Although dense that year, cheatgrass appeared to be infected by a fungus that in many areas of the state had greatly reduced seed production during the wet years of 1983-85. Since the destructive wildfire, annuals have accounted for 88% to 96% of the total vegetation cover on the site. The annual grass species cheatgrass and sixweeks fescue (*Vulpia octoflora*) have fluctuated in being the dominant cover species. In 2000, much of the cheatgrass did not germinate, likely due to the dry fall and winter, with a subsequent decrease in cover. The perennial grass species galleta (*Hilaria jamesii*) and sand dropseed (*Sporobolus cryptandrus*) are also present, but in very low numbers. The annual forb species tumble mustard (*Sisymbrium altissimum*), storksbill (*Erodium cicutarium*), and Russian thistle (*Salsola iberica*) have been the predominant forbs on the site. Perennial forbs are very rare on the site (Table - Herbaceous Trends).

Soil: The soil is a reddish sandy loam with a neutral pH (7.2) (Table - Soil Analysis Data). Litter and vegetation cover is essentially contributed by only annual species and is therefore prone to large vacillations driven by climatic variation. This has been evident on this site. Bare ground cover has been moderately low on the site despite the presence of annuals (Table -Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 to 1995 - down (-2):** The entire population of basin big sagebrush was removed from the site by a wildfire. There was no browse sampled on the site in 1995.
- **1995 to 2000 - stable (0):** There were no preferred browse species sampled on the site. The browse condition remained very poor.
- **2000 to 2005 - stable (0):** There were no preferred browse species sampled on the site. The browse condition remained very poor.
- **2005 to 2010 - stable (0):** There were no preferred browse species sampled on the site. The browse condition remained very poor.

Grass:

- **1986 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial grasses and perennial grasses are rare. Cheatgrass was the dominant grass species on the site.
- **1995 to 2000 - slightly up (+1):** The sum of nested frequency of perennial grasses increased slightly, but they remain rare. Cheatgrass decreased two degrees of significance and cover decreased from 16% to less than 1%. However, sixweeks fescue increased significantly and cover increased from 3% to 5%.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, but cheatgrass increased significantly in nested frequency and cover increased to 6%. Sixweeks fescue also increased in cover to 15%.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased slightly and they remained rare on the site. Cheatgrass increased significantly and cover increased markedly to 38%. However, sixweeks fescue nested frequency decreased two degrees of significance and cover decreased to less than 1%.

Forb:

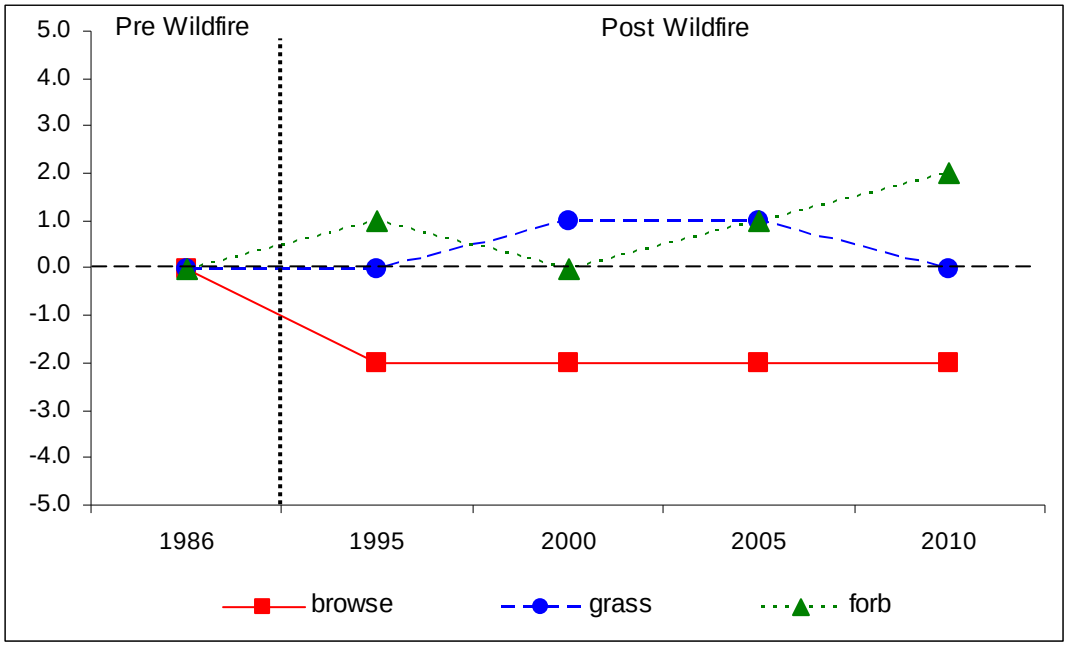
- **1986 to 1995 - slightly up (+1):** Perennial forbs increased in nested frequency, but cover remains less than 1%. Annual species dominate the site.
- **1995 to 2000 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased, but cover increased slightly. Annual species also had a decrease in the sum of nested frequency, but cover increased markedly due to a significant increase in the nested frequency of storksbill.
- **2000 to 2005 - slightly up (+1):** The perennial forb sum of nested frequency increased and cover increased to over 1%. However, the cover of annual species nearly doubled.
- **2005 to 2010 - slightly up (+1):** The sum of nested frequency of perennial forbs increased due to a significant increase in the nested frequency of hoary aster (*Machaeranthera canescens*), but cover remained around 1%. Annual species cover and sum of nested frequency decreased slightly.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13B, study no: 2

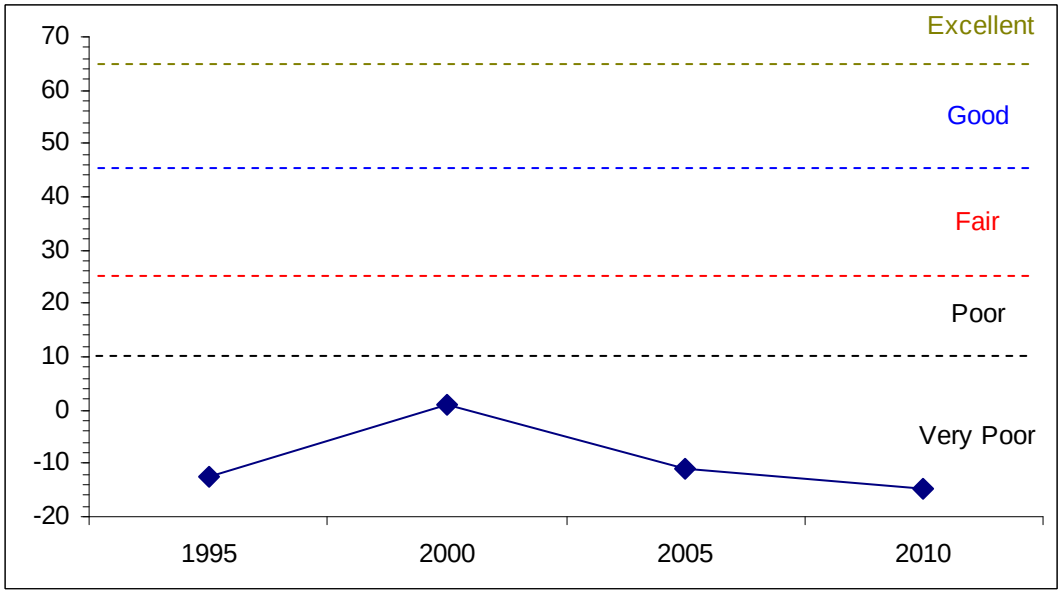
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	0.0	0.0	0.0	1.4	-14.5	0.6	0.0	**-12.5**	Very Poor
00	0.0	0.0	0.0	4.2	-4.7	1.4	0.0	**0.9**	Very Poor
05	0.0	0.0	0.0	2.0	-15.7	2.8	0.0	**-11.0**	Very Poor
10	0.0	0.0	0.0	3.5	-20.0	1.8	0.0	**-14.7**	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13B, Study no: 2



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 13B, Study no: 2



HERBACEOUS TRENDS--
Management unit 13B, Study no: 2

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Aristida purpurea	-	2	6	-	-	.03	.21	-	-
G	Bromus tectorum (a)	-	$_{c}$371	$_{a}$187	$_{b}$250	$_{c}$372	16.27	.89	5.99	38.45
G	Hilaria jamesii	45	40	33	29	32	.65	.95	.35	1.16
G	Sporobolus cryptandrus	$_{a}$-	$_{a}$-	$_{b}$15	$_{b}$28	$_{b}$10	-	.93	.65	.60
G	Vulpia octoflora (a)	-	$_{b}$277	$_{c}$326	$_{c}$334	$_{a}$49	3.01	5.39	15.00	.19
Total for Annual Grasses		0	648	513	584	421	19.29	6.29	20.99	38.64
Total for Perennial Grasses		45	42	54	57	42	0.69	2.09	1.01	1.76
Total for Grasses		45	690	567	641	463	19.98	8.38	22.00	40.40
F	Astragalus nuttallianus (a)	-	$_{b}$15	$_{a}$-	$_{ab}$9	$_{a}$-	.08	-	.19	-
F	Calochortus nuttallii	$_{a}$-	$_{a}$3	$_{a}$-	$_{b}$45	$_{b}$45	.00	-	.20	.38
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{b}$12	$_{a}$-	$_{ab}$8	-	.03	-	.02
F	Chenopodium leptophyllum(a)	-	-	-	-	2	-	-	-	.00
F	Cryptantha sp.	-	1	-	-	-	.00	-	-	-
F	Descurainia pinnata (a)	-	$_{a}$-	$_{a}$-	$_{b}$35	$_{b}$21	-	-	.14	.50
F	Draba sp. (a)	-	$_{a}$-	$_{b}$24	$_{c}$67	$_{b}$15	-	.04	.32	.03
F	Erigeron sp.	-	2	-	-	-	.00	-	-	-
F	Eriogonum cernuum (a)	-	2	-	-	-	.00	-	-	-
F	Erodium cicutarium (a)	-	$_{a}$44	$_{b}$213	$_{c}$344	$_{b}$252	.14	9.74	20.87	5.69
F	Lepidium densiflorum (a)	-	$_{b}$70	$_{a}$10	$_{a}$3	$_{a}$4	.15	.05	.00	.15
F	Machaeranthera canescens	$_{a}$-	$_{a}$6	$_{a}$-	$_{a}$5	$_{b}$42	.01	-	.04	.20
F	Navarretia intertexta (a)	-	$_{c}$51	$_{b}$11	$_{ab}$2	$_{a}$-	.15	.02	.00	-
F	Oenothera sp.	-	-	-	-	1	-	-	-	.00
F	Plantago patagonica (a)	-	$_{b}$276	$_{a}$6	$_{a}$10	$_{a}$10	1.93	.01	.02	.02
F	Salsola iberica (a)	-	$_{a}$-	$_{a}$10	$_{b}$260	$_{b}$258	-	.02	3.79	10.21
F	Sisymbrium altissimum (a)	-	$_{d}$307	$_{c}$241	$_{b}$58	$_{a}$9	5.85	3.69	.78	.19
F	Sphaeralcea coccinea	$_{a}$2	$_{d}$54	$_{c}$25	$_{ab}$9	$_{a}$2	.27	.72	.52	.01
F	Sphaeralcea parvifolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$10	$_{b}$4	-	-	.61	.31
Total for Annual Forbs		0	765	527	788	579	8.33	13.62	26.12	16.84
Total for Perennial Forbs		2	66	25	69	94	0.30	0.72	1.38	0.90
Total for Forbs		2	831	552	857	673	8.63	14.35	27.50	17.75

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

BROWSE TRENDS--
Management unit 13B, Study no: 2

Type	Species	Strip Frequency			Average Cover %		
		'00	'05	'10	'00	'05	'10
B	Gutierrezia sarothrae	1	0	0	.03	-	-
Total for Browse		1	0	0	0.03	0	0

BASIC COVER--
Management unit 13B, Study no: 2

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	10.50	47.54	26.79	49.97	57.46
Rock	0	.00	.00	0	0
Pavement	0	0	.01	0	.03
Litter	69.50	59.21	36.02	20.01	44.00
Cryptogams	3.50	3.03	16.78	6.24	.45
Bare Ground	16.50	13.90	29.22	29.78	23.27

SOIL ANALYSIS DATA --
Management unit 13B, Study no: 2, Study Name: Upper Westwater Dolores

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.4	7.2	56.0	26.0	18.0	0.4	8.4	163.2	0.5

PELLET GROUP DATA--
Management unit 13B, Study no: 2

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	9	2	7	11
Elk	-	-	-	-
Deer	10	9	7	2
Cattle	9	25	29	23

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	-	1 (2)
8 (20)	6 (15)	9 (23)
51 (126)	57 (142)	38 (93)

BROWSE CHARACTERISTICS--
Management unit 13B, Study no: 2

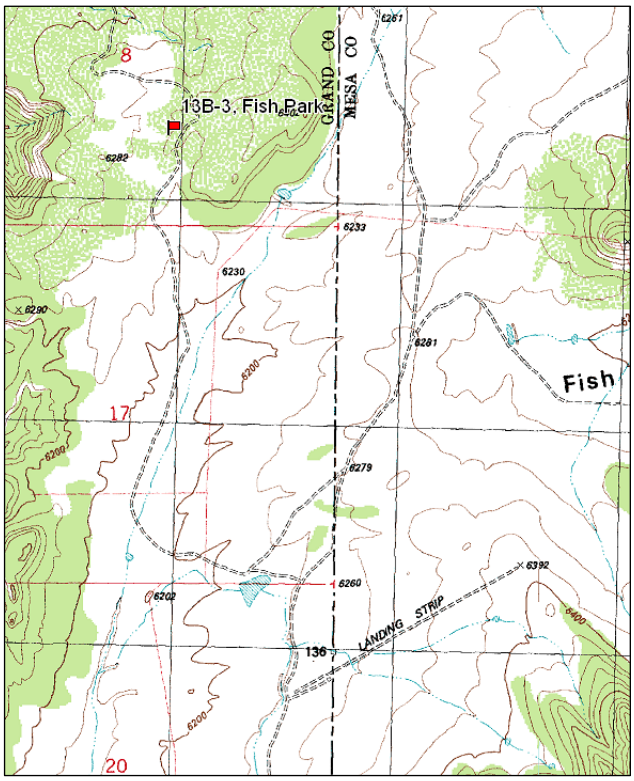
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata tridentata									
86	**2198**	30	18	52	-	0	0	0	28/27
95	**0**	0	0	0	-	0	0	0	-/-
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Gutierrezia sarothrae									
86	**0**	0	0	0	-	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**20**	0	0	100	-	0	0	100	6/12
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Opuntia sp.									
86	**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	7/50
10	**0**	0	0	-	-	0	0	0	7/8

FISH PARK - TREND STUDY NO. 13B-3-10

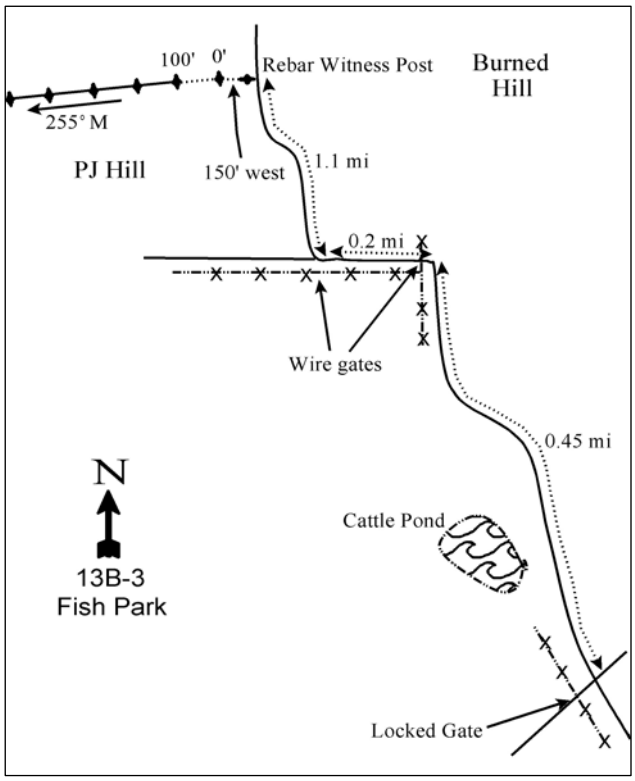
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 6300 ft. (1921 m)
Aspect: West
Slope: 6%-8%
Transect bearing: 255° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

Directions:
Starting from the turnoff to the Picture Gallery Ranch (approximately 0.75 miles west of the Utah_Colorado state line out of Glade Park, CO), turn right off the main road and drive 0.1 mile to a fork. Take the right (upper) fork, go 1.2 miles to a ranch. Just past the first house, turn right and proceed northeast toward a hill. You are heading basically north-northwest toward the juniper-covered hills. At 0.6 miles beyond the house, go through a gate and continue north 0.4 miles to a locked gate (permission and combo needed). After going through the locked gate turn left and go 0.45 miles to another wire gate. Go through the wire gate and continue 0.2 miles. Turn right onto a faint road that has been seeded over. This turn is opposite a gate in the fence. Continue 1.1 miles gradually climbing the hill. The road becomes very rocky toward the top. Pass a fencepost which is not the witness post. Once in the pinyon and juniper look for a rebar witness post on the left side of the road. The 0-foot baseline stake, a rebar tagged #7874, is 150 feet west of the witness post.

Map Name: Marble Canyon



Diagrammatic Sketch:



Township: 21S Range: 26E Section: 8

GPS: NAD 83, UTM 12S 667883 E 4317496 N

FISH PARK - TREND STUDY NO. 13B-3

Site Information

Site Description: The study is on the upper, eastern edge of a 2,600 acre Bureau of Land Management (BLM) chaining and seeding completed in 1968. To the south and east are the pastures and fields in Fish Park. The gentle west-sloping country is cut by intermittent canyons which flow directly into the Colorado River. To accommodate the increased sample size and stay within the same vegetation type, the transect was repositioned in 1995. The chaining is part of the Mountain Island allotment, which is administered by the Grand Junction BLM office. Livestock grazing pressure appears moderately light in the study area. Deer pellet groups were rarely encountered and pellet group data has indicated light use by deer since 2000. Estimated elk use has increased steadily from light use in 2000 to moderately heavy use in 2010. Estimated cattle use has been very light since 2000. Rabbit pellet group quadrat frequency was quite high in 1995 and 2005, which could account for much of the utilization (Table - Pellet Group Data).

Browse: Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) is the key browse species on this chained site. Browse seed was provided by the Utah Division of Wildlife Resources, which included big sagebrush and four-wing saltbush (*Atriplex canescens*). However, which sagebrush subspecies was included in the seed mix is not clear because both basin big sagebrush and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) are present on the site. Basin big sagebrush appears to be dominant; therefore the data tables refer to all sagebrush as basin big sagebrush. In general, the sagebrush has been lightly used and vigorous, with good seed production. The age structure has shifted from a young population to a more mature population with more decadent individuals (Table - Browse Characteristics). Broom snakeweed (*Gutierrezia sarothrae*) and cactus (*Opuntia sp.*) are present and have fluctuated in numbers, yet these populations together have made up less than 1% total cover (Table - Browse Trends).

There is a healthy, mature and moderately dense stand of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) on and surrounding the site. The size of the pinyon-juniper trees has noticeably increased since 1986 as evidenced by comparing photographs from each year. The point-center quarter estimation has fluctuated in density since 2000, but has been moderately low for a 42 year old chaining (Table - Point Quarter Tree Data). Much of the herbaceous understory on this site appeared to be around the drip line of the mature trees.

Herbaceous Understory: The seeded species crested wheatgrass (*Agropyron cristatum*) is the dominant grass species on the site and has steadily increased in cover since 1995. Other perennial grass species include galleta (*Hilaria jamesii*), needle and thread (*Stipa comata*) and several bluegrass species (*Poa spp.*), but none of these species is overly abundant. The annual grasses, cheatgrass (*Bromus tectorum*) and sixweeks fescue (*Vulpia octoflora*) are common on the site and account for most of the grass cover other than crested wheatgrass. Both annual species have fluctuated highly in cover and frequency over the course of the study, however. Forbs occur infrequently and account for only a small amount of the total vegetation cover. Alfalfa (*Medicago sativa*) was reported as large and vigorous in 1986, yet with the extended drought has not been sampled in any of the subsequent readings. Other perennial forbs have steadily decreased in sum of nested frequency since 1995 (Table - Herbaceous Trends).

Soil: The soil is a loam texture with a neutral soil reaction (pH of 6.8). Effective rooting depth is almost 16 inches, at which depth there is a bedrock of sandstone. Phosphorus has limited availability at 5.9 ppm and potassium marginal availability at 61 ppm for plant growth and development (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The soil surface contains very few rocks or pavement, although there is good vegetation and litter cover on this site with some scattered bare interspaces between clumps of basin big sagebrush and pinyon-juniper trees (Table - Basic Cover). In the bare interspaces, erosion doesn't appear to be a problem. Annual plants and slight erosion can be found near the roadside where the soil has been disturbed. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 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 the recruitment of young sagebrush plants.
- **1995 to 2000 - slightly up (+1):** The density of sagebrush increased 25% from 3,240 plants/acre to 4,040 plants/acre, and cover increased from 12% to 17%. Recruitment of young sagebrush plants decreased substantially, but remained good at 16%.
- **2000 to 2005 - down (-2):** Sagebrush density decreased by 42% to 2,340 plants/acre and cover decreased to 8%. Decadence increased from 9% to 57% and plants displaying poor vigor increased from 2% of the population to 38%. However, recruitment of young sagebrush plants decreased to its lowest levels at 2% of the population.
- **2005 to 2010 - stable (0):** There was a slight increase in the density of sagebrush to 2,500 plants/acre, but cover remained similar. Decadence and poor vigor decreased to 26%, and 11%, respectively, but recruitment of young sagebrush plants increased to 10% of the population.

Grass:

- **1986 to 1995 - down (-2):** There was a 20% decrease in the sum of nested frequency of perennial grasses with a significant decrease in the nested frequency of crested wheatgrass and needle and thread.
- **1995 to 2000 - slightly up (+1):** The sum of nested frequency of perennial grasses increased 9%, but cover decreased slightly. Crested wheatgrass increased two degrees of significance and cover increased from 4% to 6%. Cheatgrass and sixweeks fescue both decreased significantly in nested frequency and the cover of annual grasses decreased from 6% to 1%.
- **2000 to 2005 - down (-2):** The perennial grass sum of nested frequency decreased by 13%, though cover increased to 11%. There was a significant decrease in the nested frequency of crested wheatgrass and galleta, though the cover of crested wheatgrass increased slightly. Cheatgrass and sixweeks fescue increased significantly in nested frequency and cover of annual grasses increased to 21%.
- **2005 to 2010 - slightly up (+1):** Perennial grass sum of nested frequency increased by 7%, but cover increased substantially to 20%. There was a significant decrease in the nested frequency of sixweeks fescue and the cover of annual grasses decreased to 6%.

Forb:

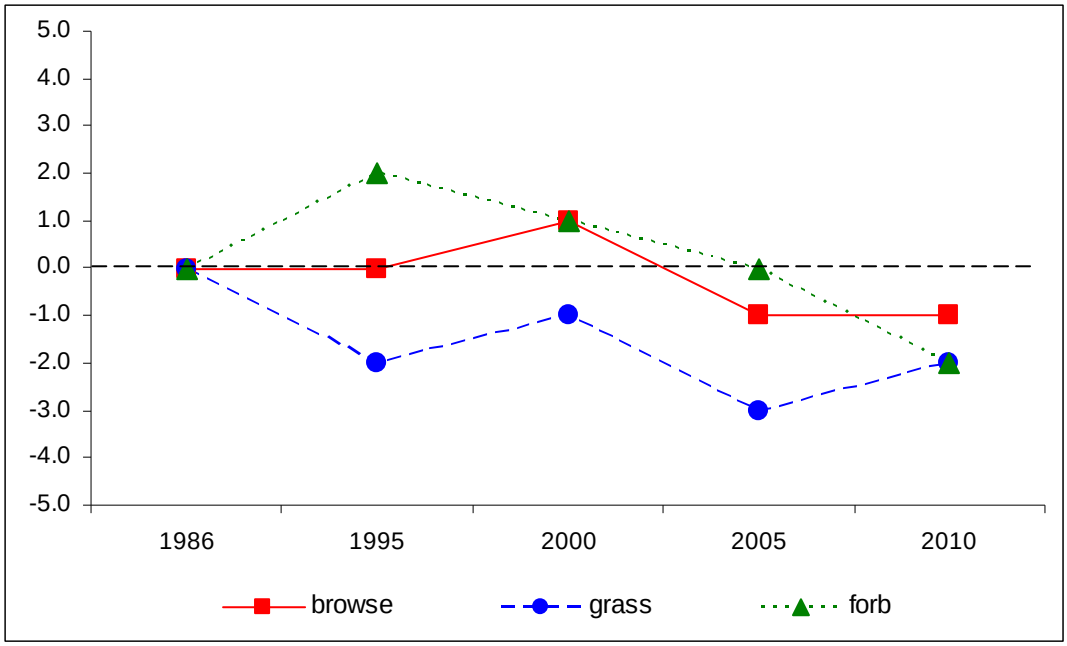
- **1986 to 1995 - up (+2):** The sum of nested frequency of perennial forbs increased by 35%.
- **1995 to 2000 - slightly down (-1):** Perennial forb sum of nested frequency decreased by 13%, though cover increased slightly.
- **2000 to 2005 - slightly down (-1):** There was a 20% decrease in the sum of nested frequency of perennial forbs, though cover remained similar. Forbs were not abundant on the site.
- **2005 to 2010 - down (-2):** The sum of nested frequency of perennial forbs decreased by 62% and cover decreased to less than 1%. Perennial forbs were very rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13B, study no: 3

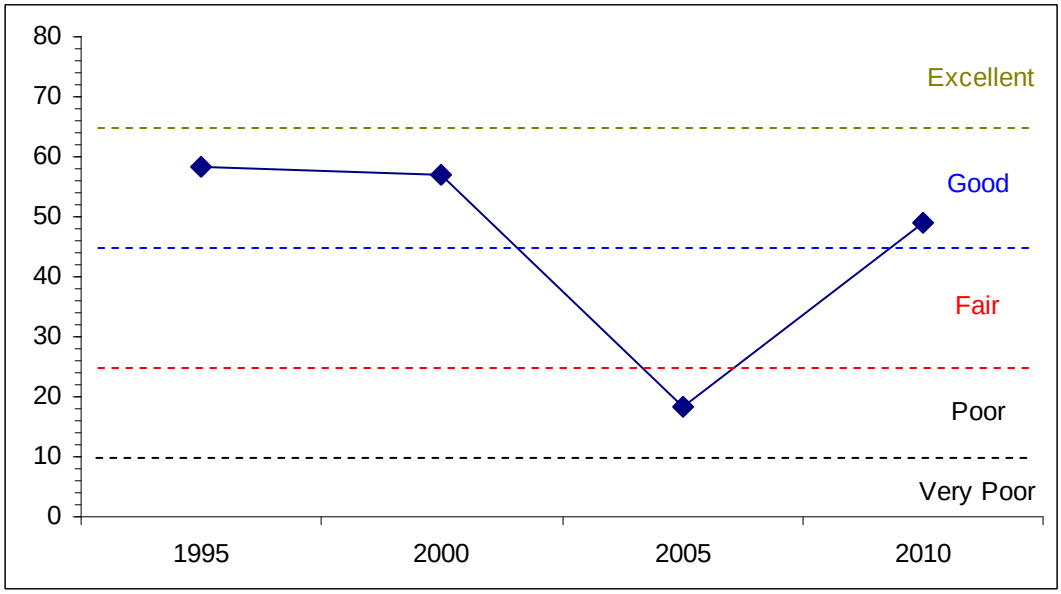
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	14.5	14.4	15.0	15.8	-4.2	2.7	0.0	**58.2**	Good
00	20.9	12.3	8.0	13.5	-0.8	3.2	0.0	**57.0**	Good
05	10.3	-2.1	1.0	21.9	-15.7	3.0	0.0	**18.5**	Poor
10	10.5	7.2	5.0	30.0	-4.8	1.2	0.0	**49.1**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13B, Study no: 3



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 13B, Study no: 3



HERBACEOUS TRENDS--
Management unit 13B, Study no: 3

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	bc169	a115	c171	ab131	bc158	3.70	5.76	7.48	15.87
G	Agropyron intermedium	-	-	-	2	-	-	-	.03	-
G	Bromus tectorum (a)	-	b278	a125	b264	b246	4.42	.77	12.88	6.28
G	Hilaria jamesii	b76	b97	b65	a27	a13	3.12	.49	.38	.33
G	Poa bulbosa	-	-	-	5	10	-	-	.04	.21
G	Poa fendleriana	a-	b38	ab24	ab23	a8	1.05	.12	.63	.33
G	Poa secunda	a-	a-	a-	b27	c55	-	-	1.50	1.15
G	Sitanion hystrix	9	1	-	8	8	.00	-	.21	.33
G	Sporobolus cryptandrus	-	-	2	-	-	-	.00	-	-
G	Stipa comata	b70	a8	a21	a23	a12	.02	.35	.66	1.65
G	Vulpia octoflora (a)	-	c186	b77	c234	a25	1.23	.36	8.05	.05
Total for Annual Grasses		0	464	202	498	271	5.65	1.13	20.94	6.34
Total for Perennial Grasses		324	259	283	246	264	7.91	6.74	10.95	19.89
Total for Grasses		324	723	485	744	535	13.57	7.88	31.89	26.23
F	Agoseris glauca	-	2	-	-	-	.00	-	-	-
F	Allium sp.	-	-	-	3	-	-	-	.00	-
F	Astragalus convallarius	b10	b14	ab9	a-	a-	.44	.12	-	-
F	Astragalus mollissimus	a-	b13	ab4	ab5	a-	.18	.06	.16	-
F	Astragalus sp.	-	-	-	5	2	-	-	.03	.18
F	Calochortus nuttallii	-	2	-	5	3	.00	-	.01	.00
F	Castilleja linariaefolia	-	2	-	-	1	.03	.03	-	.00
F	Cryptantha fulvocanescens	5	-	-	-	-	-	-	-	-
F	Cryptantha sp.(a)	-	-	-	6	-	-	-	.04	-
F	Cymopterus sp.	-	2	-	2	-	.00	-	.00	-
F	Delphinium nuttallianum	-	-	-	-	6	-	-	-	.03
F	Descurainia pinnata (a)	-	b22	a1	ab12	a-	.04	.00	.66	-
F	Draba nemorosa (a)	-	c95	ab6	b14	a-	.20	.01	.03	-
F	Erigeron pumilus	5	8	8	8	6	.02	.05	.24	.24
F	Erodium cicutarium (a)	-	-	-	3	5	-	-	.03	.01
F	Gayophytum ramosissimum(a)	-	b31	a-	a7	a-	.08	-	.01	-
F	Gilia hutchinifolia (a)	-	c43	a-	c42	b13	.08	-	.13	.03
F	Haplopappus acaulis	-	3	-	-	1	.00	-	-	.03
F	Ipomopsis aggregata	-	1	-	-	-	.03	-	-	-
F	Lappula occidentalis (a)	-	b18	a-	b9	ab7	.06	-	.08	.02
F	Lepidium densiflorum (a)	-	c21	a2	ab4	bc14	.04	.00	.01	.05
F	Lithospermum sp.	-	6	-	-	-	.01	-	-	-
F	Lygodesmia spinosa	-	2	-	-	-	.00	-	-	-
F	Medicago sativa	4	-	-	-	-	-	-	-	-
F	Microsteris gracilis (a)	-	a-	ab2	b12	a-	-	.00	.08	-
F	Petradoria pumila	-	-	8	-	3	-	.06	-	.00
F	Phlox hoodii	-	-	23	-	-	-	.26	-	-
F	Phlox longifolia	b87	b92	b91	b81	a10	.33	.69	.93	.04
F	Plantago patagonica (a)	-	b114	a51	b108	a50	.27	.21	1.04	.13

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
F	Polygonum douglasii (a)	-	9	-	-	-	.02	-	-	-
F	Ranunculus testiculatus (a)	-	-	-	-	3	-	-	-	.00
F	Salsola iberica (a)	-	-	-	-	3	-	-	-	.00
F	Sisymbrium altissimum (a)	-	8	-	-	-	.01	-	-	-
F	Sphaeralcea coccinea	$_{ab}$23	$_{b}$30	$_{a}$14	$_{ab}$16	$_{a}$13	.27	.32	.14	.03
F	Streptanthus cordatus	-	1	-	-	-	.00	-	-	-
F	Trifolium sp.	-	3	-	-	-	.00	-	-	-
F	Zigadenus paniculatus	-	-	-	-	3	-	-	-	.01
Total for Annual Forbs		0	361	62	217	95	0.82	0.24	2.13	0.25
Total for Perennial Forbs		134	181	157	125	48	1.35	1.60	1.52	0.58
Total for Forbs		134	542	219	342	143	2.17	1.84	3.65	0.84

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

BROWSE TRENDS--
Management unit 13B, Study no: 3

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata tridentata	56	63	56	61	11.60	16.71	8.27	8.38
B	Gutierrezia sarothrae	8	17	5	1	.05	.64	.03	.00
B	Juniperus osteosperma	0	7	8	7	6.21	6.83	7.33	9.55
B	Opuntia sp.	4	4	3	5	.38	.30	.30	.15
B	Pinus edulis	0	3	2	1	2.67	5.52	1.86	.03
Total for Browse		68	94	74	75	20.93	30.02	17.79	18.11

CANOPY COVER, LINE INTERCEPT--
Management unit 13B, Study no: 3

Species	Percent Cover		
	'00	'05	'10
Artemisia tridentata tridentata	-	10.85	10.91
Gutierrezia sarothrae	-	-	.23
Juniperus osteosperma	6.59	12.10	8.16
Opuntia sp.	-	.16	.21
Pinus edulis	3.00	3.54	.45

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13B, Study no: 3

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata tridentata	1.3	6.2

POINT-QUARTER TREE DATA--
Management unit 13B, Study no: 3

Species	Trees per Acre				Average diameter (in)			
	'95	'00	'05	'10	'95	'00	'05	'10
Juniperus osteosperma	68	73	41	93	5.2	5.0	5.7	8.5
Pinus edulis	25	13	34	22	3.5	6.2	5.1	7.2

BASIC COVER--
Management unit 13B, Study no: 3

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	16.50	37.57	40.97	50.97	45.07
Rock	0	.12	.33	.06	.15
Pavement	0	.04	.18	.05	.36
Litter	68.50	44.53	48.42	35.73	51.99
Cryptogams	0	5.65	10.93	2.52	4.68
Bare Ground	15.00	24.65	31.86	25.11	20.38

SOIL ANALYSIS DATA --
Management unit 13B, Study no: 3, Study Name: Fish Park

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.5	6.8	48.0	30.0	22.0	1.0	5.9	60.8	0.6

PELLET GROUP DATA--
Management unit 13B, Study no: 3

Type	Quadrat Frequency				Days use per acre (ha)		
	'95	'00	'05	'10	'00	'05	'10
Rabbit	48	20	49	28	-	-	-
Elk	-	-	11	21	1 (2)	23 (58)	50 (122)
Deer	3	7	20	20	14 (35)	13 (33)	15 (36)
Cattle	5	1	-	-	3 (8)	2 (5)	1 (2)

BROWSE CHARACTERISTICS--
Management unit 13B, Study no: 3

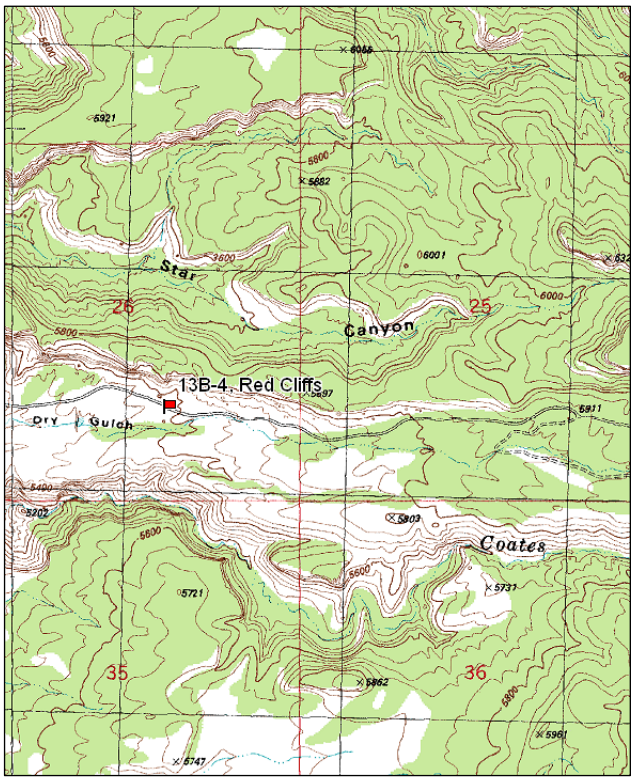
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata tridentata									
86	**2265**	71	24	6	933	7	0	3	24/20
95	**3240**	35	63	2	1440	2	.61	4	29/42
00	**4040**	16	75	9	760	29	8	2	28/38
05	**2340**	2	41	57	1380	44	10	38	29/41
10	**2500**	10	65	26	100	29	5	11	25/37
Gutierrezia sarothrae									
86	**531**	19	75	6	-	0	0	0	7/8
95	**200**	30	70	0	-	0	0	0	10/12
00	**1640**	0	100	0	20	0	0	0	7/9
05	**240**	17	83	0	-	0	0	0	9/11
10	**20**	0	100	0	-	0	0	0	7/8
Juniperus osteosperma									
86	**33**	0	100	0	-	0	0	0	61/44
95	**0**	0	0	0	-	0	0	0	-/-
00	**160**	13	88	0	-	0	0	0	-/-
05	**160**	13	75	13	-	0	0	13	-/-
10	**140**	14	86	0	-	0	0	14	-/-
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
95	**200**	0	90	10	-	0	0	10	4/18
00	**380**	0	100	0	-	0	0	0	4/10
05	**120**	0	100	0	-	0	0	0	5/24
10	**320**	0	100	0	-	0	0	0	4/11
Pinus edulis									
86	**0**	0	0	0	-	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**100**	0	100	0	-	0	0	0	-/-
05	**40**	0	50	50	-	0	0	50	-/-
10	**20**	100	0	0	-	0	0	0	-/-

RED CLIFFS - TREND STUDY NO. 13B-4-10

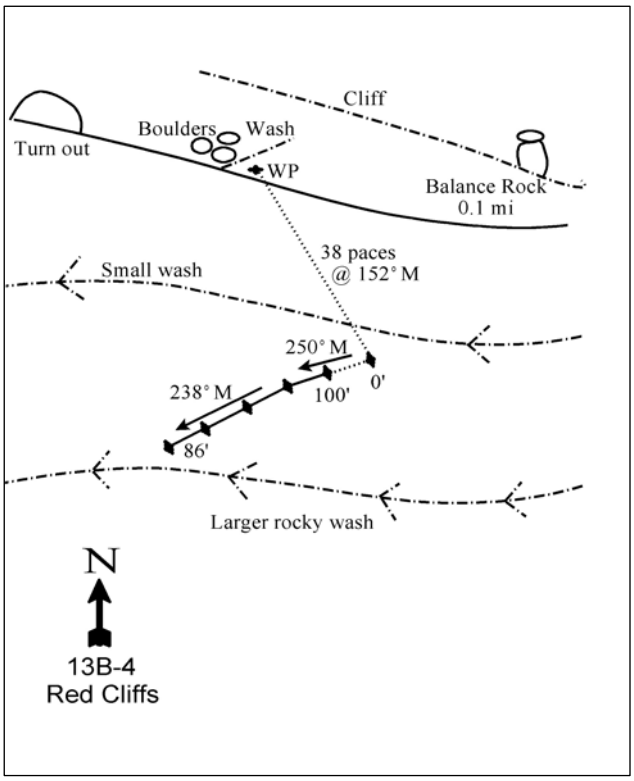
Vegetation Type: Blackbrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 5605 ft. (1709 m)
Aspect: Southwest
Slope: 3%-5%
Transect bearing: 250° magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (86ft). Belt rebar placement: belt 2@1ft, belt 3@2ft, belt 5@5ft.

Directions:
From the Utah-Colorado state line west of Glade Park, go west 2.1 miles on the Coates Creek Road to a cattle guard. Continue on the main road 2.1 miles to a Pinyon-Juniper area bordered on the right by large sandstone cliffs. The witness post is on the right (north) side of the road. The baseline starts 140 feet south (across the road) from the witness post. A short rebar, tagged #7816, marks the 0-foot end of the baseline.

Map Name: Marble Canyon



Diagrammatic Sketch:



Township: 21S Range: 25E Section: 26

GPS: NAD 83, UTM 12S 663120 E 4312556 N

Site Information

Site Description: The study site is located along the Coates Creek Road in an area dominated by pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*) and blackbrush (*Coleogyne ramosissima*). Steep orange sandstone cliffs are located just north and across the road from the site. The transect samples slightly rolling topography with exposures varying from north to south and west. There is a stock pond down a wash about one-tenth of a mile to the west of the transect, although livestock do not appear to utilize this site. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Sand Flats allotment. Deer and rabbit pellet groups are usually common in the area. To accommodate the increased sample size and stay within the same vegetation type, the position of the transect extension was slightly altered in 1995. The pellet-group data has indicated increasing deer use from moderate use in 2000 to very heavy use in 2010. No elk use was noted in 2000 and use has been light since 2005. Cattle use was estimated to be light in 2010 (Table - Pellet Group Data).

Browse: The key browse species on this site is blackbrush which has provided the majority of the cover on the site since 1995 (Table - Browse Trends). The age class structure of the blackbrush population has changed little since 1986 with it being a mature population with few young or decadent plants. Utilization has been mostly light with some moderate use. Blackbrush plants exhibit good vigor. Several other browse species are present, but infrequently encountered. These include: broom snakeweed (*Gutierrezia sarothrae*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), spiny hopsage (*Grayia spinosa*) and green ephedra (*Ephedra viridis*) (Table - Browse Characteristics). Point-center quarter data shows a small, mature stand of pinyon pine and Utah juniper trees established on the site (Table - Point Quarter Tree Data).

Herbaceous Understory: The herbaceous understory is dominated by the annual grass, cheatgrass (*Bromus tectorum*), with perennial grasses and forbs being rare. Perennial forbs have rarely been found, but the annual species have been sampled at fluctuating frequency and cover over the sample years (Table - Herbaceous Trends).

Soil: The light orange soil texture is a sandy clay loam composed of very fine particles which is loosely compacted on the surface, and with a soil reaction that is mildly alkaline (pH 7.6). Phosphorus may have limited availability for plant growth and development at 5.9 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Black rock and pavement are scattered throughout the site providing good ground cover. Vegetation and little cover have fluctuated over the sample years due to the prevalence of annual species on the site, but bare ground cover has remained relatively low. The bare soil interspaces between the blackbrush plants is protected mainly by cryptogrammic crust, which has high cover over the site (Table - Basic Cover). Some slight erosion, as well as pedestaling under the shrubs, was noted in 1995 and 2000. The soil erosion condition was classified as slight in 2005 due to common pedestaling under the shrubs, a small amount of recent soil and rock movement, small rills on the site, and a large gully north of the site near the road. The soil erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **1986 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. Decadence and the proportion of plants displaying poor vigor in the blackbrush population decreased slightly, but recruitment of young plants remained low.
- **1995 to 2000 - stable (0):** The density of blackbrush decreased 6% from 4,560 plants/acre to 4,280 plants/acre, and cover decreased from 17% to 14%. Decadence and poor vigor of blackbrush remained low, but so did the recruitment of young plants.

- **2000 to 2005 - stable (0):** Blackbrush density increased by 4% to 4,460 plants/acre, and cover increased to 15%. Decadence in the blackbrush population increased slightly to 12%.
- **2005 to 2010 - slightly down (-1):** The density of blackbrush decreased by 24% to 3,380 plants/acre, though cover increased to 16%. Decadence decreased slightly to 5% and recruitment of young blackbrush plants increased slightly from 2% to 4%, but remained low.

Grass:

- **1986 to 1995 - down (-2):** Perennial grass sum of nested frequency decreased by 78% and perennial grasses were very rare on the site. Cheatgrass was prevalent on the site with high nested frequency and cover at around 5%.
- **1995 to 2000 - slightly up (+1):** The sum of nested frequency of perennial grasses increased substantially, but perennial grasses remain rare at less than 1% cover. Cheatgrass nested frequency decreased significantly and cover decreased to 2%.
- **2000 to 2005 - slightly down (-1):** There was little change in the sum of nested frequency of perennial grasses, though cover increased to 2%. There was a significant increase in the nested frequency of cheatgrass and cover increased to 15%.
- **2005 to 2010 - stable (0):** The sum of nested frequency and cover of perennial grasses and cheatgrass changed little.

Forb:

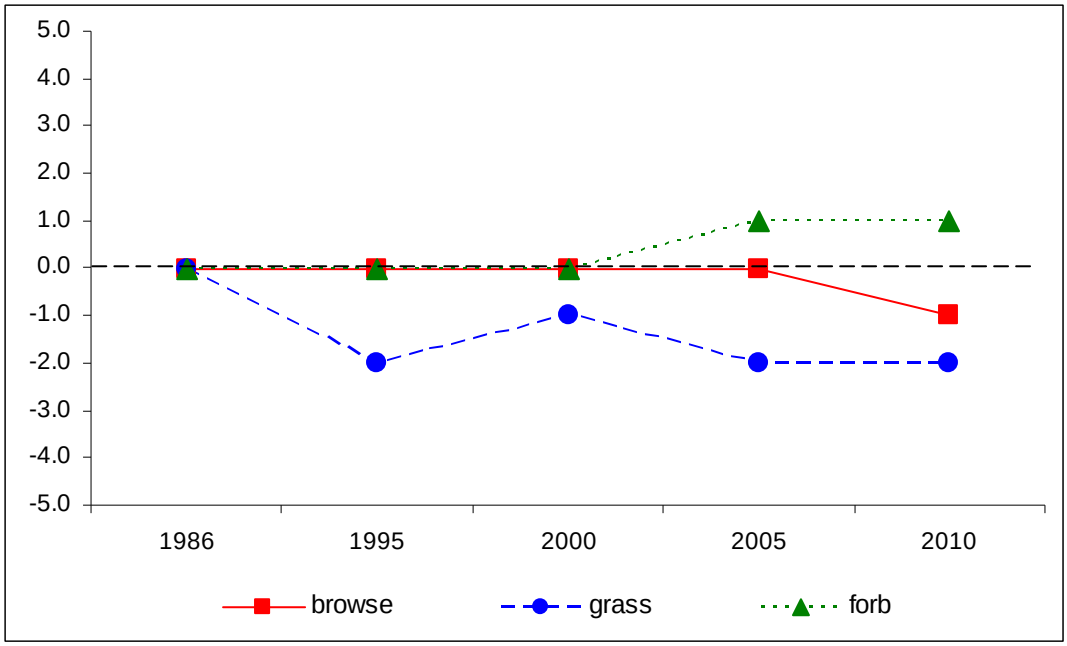
- **1986 to 1995 - stable (0):** Perennial forbs were very rare on the site with little change in frequency or cover.
- **1995 to 2000 - stable (0):** Perennial forbs were very rare on the site with little change in frequency or cover.
- **2000 to 2005 - slightly up (+1):** There was a slight increase in the sum of nested frequency and cover of perennial forbs, but perennial forbs remain rare.
- **2005 to 2010 - stable (0):** Perennial forbs were rare on the site with little change in frequency or cover.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13B, study no: 4

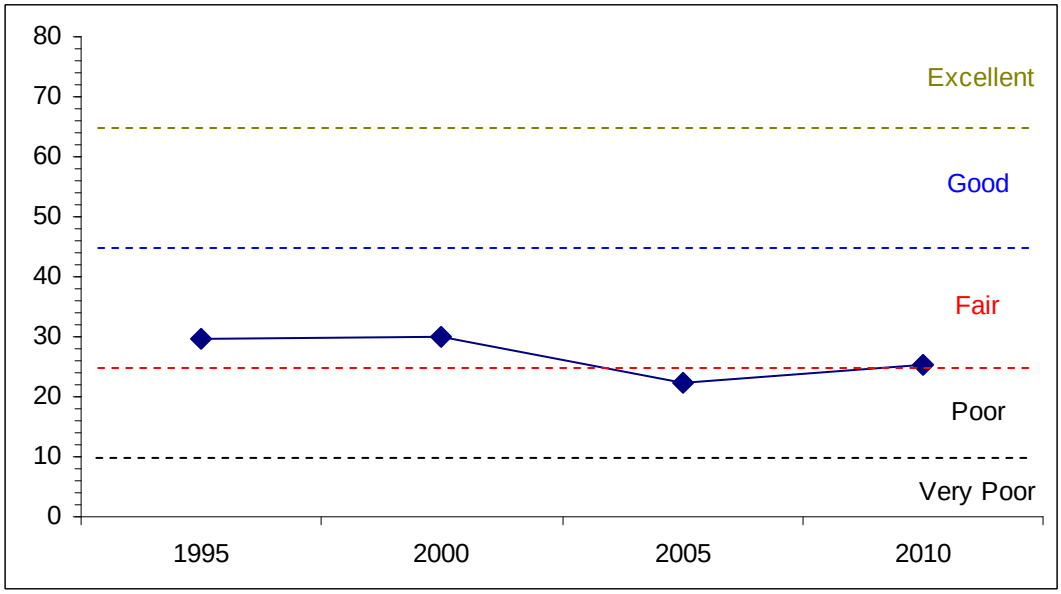
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	16.7	13.8	1.5	1.0	-3.4	0.1	0.0	**29.6**	Fair
00	14.6	13.6	1.5	1.8	-1.7	0.1	0.0	**29.9**	Fair
05	15.5	11.5	1.7	4.0	-11.5	1.3	0.0	**22.5**	Poor
10	16.3	13.5	2.2	2.2	-9.7	1.0	0.0	**25.5**	Poor-Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13B, Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 13B, Study no: 4



HERBACEOUS TRENDS--
Management unit 13B, Study no: 4

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Aristida purpurea	3	3	6	-	-	.30	.06	-	-
G	Bromus tectorum (a)	-	$_{b}$336	$_{a}$264	$_{b}$308	$_{b}$312	4.56	2.24	14.91	12.92
G	Oryzopsis hymenoides	-	-	5	-	-	-	.03	-	-
G	Poa fendleriana	$_{c}$110	$_{b}$21	$_{b}$11	$_{a}$-	$_{b}$25	.15	.13	-	.25
G	Poa secunda	$_{a}$-	$_{a}$-	$_{b}$31	$_{c}$57	$_{b}$36	-	.68	1.98	.84
G	Sitanion hystrix	5	-	-	1	-	-	-	.01	-
G	Sporobolus cryptandrus	3	-	-	-	-	-	-	-	-
G	Stipa comata	-	3	-	-	-	.03	-	-	-
G	Vulpia octoflora (a)	-	$_{a}$-	$_{b}$24	$_{b}$33	$_{b}$14	-	.05	.44	.02
Total for Annual Grasses		0	336	288	341	326	4.56	2.28	15.35	12.94
Total for Perennial Grasses		121	27	53	58	61	0.48	0.91	1.99	1.09
Total for Grasses		121	363	341	399	387	5.04	3.20	17.34	14.03
F	Astragalus nuttallianus (a)	-	$_{d}$242	$_{a}$-	$_{c}$177	$_{b}$23	6.36	-	1.54	.05
F	Calochortus nuttallii	$_{a}$-	$_{a}$-	$_{ab}$1	$_{ab}$5	$_{b}$6	-	.00	.01	.06
F	Chaenactis stevioides	-	-	-	12	-	-	-	.21	-
F	Chenopodium fremontii (a)	-	-	-	-	2	-	-	-	.00
F	Cryptantha sp.	$_{a}$-	$_{a}$2	$_{a}$-	$_{b}$14	$_{a}$3	.00	-	.03	.00
F	Cymopterus sp.	$_{a}$-	$_{a}$-	$_{a}$1	$_{a}$1	$_{b}$9	-	.00	.01	.10
F	Delphinium nuttallianum	-	-	-	4	5	-	-	.02	.06
F	Delphinium occidentale	-	-	-	3	-	-	-	.00	-
F	Draba nemorosa (a)	-	$_{a}$12	$_{b}$33	$_{a}$16	$_{b}$21	.02	.08	.05	.05
F	Erigeron sp.	-	1	-	-	-	.00	-	-	-
F	Erodium cicutarium (a)	-	$_{a}$18	$_{a}$20	$_{b}$41	$_{c}$80	.19	.07	.38	.65
F	Gilia hutchinifolia (a)	-	$_{a}$14	$_{a}$10	$_{b}$88	$_{a}$27	.03	.64	.45	.07
F	Lappula occidentalis (a)	-	$_{ab}$3	$_{a}$-	$_{ab}$4	$_{b}$11	.01	-	.01	.02
F	Lepidium sp. (a)	-	$_{b}$12	$_{a}$-	$_{ab}$7	$_{a}$-	.02	-	.02	-
F	Machaeranthera glabriusculas	3	-	-	-	7	-	-	-	.01
F	Mentzelia sp.	$_{a}$-	$_{a}$-	$_{b}$20	$_{c}$43	$_{c}$45	-	.03	.36	.22
F	Navarretia intertexta (a)	-	-	7	8	-	-	.01	.04	-
F	Phlox longifolia	-	9	-	3	-	.04	-	.00	-
F	Plantago patagonica (a)	-	8	-	4	3	.01	-	.01	.00
F	Ranunculus testiculatus (a)	-	-	-	-	2	-	-	-	.00
F	Schoencrambe linifolia	-	1	-	-	-	.00	-	-	-
F	Unknown forb-annual (a)	-	2	-	-	-	.00	-	-	-
F	Zigadenus paniculatus	-	-	-	-	2	-	-	-	.03
Total for Annual Forbs		0	311	70	345	169	6.68	0.81	2.51	0.86
Total for Perennial Forbs		3	13	22	85	77	0.05	0.04	0.66	0.51
Total for Forbs		3	324	92	430	246	6.73	0.86	3.17	1.37

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

BROWSE TRENDS--
Management unit 13B, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata wyomingensis	2	5	2	2	-	.84	.00	.38
B	Coleogyne ramosissima	81	72	76	74	16.70	13.51	14.83	15.67
B	Ephedra viridis	0	1	1	2	-	-	.53	.15
B	Grayia spinosa	0	1	2	2	-	.38	.93	1.63
B	Gutierrezia sarothrae	3	2	0	0	.04	.15	-	-
B	Juniperus osteosperma	0	3	2	2	4.65	4.22	4.43	2.65
B	Opuntia sp.	2	5	4	4	.03	.15	.38	.38
B	Pinus edulis	-	-	-	-	.38	-	-	-
B	Sclerocactus sp.	1	8	3	1	-	.06	-	-
Total for Browse		89	97	90	87	21.80	19.30	21.12	20.88

CANOPY COVER, LINE INTERCEPT--
Management unit 13B, Study no: 4

Species	Percent Cover		
	'00	'05	'10
Coleogyne ramosissima	-	18.73	18.78
Ephedra viridis	-	-	.35
Grayia spinosa	-	1.10	4.13
Juniperus osteosperma	3.40	5.19	5.40
Opuntia sp.	-	.16	.16

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13B, Study no: 4

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata	1.8	2.5
Coleogyne ramosissima	1.5	1.5

POINT-QUARTER TREE DATA--
Management unit 13B, Study no: 4

Species	Trees per Acre			Average diameter (in)		
	'00	'05	'10	'00	'05	'10
Juniperus osteosperma	33	36	31	11.9	9.1	7.0
Pinus edulis	8	-	22	6.2	-	5.7

BASIC COVER--
Management unit 13B, Study no: 4

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	13.75	33.59	24.73	39.10	34.42
Rock	16.25	11.28	13.46	10.78	11.46
Pavement	3.00	.08	6.66	5.07	3.06
Litter	25.00	23.32	20.85	13.35	39.85
Cryptogams	23.50	15.57	20.23	20.57	13.83
Bare Ground	18.50	25.61	30.77	24.21	25.70

SOIL ANALYSIS DATA --
Management unit 13B, Study no: 4, Study Name: Red Cliffs

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.8	7.6	60.0	19.4	20.6	0.7	5.8	147.2	0.5

PELLET GROUP DATA--
Management unit 13B, Study no: 4

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	23	11	24	14
Elk	-	-	1	16
Deer	34	29	37	26
Cattle	-	-	-	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	3 (8)	9 (22)
44 (108)	80 (197)	103 (255)
-	-	3 (7)

BROWSE CHARACTERISTICS--
Management unit 13B, Study no: 4

		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 wyomingensis									
86	**0**	0	0	0	-	0	0	0	-/-
95	**40**	0	50	50	-	50	0	0	26/41
00	**100**	20	80	0	-	20	40	0	27/44
05	**40**	50	50	0	-	50	50	0	29/37
10	**40**	0	100	0	-	0	0	0	24/38
Chrysothamnus nauseosus albicaulis									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	15/42
05	**0**	0	0	-	-	0	0	0	19/43
10	**0**	0	0	-	-	0	0	0	20/43

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus stenophyllus									
86	**133**	0	0	100	-	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Coleogyne ramosissima									
86	**11197**	4	86	11	-	27	5	11	15/16
95	**4560**	3	94	4	-	20	2	1	16/30
00	**4280**	2	93	5	20	12	0	1	15/26
05	**4460**	2	86	12	240	21	0	2	16/31
10	**3380**	4	92	5	80	17	0	1	15/34
Echinocactus sp.									
86	**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	10/26
Ephedra viridis									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	26/33
00	**20**	0	100	-	-	0	0	0	26/43
05	**220**	45	55	-	-	55	0	0	36/49
10	**80**	50	50	-	-	0	75	25	32/42
Grayia spinosa									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	0	0	0	23/59
05	**80**	0	100	-	-	0	0	0	23/48
10	**80**	0	100	-	-	0	0	0	27/50
Gutierrezia sarothrae									
86	**66**	0	100	-	-	0	0	0	10/5
95	**100**	0	100	-	-	0	0	0	10/12
00	**40**	0	100	-	-	0	0	0	7/13
05	**0**	0	0	-	-	0	0	0	10/10
10	**0**	0	0	-	-	0	0	0	10/15
Juniperus osteosperma									
86	**0**	0	0	0	-	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**60**	33	67	0	20	0	0	0	22/48
05	**40**	0	50	50	-	0	0	50	-/-
10	**40**	50	50	0	-	0	0	50	-/-

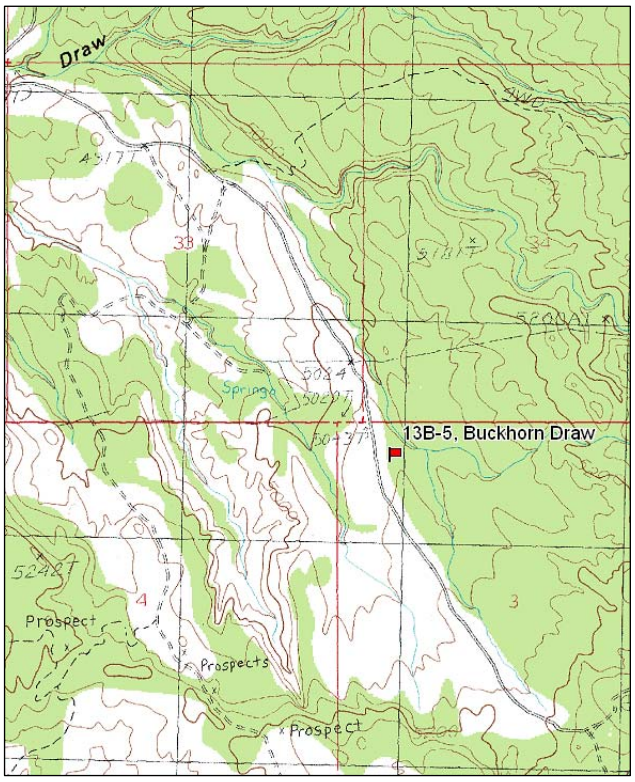
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
95	**40**	0	100	0	-	0	0	0	5/26
00	**220**	0	100	0	-	0	0	0	5/23
05	**160**	0	38	63	-	0	0	63	6/24
10	**100**	0	40	60	-	0	0	0	5/18
Sclerocactus sp.									
86	**66**	0	100	-	-	0	0	0	7/3
95	**20**	0	100	-	-	0	0	0	4/3
00	**260**	0	100	-	-	0	0	0	5/3
05	**80**	0	100	-	-	0	0	0	5/7
10	**20**	0	100	-	-	0	0	0	7/7

BUCKHORN DRAW - TREND STUDY NO. 13B-5-10

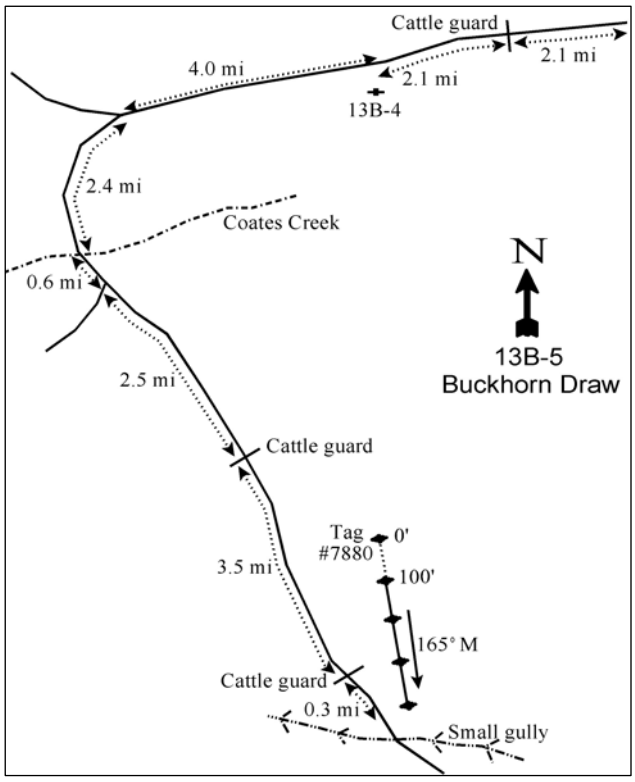
Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 5050 ft. (1540 m)
Aspect: North
Slope: 4%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the Utah-Colorado state line west of Glade Park travel 2.1 miles to a cattle guard. Continue west 2.1 miles to the Red Cliffs transect (13B-4). Continue west on the main road 4.0 miles to a fork. Stay left and go 2.4 miles to Coates Creek. Cross the creek and continue 0.6 miles to a fork. Stay left, go 2.5 miles to a cattle guard. Proceed 3.5 miles to another cattle guard. Go 0.3 miles past the cattle guard and stop. The transect is on the left (east) side of the road. The 0-foot end of the baseline (found 400 feet north) is also marked by a fence post, tagged #7880. All other plot markers are short rebar stakes.

Map Name: Blue Chief Mesa



Diagrammatic Sketch:



Township: 23S Range: 25E Section: 3

GPS: NAD 83, UTM 12S 660872 E 4300577 N

BUCKHORN DRAW - TREND STUDY NO. 13B-5

Site Information

Site Description: The study is located on an open bench in an area that supports a mixed desert shrub community dominated by broom snakeweed (*Gutierrezia sarothrae*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), spiny hopsage (*Grayia spinosa*), blackbrush (*Coleogyne ramosissima*) and some scattered Utah junipers (*Juniperus osteosperma*). Deep washes to the east and west intermittently carry water and drain to the north. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Scharf Mesa allotment. The area is also used as winter range by deer and elk. In 1986, the BLM estimated use of sagebrush to be heavy (60%-80%), but much of this could have been cattle use because it is a winter cattle allotment. Pellet group data has indicated moderate deer use and light elk use since 2000. Estimated cattle use was moderate in 2000, light in 2005 and moderately heavy in 2010 (Table - Pellet Group Data).

Browse: The key browse species on the site are spiny hopsage and Wyoming big sagebrush. Spiny hopsage is the dominant browse species in cover (Table - Browse Trends). The spiny hopsage population has been mature with moderate to heavy hedging, high decadence, and minimal recruitment of young plants over the course of the study. In exceptionally dry years, spiny hopsage tends to loose its leaves, which makes it difficult to determine its true condition. The Wyoming big sagebrush population has been a mixture of young and mature plants with moderate to heavy browsing, fluctuating decadence and good vigor since the outset of the study in 1986. Both spiny hopsage and Wyoming big sagebrush had a marked decrease in density between the 2000 and 2005 sample years. Broom snakeweed was the most abundant browse species until 2005 when it also decreased substantially in density. Other less abundant shrubs include: green ephedra (*Ephedra viridis*) and blackbrush (Table - Browse Characteristics). Juniper trees are scattered throughout the area with low point-center quarter density estimates since 2000 (Table - Point-Quarter Tree Data).

Herbaceous Understory: Perennial grasses comprised primarily of sand dropseed (*Sporobolus cryptandrus*) and purple three-awn (*Aristida purpurea*) were prevalent on the site from 1986 to 2000, but there was a marked decrease in the sum of nested frequency and cover of perennial grasses in 2005. The annual grass cheatgrass (*Bromus tectorum*) increased substantially with the decrease of perennial grasses in 2005. Cheatgrass is now the dominant species on the site and provided nearly all of the total vegetation cover in 2005, and over half of the total vegetation cover in 2010. Forbs are not abundant on the site and the forbs that are present are comprised of annual species with storksbill (*Erodium cicutarium*) being the most prevalent (Table - Herbaceous Trends).

Soil: The soil is a fine sandy loam, well drained, deep with a mildly alkaline soil reaction (pH 7.6). There is a compacted layer of fine silty sand at about 12 inches with a noticeable accumulation of calcium carbonate. Phosphorus may have limited availability for plant growth and development at only 2.3 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Percent bare ground has been moderate to high since 1986, with the highest bare ground in 2000 in correlation with a severe drought. Protective ground cover constituted an almost equal percent of vegetation and litter until 2005, when vegetation far exceeded litter. Most of the vegetation cover consisted of grasses, especially cheatgrass. No rock or pavement cover was encountered on the site, but there is good cryptogam cover (Table - Basic Cover). The gentle slope mitigates erosion from becoming excessive, although there is one small gully running southwest of the study site. The soil erosion condition was classified as slight in 2005 due to excessive pedestalling around shrubs and perennial grasses as well as some soil movement between perennial species, but was stable in 2010.

Trend Assessments

Browse:

- **1986 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 the two primary

browse species, spiny hopsage and Wyoming big sagebrush, decreased from 100% to 32% and 40% to 12%, respectively. Recruitment of young sagebrush plants increased from 13% to 33%, though there was no new recruitment of spiny hopsage.

- **1995 to 2000 - stable (0):** The density and cover of both of the primary browse species increased slightly. Recruitment of young sagebrush plants decreased, but remained good at 13%, though there continued to be no new recruitment of hopsage. Decadence of spiny hopsage increased again to 88%.
- **2000 to 2005 - down (-2):** The density of Wyoming big sagebrush decreased by 43% from 1,160 plants/acre to 660 plants/acre, and the density of spiny hopsage decreased 20% from 1,020 plants/acre to 820 plants/acre, but cover of both species remained similar. Decadence of sagebrush increased to 39%, but the decadence of hopsage decreased to 49%. The density of the weedy species broom snakeweed also decreased substantially.
- **2005 to 2010 - slightly down (-1):** The density of Wyoming big sagebrush decreased 24% to 500 plants/acre and the density of spiny hopsage decreased 10% to 740 plants/acre, but cover of each species remained similar. Decadence of the two primary species also decreased to 12% in sagebrush and 5% in hopsage. Recruitment of young sagebrush plants increased to nearly half of the population, with no new recruitment of hopsage.

Grass:

- **1986 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1995 to 2000 - stable (0):** The sum of nested frequency of perennial grasses increased 9% and cover increased from 7% to 11%. Cheatgrass nested frequency decreased two degrees of significance and cover decreased from 4% to 3%.
- **2000 to 2005 - down (-2):** Perennial grass sum of nested frequency decreased by 87% and cover decreased to less than 1%. Perennial grasses became rare on the site. Cheatgrass nested frequency increased three levels of significance and cover increased to 39% and cheatgrass became the dominant species on the site.
- **2005 to 2010 - slightly up (+1):** The sum of nested frequency of perennial grasses increased three-fold, but perennial grasses are still not abundant. Cover of perennial grasses increased to near 4%. Cheatgrass nested frequency decreased two levels of significance and cover decreased to 19%, but cheatgrass remains the dominant species on the site.

Forb:

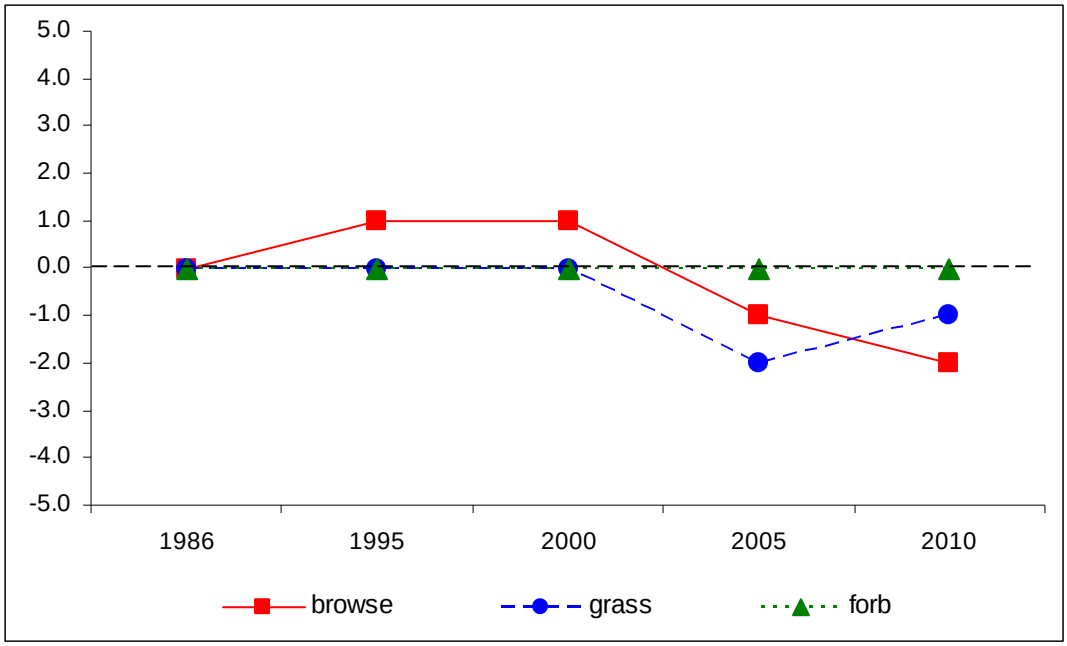
- **1986 to 1995 - stable (0):** There were few forbs sampled.
- **1995 to 2000 - stable (0):** There were few forbs sampled.
- **2000 to 2005 - stable (0):** There were few forbs sampled.
- **2005 to 2010 - stable (0):** There were few forbs sampled.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13B, study no: 5

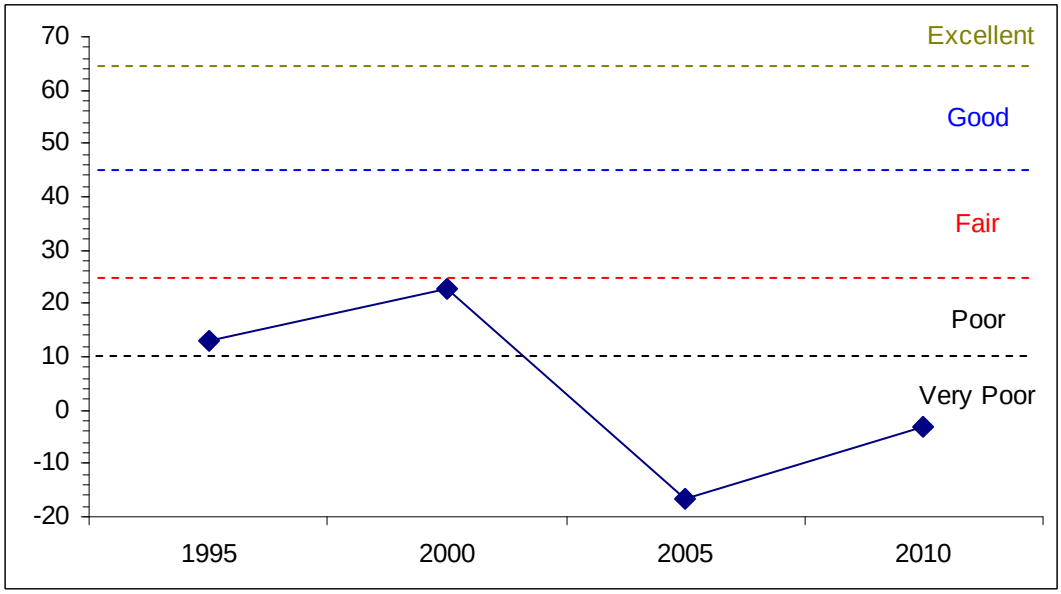
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	1.0	0.0	0.0	14.6	-3.1	0.4	0.0	**12.9**	Poor
00	3.7	0.0	0.0	20.9	-2.0	0.1	0.0	**22.6**	Poor
05	2.3	0.0	0.0	0.4	-20.0	0.5	0.0	**-16.8**	Very Poor
10	3.3	0.0	0.0	7.5	-14.6	0.7	0.0	**-3.0**	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13B, Study no: 5



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 13B, Study no: 5



HERBACEOUS TRENDS--
Management unit 13B, Study no: 5

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Aristida purpurea	$_{b}$68	$_{b}$73	$_{b}$75	$_{a}$-	$_{a}$-	2.42	3.20	-	-
G	Bromus tectorum (a)	-	$_{c}$353	$_{a}$237	$_{d}$376	$_{b}$329	4.07	2.65	38.47	19.40
G	Oryzopsis hymenoides	$_{ab}$18	$_{b}$35	$_{b}$32	$_{a}$7	$_{a}$8	.20	.46	.03	.07
G	Sporobolus cryptandrus	$_{c}$156	$_{bc}$137	$_{c}$160	$_{a}$27	$_{b}$109	4.66	6.79	.17	3.68
G	Vulpia octoflora (a)	-	20	18	31	18	.04	.07	.06	.06
Total for Annual Grasses		0	373	255	407	347	4.11	2.72	38.53	19.46
Total for Perennial Grasses		242	245	267	34	117	7.28	10.46	0.20	3.75
Total for Grasses		242	618	522	441	464	11.40	13.18	38.73	23.21
F	Calochortus nuttallii	-	-	4	-	2	-	.00	-	.00
F	Cryptantha sp.	$_{a}$-	$_{b}$24	$_{a}$-	$_{a}$1	$_{a}$3	.05	-	.00	.01
F	Cymopterus sp.	$_{a}$-	$_{ab}$6	$_{b}$14	$_{c}$35	$_{bc}$18	.01	.03	.07	.16
F	Eriogonum sp.	$_{a}$-	$_{b}$15	$_{a}$-	$_{a}$-	$_{a}$-	.03	-	-	-
F	Erodium cicutarium (a)	-	$_{a}$5	$_{b}$12	$_{b}$16	$_{c}$74	.01	.03	.62	1.16
F	Gilia sp. (a)	-	-	3	-	8	-	.00	-	.02
F	Lappula occidentalis (a)	-	-	1	-	5	-	.00	-	.01
F	Lepidium densiflorum (a)	-	$_{b}$37	$_{a}$3	$_{c}$55	$_{ab}$14	.08	.00	.17	.03
F	Lepidium sp. (a)	-	-	-	-	4	-	-	-	.01
F	Lygodesmia grandiflora	-	7	3	3	-	.04	.00	.15	-
F	Navarretia intertexta (a)	-	-	-	1	-	-	-	.00	-
F	Plantago patagonica (a)	-	$_{c}$147	$_{a}$29	$_{c}$146	$_{b}$91	.32	.06	.46	.58
F	Sphaeralcea coccinea	-	$_{b}$19	$_{a}$-	$_{ab}$3	$_{ab}$5	.06	-	.01	.02
F	Sphaeralcea parvifolia	-	-	-	-	6	-	-	-	.18
Total for Annual Forbs		0	189	48	218	196	0.41	0.10	1.27	1.83
Total for Perennial Forbs		0	71	21	42	34	0.19	0.04	0.23	0.37
Total for Forbs		0	260	69	260	230	0.61	0.15	1.51	2.20

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

BROWSE TRENDS--
Management unit 13B, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata wyomingensis	31	28	20	17	.82	1.63	1.04	1.90
B	Coleogyne ramosissima	3	5	6	5	-	1.63	1.01	.97
B	Grayia spinosa	33	28	27	29	3.76	4.67	3.93	4.26
B	Gutierrezia sarothrae	65	71	15	15	3.95	1.60	.37	.89
B	Juniperus osteosperma	0	0	0	0	-	-	-	.15
B	Opuntia sp.	4	8	8	8	.06	.33	.31	1.42
B	Sclerocactus sp.	0	1	0	0	-	-	-	-
Total for Browse		136	141	76	74	8.60	9.89	6.67	9.60

CANOPY COVER, LINE INTERCEPT--
Management unit 13B, Study no: 5

Species	Percent Cover	
	'05	'10
Artemisia tridentata wyomingensis	.30	.46
Coleogyne ramosissima	1.38	1.43
Grayia spinosa	3.61	4.88
Gutierrezia sarothrae	.08	.23
Opuntia sp.	.21	.73

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13B, Study no: 5

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	0.3	5.0
Coleogyne ramoosissima	1.5	2.8
Grayia spinosa	3.5	7.7

POINT-QUARTER TREE DATA--
Management unit 13B, Study no: 5

Species	Trees per Acre			
	'95	'00	'05	'10
Juniperus osteosperma	9	16	25	26

Average diameter (in)			
'95	'00	'05	'10
6.7	8.6	13.5	8.9

BASIC COVER--
Management unit 13B, Study no: 5

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	8.50	24.78	23.74	45.62	36.23
Rock	0	0	0	0	0
Pavement	0	0	.00	.00	0
Litter	42.00	25.71	24.92	20.39	38.65
Cryptogams	.75	2.11	5.05	9.43	8.72
Bare Ground	48.75	33.26	54.67	34.37	38.89

SOIL ANALYSIS DATA --
Management unit 13B, Study no: 5, Study Name: Buckhorn Draw

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.9	7.6	64.0	18.0	18.0	0.3	2.3	99.2	0.6

PELLET GROUP DATA--
Management unit 13B, Study no: 5

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	21	19	30	30
Elk	2	1	2	5
Deer	28	23	21	24
Cattle	5	9	23	12

Days use per acre (ha)		
'00	'05	'10
-	-	-
1 (2)	3 (8)	3 (7)
27 (67)	20 (50)	25 (63)
20 (49)	6 (16)	46 (115)

BROWSE CHARACTERISTICS--
Management unit 13B, Study no: 5

		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 wyomingensis									
86	**498**	13	47	40	66	13	87	0	11/13
95	**1020**	33	55	12	200	47	6	8	16/24
00	**1160**	16	76	9	-	24	9	2	17/22
05	**660**	21	39	39	-	30	55	15	15/21
10	**500**	48	40	12	-	16	12	4	17/26
Chrysothamnus nauseosus									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	6/14
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	16/22
Chrysothamnus viscidiflorus stenophyllus									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	18/35
05	**0**	0	0	-	-	0	0	0	13/15
10	**0**	0	0	-	-	0	0	0	-/-
Coleogyne ramosissima									
86	**166**	0	100	-	-	0	100	0	15/31
95	**60**	33	67	-	-	33	0	0	27/50
00	**160**	25	75	-	-	0	0	0	21/36
05	**120**	17	83	-	-	17	0	0	19/38
10	**100**	20	80	-	-	20	0	0	20/44
Ephedra viridis									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	27/27
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	25/31
10	**0**	0	0	-	-	0	0	0	-/-
Grayia spinosa									
86	**299**	0	0	100	-	0	100	100	-/-
95	**880**	0	68	32	-	66	16	27	17/33
00	**1020**	0	12	88	-	2	29	24	18/33
05	**820**	0	51	49	-	34	7	20	19/32
10	**740**	3	92	5	-	38	11	5	19/36

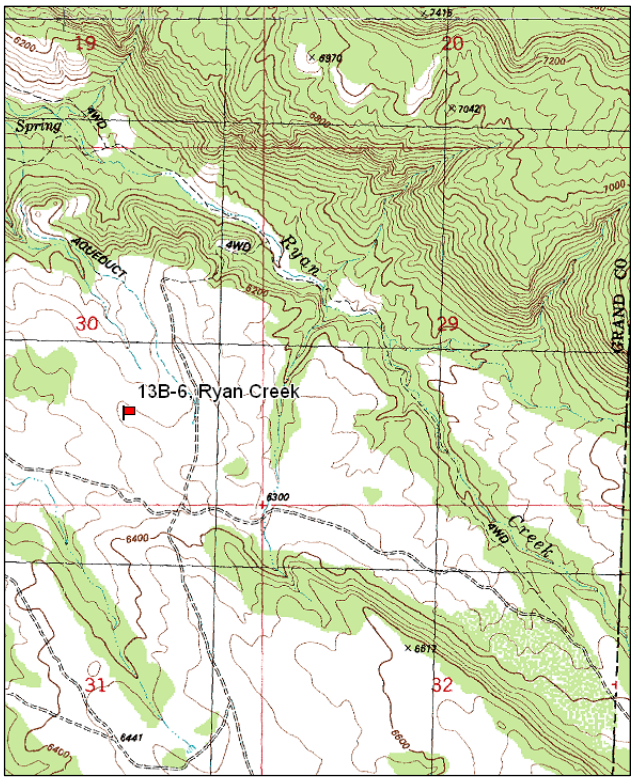
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
86	**7765**	11	74	15	-	.85	.42	0	9/5
95	**3260**	18	82	0	100	0	0	0	11/15
00	**4060**	17	77	5	60	0	0	5	6/8
05	**440**	5	95	0	-	0	0	0	9/10
10	**420**	19	76	5	-	0	0	5	9/13
Juniperus osteosperma									
86	**33**	0	100	-	-	0	0	0	63/63
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	-/-
Opuntia sp.									
86	**66**	0	100	0	-	0	0	0	4/6
95	**120**	0	100	0	-	0	0	33	6/17
00	**220**	0	100	0	-	0	0	0	7/12
05	**200**	0	70	30	-	0	0	30	7/25
10	**200**	0	80	20	-	10	0	20	5/28
Sclerocactus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	5/3
05	**0**	0	0	-	-	0	0	0	6/7
10	**0**	0	0	-	-	0	0	0	7/10

RYAN CREEK - TREND STUDY NO. 13B-6-10

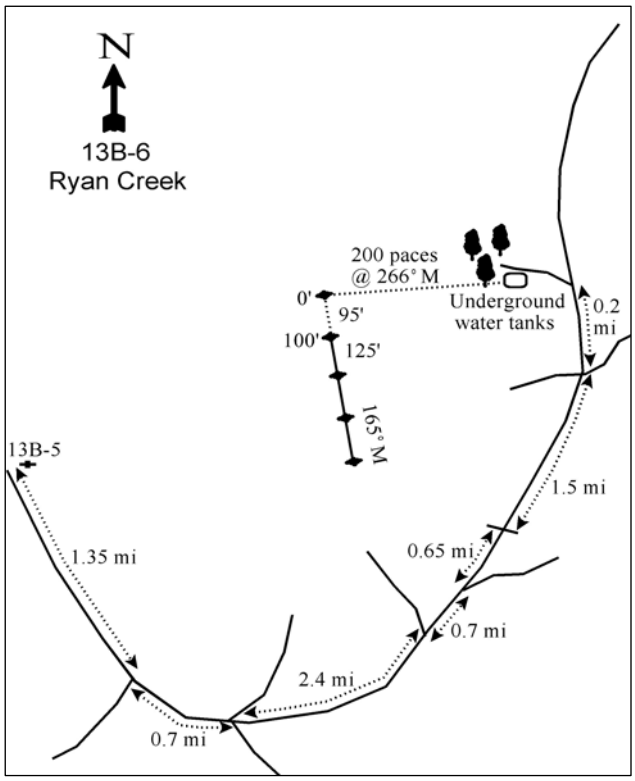
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 6350 ft. (1936 m)
Aspect: South-Southwest
Slope: 10%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
At the "Granary" intersection 1.35 miles south of Buckhorn Draw, 13B-5 (Coates Creek 15-minute Quad; T23S, R25E, southeast quarter of section 3) bear left and go east 0.7 miles to a fork. Take the middle fork, go 2.4 miles and turn right at the next fork. Continue 0.7 miles to another fork. Turn left. Go 0.65 miles to a cattle guard. Continue 1.5 miles to a fork. Continue straight (north) and go 0.2 miles to a water development and a few lone junipers on the left. From here, walk up the small ridge to the west for 200 paces at 266°M to a full high fence post with browse tag #7678 attached. The transect runs south from the start of the baseline. All other plots are marked by rebar stakes.

Map Name: Steamboat Mesa



Diagrammatic Sketch:



Township: 22S Range: 26E Section: 30

GPS: NAD 83, UTM 12S 666520 E 4302852 N

RYAN CREEK - TREND STUDY NO. 13B-6

Site Information

Site Description: The study is located within an old 1,800 acre pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) chaining, which in the past had been considered an important big game winter range. The area was chained and aerially seeded with crested wheatgrass (*Agropyron cristatum*), fourwing saltbush (*Atriplex canescens*), big sagebrush (*Artemisia tridentata*), alfalfa (*Medicago sativa*) and bitterbrush (*Purshia tridentata*) in 1968. To help maintain the integrity of the chaining, the Bureau of Land Management (BLM) used the herbicide tebuthiuron (Spike) to eliminate the released population of pinyon pine and Utah juniper trees on 300 acres of the chaining. The Ryan Creek Wildfire burned 3,947 acres of the area in 1989, which eliminated nearly all of the browse on the site. Grazing in the area is managed by the BLM as part of the Buckhorn allotment. A nearby deer pellet group transect in Ryan Park, on the Utah side, averaged 8 deer days use/acre (20 ddu/ha) between 1986 and 1996. Pellet group data taken along the trend study site base line indicated moderately light use by deer in 2000 and 2005 with heavier use in 2010. Estimated elk use has been light and estimated cattle use has been light to moderately light since 2000 (Table - Pellet Group Data). Cattle grazing is managed as part of the large Buckhorn allotment.

Browse: The pinyon and juniper trees, and a very low density of various browse species, were eliminated from the site when it burned. Previous to the fire the estimated combined density of pinyon and juniper trees was about 198 trees/acre. The most numerous shrubs on the site after the burn were Harriman's yucca (*Yucca harrimaniae*), broom snakeweed (*Gutierrezia sarothrae*), white stemmed rabbitbrush (*Chrysothamnus nauseosus* ssp. *hololeucus*) and a few scattered fourwing saltbush. Harriman's yucca subsequently decreased in following sample years and is now longer present on the site (Table - Browse Characteristics). There was no measurable browse cover sampled on the site in 2010 (Table - Browse Trends). Little change has occurred with the browse species since the fire. With the loss of the browse species, this site is no longer considered crucial winter range for wildlife.

Herbaceous Understory: The dominant grass species on the site are the seeded perennial species crested wheatgrass and the invasive annual cheatgrass (*Bromus tectorum*). These two species provide nearly all of the grass cover on the site with other grass species being rare. Other perennial grass species sampled include: Indian ricegrass (*Oryzopsis hymenoides*), galleta (*Hilaria jamesii*) and purple threeawn (*Aristida purpurea*). Forbs are diverse on the site, but are primarily dominated by annual species. Common perennial forbs include alfalfa and heath aster (*Leucelene ericoides*). Common annual species include storksbill (*Erodium cicutarium*) and burr buttercup (*Ranunculus testiculatus*) (Table - Herbaceous Trends).

Soil: The soil has a sandy clay loam texture with a neutral soil reaction (pH 7.3) (Table - Soil Analysis Data). The cover of bare ground has been moderate with a high of 35% in 2000. However, the vegetation and litter cover have provided adequate protection for the soil (Table- Basic Cover), and there has been no evidence of noticeable erosion. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 to 1995 - down (-2):** A wildfire burned the site in 1989 and removed nearly all of the browse.
- **1995 to 2000 - stable (0):** Browse species were limited on the site.
- **2000 to 2005 - stable (0):** Browse species were limited on the site.
- **2005 to 2010 - stable (0):** Browse species were limited on the site.

Grass:

- **1986 to 1995 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 18% with a significant decrease in the nested frequency of crested wheatgrass.

- **1995 to 2000 - up (+2):** Perennial grass sum of nested frequency increased by 21% and cover increased from 6% to 17%. The increase was due to a significant increase in the nested frequency of crested wheatgrass. Cheatgrass nested frequency decreased two levels of significance and cover decreased from 19% 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 10%. There was a slight change in composition with a significant decrease in crested wheatgrass nested frequency and a significant increase in the nested frequency of Indian ricegrass. Cheatgrass increased significantly in nested frequency and cover increased to 9%.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased 11%, but cover increased to 19%. Crested wheatgrass nested frequency decreased significantly, but Indian ricegrass was not sampled. There was little change in the nested frequency of cheatgrass, but cover increased to 14%.

Forb:

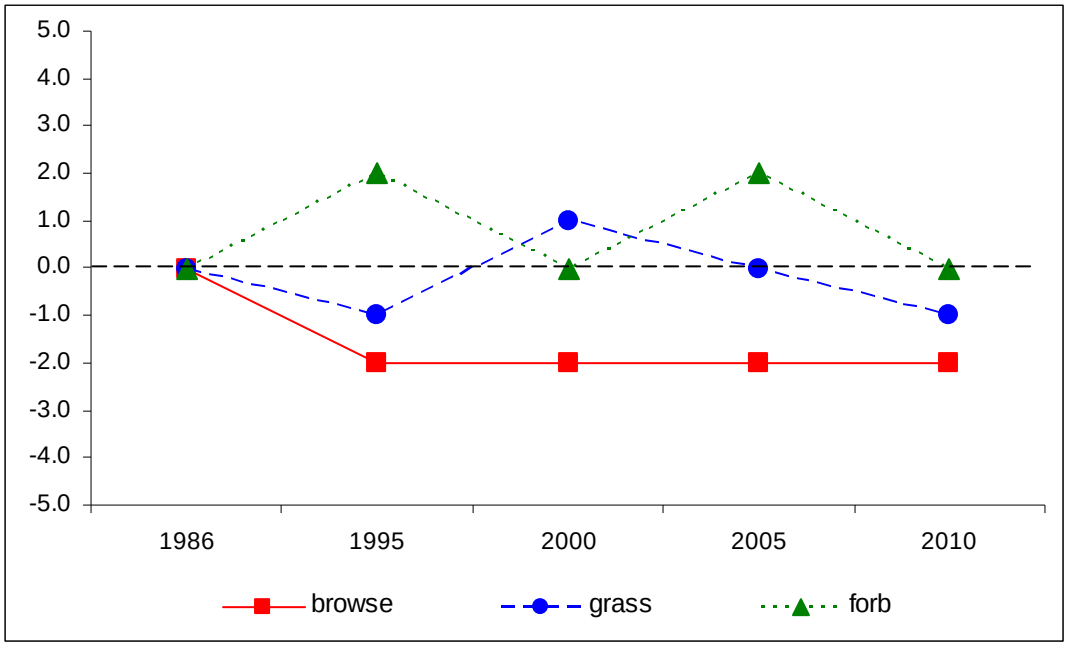
- **1986 to 1995 - up (+2):** There was a substantial increase in the sum of nested frequency of perennial forbs with a significant increase in the nested frequency of alfalfa and an aster (*Machaeranthera spp.*).
- **1995 to 2000 - down (-2):** Perennial forb sum of nested frequency decreased by 63%, but cover remained similar. Annual forbs also decreased substantially in nested frequency.
- **2000 to 2005 - up (+2):** The sum of nested frequency of perennial forbs increased by 55% and cover increased from 3% to 5%. There was a significant increase in the nested frequency of alfalfa. Annual species also increased markedly in nested frequency and annual forb cover increased from less than 1% to 16%.
- **2005 to 2010 - down (-2):** The sum of nested frequency of perennial forbs decreased by 57% and cover decreased to 1%. The nested frequency of alfalfa decreased significantly. Annual forbs also declined substantially.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13B, study no: 6

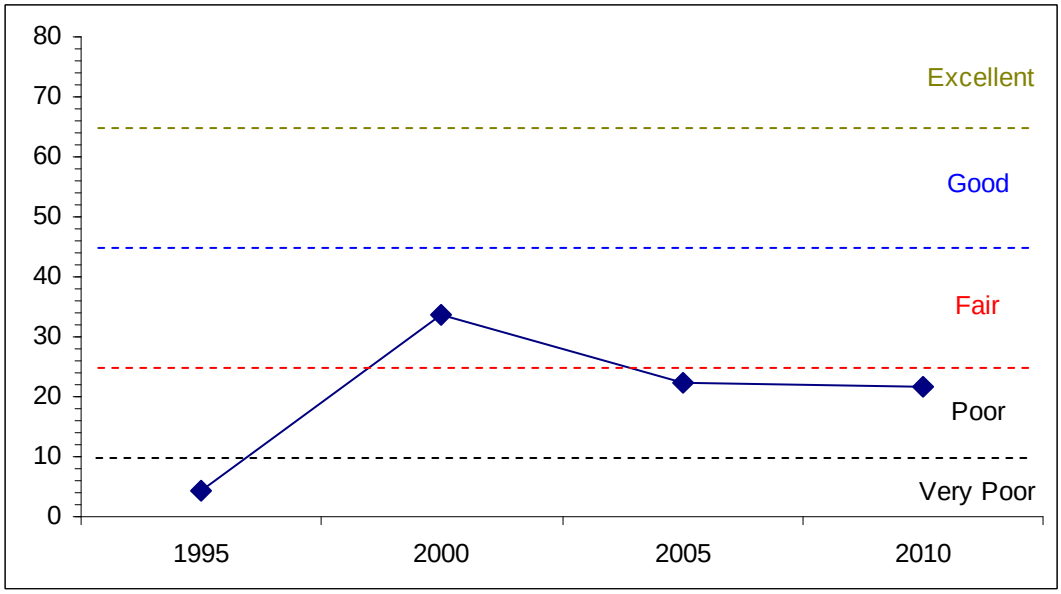
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	0.0	0.0	0.0	12.7	-13.9	5.4	0.0	**4.2**	Very Poor
00	0.0	0.0	0.0	30.0	-1.3	5.1	0.0	**33.8**	Fair
05	0.0	0.0	0.0	19.7	-6.9	9.4	0.0	**22.2**	Poor
10	0.0	0.0	0.0	30.0	-10.7	2.4	0.0	**21.7**	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13B, Study no: 6



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 13B, Study no: 6



HERBACEOUS TRENDS--
Management unit 13B, Study no: 6

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	d286	ab215	cd255	a194	bc242	5.60	14.70	9.10	18.80
G	Aristida purpurea	-	1	7	-	-	.00	.24	-	-
G	Bromus tectorum (a)	-	c365	a138	b273	b287	18.56	1.72	9.25	14.30
G	Hilaria jamesii	-	3	7	7	9	.15	.53	.21	.07
G	Oryzopsis hymenoides	a-	a12	a12	b80	a-	.57	1.10	.52	-
G	Poa fendleriana	-	2	-	-	-	.03	-	-	-
G	Poa secunda	-	-	-	-	1	-	-	-	.03
G	Sitanion hystrix	2	4	4	-	-	.00	.18	-	-
G	Sporobolus cryptandrus	-	-	2	2	-	-	.15	.00	-
G	Stipa comata	-	-	-	-	-	-	-	.01	-
G	Vulpia octoflora (a)	4	3	-	-	-	.00	-	-	-
Total for Annual Grasses		4	368	138	273	287	18.57	1.72	9.25	14.30
Total for Perennial Grasses		288	237	287	283	252	6.37	16.90	9.85	18.90
Total for Grasses		292	605	425	556	539	24.95	18.63	19.10	33.20
F	Astragalus mollissimus	ab2	b7	ab1	ab7	a-	.02	.00	.05	-
F	Astragalus nuttallianus (a)	-	6	-	5	-	.02	-	.01	-
F	Calochortus nuttallii	-	-	-	2	3	-	-	.01	.03
F	Chenopodium fremontii (a)	-	-	3	-	-	-	.00	-	-
F	Chorispora tenella (a)	-	-	-	2	-	-	-	.06	-
F	Cryptantha sp.	-	-	-	7	2	-	-	.21	.00
F	Cymopterus sp.	-	3	6	6	2	.00	.01	.06	.01
F	Descurainia pinnata (a)	-	a-	a-	b22	a1	-	-	.06	.00
F	Draba nemorosa (a)	-	a6	a2	c105	b26	.01	.00	.59	.09
F	Erigeron sp.	-	-	-	3	9	-	-	.03	.19
F	Erodium cicutarium (a)	-	b125	a24	c246	b153	1.60	.39	13.15	1.90
F	Euphorbia sp.	a-	b14	b13	b15	ab8	.03	.10	.40	.06
F	Gilia sp. (a)	-	a-	a-	c33	b12	-	-	.21	.03
F	Heterotheca villosa	-	-	-	8	-	-	-	.16	-
F	Lactuca serriola	-	6	4	-	-	.02	.01	-	-
F	Lappula occidentalis (a)	-	ab5	a3	c62	b24	.01	.00	.65	.09
F	Lepidium densiflorum (a)	-	a-	a-	a-	b49	-	-	-	.56
F	Leucelene ericoides	a-	bc28	c38	bc29	b17	1.46	.79	1.60	.54
F	Machaeranthera spp	a-	b127	a-	a7	a-	.28	-	.01	-
F	Medicago sativa	a1	bc24	ab12	c34	a6	.84	1.60	2.12	.18
F	Phlox longifolia	-	-	3	-	-	-	.00	-	-
F	Ranunculus testiculatus (a)	-	a-	a-	b49	c106	-	-	.40	1.56
F	Salsola iberica (a)	-	a1	a-	b42	a-	.00	-	.12	-
F	Silene sp.	-	5	-	2	-	.01	-	.01	-
F	Sisymbrium altissimum (a)	-	c150	a2	b50	a3	1.22	.01	.80	.03
F	Sphaeralcea coccinea	-	-	3	4	7	-	.03	.03	.18
F	Unknown forb-perennial	2	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	293	34	616	374	2.87	0.41	16.06	4.28
Total for Perennial Forbs		5	214	80	124	54	2.68	2.55	4.70	1.21

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
Total for Forbs		5	507	114	740	428	5.56	2.97	20.77	5.50

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

BROWSE TRENDS--
Management unit 13B, Study no: 6

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Chrysothamnus nauseosus hololeucus	1	1	1	1	.15	.15	.85	-
B	Gutierrezia sarothrae	1	4	3	0	.15	.15	.21	-
B	Yucca harrimaniae	5	4	0	0	.30	.30	-	-
Total for Browse		7	9	4	1	0.60	0.61	1.06	0.00

CANOPY COVER, LINE INTERCEPT--
Management unit 13B, Study no: 6

Species	Percent Cover	
	'05	'10
Chrysothamnus nauseosus hololeucus	.96	.86

BASIC COVER--
Management unit 13B, Study no: 6

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	7.25	41.22	23.49	35.27	39.81
Rock	4.00	13.35	16.52	17.92	16.11
Pavement	4.00	1.11	3.95	1.92	2.98
Litter	53.00	45.07	22.25	21.54	37.34
Cryptogams	2.25	.61	1.08	.71	.93
Bare Ground	29.50	13.15	34.65	30.96	24.38

SOIL ANALYSIS DATA --
Management unit 13B, Study no: 6, Study Name: Ryan Creek

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.3	7.3	64.0	15.4	20.6	4.9	7.7	80.0	1.0

PELLET GROUP DATA--
Management unit 13B, Study no: 6

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	6	38	23	8
Elk	12	4	12	16
Deer	17	29	20	21
Cattle	3	4	8	6

Days use per acre (ha)		
'00	'05	'10
-	-	-
9 (24)	9 (22)	1 (3)
20 (50)	27 (68)	59 (146)
10 (26)	7 (16)	23 (56)

BROWSE CHARACTERISTICS--
Management unit 13B, Study no: 6

		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 wyomingensis									
86	**33**	0	0	100	-	0	100	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-
Atriplex canescens									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	28/27
00	**0**	0	0	-	-	0	0	0	39/34
05	**0**	0	0	-	-	0	0	0	38/55
10	**0**	0	0	-	-	0	0	0	27/56
Chrysothamnus nauseosus hololeucus									
86	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	30/46
00	**20**	0	100	-	-	0	0	0	36/63
05	**20**	0	100	-	-	0	0	0	42/64
10	**20**	0	100	-	-	0	0	0	30/59
Chrysothamnus viscidiflorus									
86	**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	33/81
Echinocactus sp.									
86	**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	11/18
Ephedra viridis									
86	**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	16/17
10	**0**	0	0	-	-	0	0	0	20/28

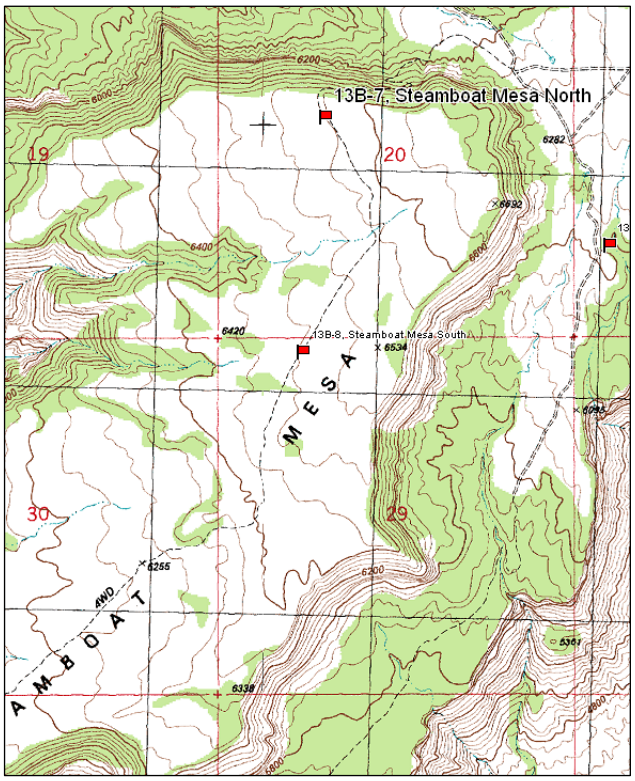
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
86	**66**	0	100	-	-	0	0	0	10/11
95	**20**	0	100	-	-	0	0	0	7/22
00	**280**	21	79	-	-	0	0	0	7/7
05	**180**	22	78	-	20	0	0	0	12/20
10	**0**	0	0	-	-	0	0	0	-/-
Juniperus osteosperma									
86	**66**	0	100	-	-	0	0	0	98/79
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	-/-
Opuntia sp.									
86	**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	4/11
10	**0**	0	0	-	-	0	0	0	-/-
Pinus edulis									
86	**132**	50	50	-	-	0	0	0	78/50
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	-/-
Yucca harrimaniae									
86	**0**	0	0	0	-	0	0	0	-/-
95	**680**	0	97	3	-	0	0	0	10/14
00	**240**	0	42	58	-	0	0	33	13/19
05	**0**	0	0	0	-	0	0	0	-/-
10	**0**	0	0	0	-	0	0	0	-/-

STEAMBOAT MESA NORTH - TREND STUDY NO. 13B-7-10

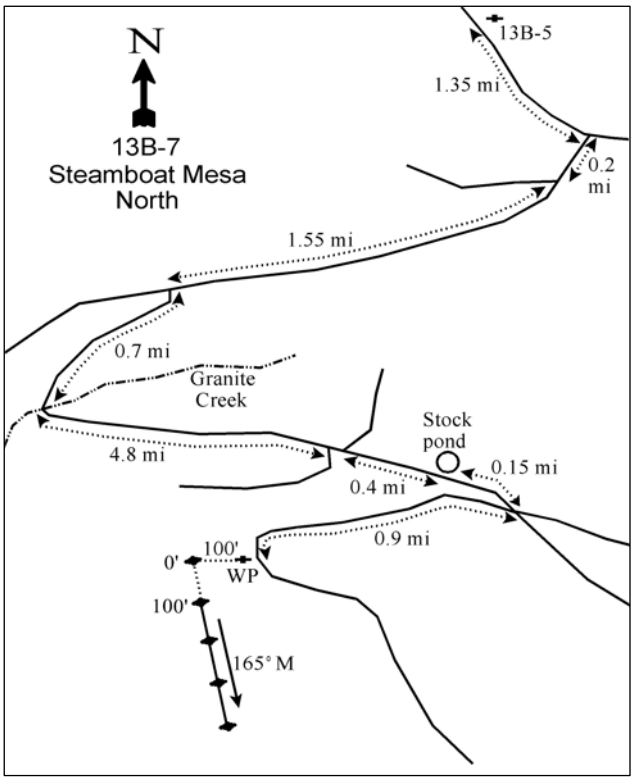
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 6550 ft. (1997 m)
Aspect: Southwest
Slope: 3%-5%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the Buckhorn Draw transect (13B-5), continue southeast for 1.35 miles to the "Granary" intersection. Turn right and go 0.2 miles to a fork. Stay left and drive 1.55 miles to a road on the left. Turn left and go down this road 0.7 miles to Granite Creek. Cross the creek and proceed 4.8 miles to a fork. Stay left, then right at another fork which connects back to the main road, traveling 0.4 miles to a stock pond. Continue 0.15 miles to a fork with many branches (the right goes up on Steamboat Mesa). It is 0.9 miles from the fork to the top of Steamboat Mesa and a witness post on the right side of the road. The witness post (a green fence post) is six feet off the road. The 0-foot baseline stake is 100 feet west of the witness post. All the transect posts are rebar.

Map Name: Steamboat Mesa



Diagrammatic Sketch:



Township: 23S Range: 26E Section: 20

GPS: NAD 83, UTM 12S 666665 E 4295412 N

STEAMBOAT MESA NORTH - TREND STUDY NO. 13B-7

Site Information

Site Description: Steamboat Mesa is a large flat mesa located in the southeast corner of the Dolores Triangle, just north of the Dolores River and west of the Colorado border. The mesa is surrounded by steep rock cliffs, with the only access being a rough 4-wheel drive road on the north end. The Steamboat Mesa North study site was set up in a large chaining just beyond the north edge of the mesa. Managed by the Bureau of Land Management (BLM), this portion of the Steamboat Mesa allotment was two-way chained and seeded in 1968. The species seeded were crested wheatgrass (*Agropyron cristatum*), fourwing saltbush (*Atriplex canescens*), big sagebrush (*Artemisia tridentata*), alfalfa (*Medicago sativa*) and bitterbrush (*Purshia tridentata*). Pellet group data has indicated moderately heavy deer use and light elk and cattle use since 2000 (Table - Pellet Group Data).

Browse: There are a wide variety of browse species found on the site in low densities and cover including: true mountain mahogany (*Cercocarpus montanus*), antelope bitterbrush, green ephedra (*Ephedra viridis*), rubber rabbitbrush (*Chrysothamnus nauseosus*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), black sagebrush (*A. nova*), Utah serviceberry (*Amelanchier utahensis*) and fourwing saltbush (Table- Browse Cover). Green ephedra and fourwing saltbush have showed moderate hedging with some in poor condition (Table - Browse Characteristics). This is generally normal for these two species where they are found in low densities. There is a mature, stable stand of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees that have had moderate canopy cover (Table - Canopy Cover) and moderate density (Table - Point-Quarter Tree Data) on the site since 2000.

Herbaceous Understory: Crested wheatgrass is the key forage species for cattle and the dominant species in cover on the site. Crested wheatgrass has accounted for nearly all of the grass cover and forms large, distinct patches over the site. Other perennial grass species are rare. Cheatgrass (*Bromus tectorum*) is prevalent on the site, but has fluctuated in nested frequency and cover. A variety of native perennial forbs are found on the site, although none are particularly important in terms of forage value on winter range. Most common are increasers such as rock goldenrod (*Petradoria pumila*), Hoods phlox (*Phlox hoodii*) and hairy gold aster (*Heterotheca villosa*). Alfalfa is scattered throughout the site in very low frequency (Table - Herbaceous Trends).

Soil: The soil is a shallow, well-drained, sandy clay loam derived from sandstone with a mildly alkaline soil reaction (pH 7.7) (Table - Soil Analysis Data). Most of the protective ground cover is provided by litter, but vegetation cover has increased since 1986. Bare ground cover is moderately high (Table - Basic Cover). The soil erosion condition was classified as slight in 2005 and 2010 due to excessive pedestalling around shrubs and perennial grasses, some flow patterns and rills between vegetation, moderate surface litter movement, and some soil movement between perennial species.

Trend Assessments

Browse:

- **1986 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. Browse species are scattered throughout the site in low cover. Green ephedra is the most common preferred browse species and had good vigor and low decadence.
- **1995 to 2000 - slightly down (-1):** Browse species are rare and scattered on the site in low densities. Green ephedra decreased slightly in density and cover, and decadence increased to 30%. Recruitment of young ephedra plants decreased from 33% to 5% of the population.
- **2000 to 2005 - slightly up (+1):** Green ephedra density returned to 1995 levels, though cover remained similar. Much of the increase in density is due to the large increase in recruitment of young ephedra plants to 44%.

- **2005 to 2010 - down (-2):** The density of green ephedra decreased by more than 50% to 220 plants/acre with the majority of the plants being young plants. There was a general decrease in many of the other browse species on the site.

Grass:

- **1986 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial grasses. However, there was a change in composition with a significant increase in the nested frequency of crested wheatgrass and a significant decreased in the nested frequency of Indian ricegrass (*Oryzopsis hymenoides*) and bottlebrush squirreltail (*Sitanion hystrix*). With the decrease in the two native species, crested wheatgrass became the only prevalent perennial grass species on the site.
- **1995 to 2000 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 18% and cover increased from 9% to 16%. Crested wheatgrass increased significantly in nested frequency and cheatgrass decreased significantly in nested frequency, with a subsequent decrease in cover.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses, but cheatgrass nested frequency increased significantly and cover increased to 2%.
- **2005 to 2010 - stable (0):** The sum of nested frequency and cover of perennial grasses changed little. There was a slight increase in the cover of cheatgrass.

Forb:

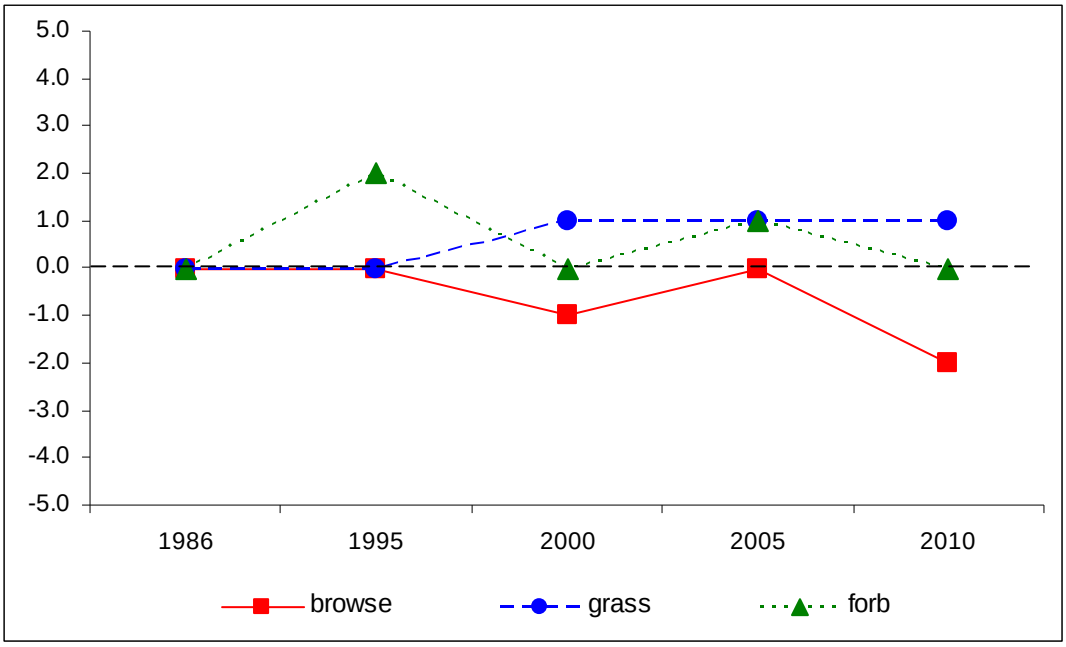
- **1986 to 1995 - up (+2):** The sum of nested frequency of perennial forbs increased more than two-fold.
- **1995 to 2000 - down (-2):** Perennial forb sum of nested frequency decreased by 57% and cover decreased from 4% to 2%.
- **2000 to 2005 - slightly up (+1):** The perennial forb sum of nested frequency increased by 50% and cover increased to 3%.
- **2005 to 2010 - slightly down (-1):** Perennial forb sum of nested frequency decreased 38% returning to 1986 and 2000 levels. Cover remained similar at 3%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13B, study no: 7

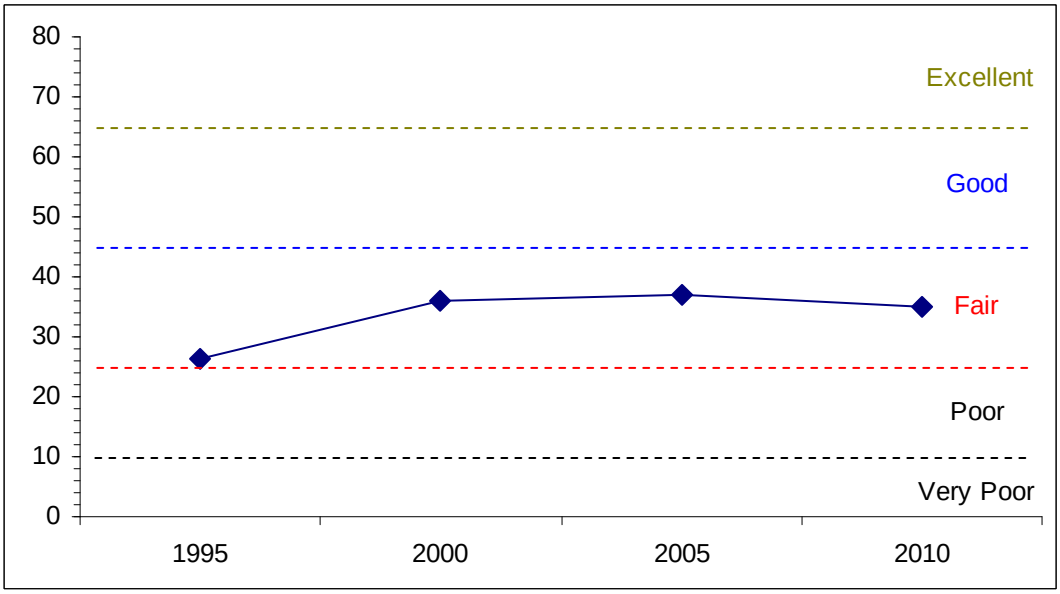
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	1.9	0.0	0.0	18.5	-1.0	7.1	0.0	**26.4**	Poor-Fair
00	2.0	0.0	0.0	30.0	0.0	4.1	0.0	**36.1**	Fair
05	2.0	0.0	0.0	30.0	-1.6	6.5	0.0	**36.9**	Fair
10	2.1	0.0	0.0	30.0	-2.6	5.5	0.0	**35.0**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13B, Study no: 7



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 13B, Study no: 7



HERBACEOUS TRENDS--
Management unit 13B, Study no: 7

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	a155	b228	c277	bc245	bc245	9.01	16.29	17.79	14.95
G	Bromus tectorum (a)	-	b163	a3	bc125	b101	1.35	.03	2.10	3.43
G	Oryzopsis hymenoides	c52	ab15	a-	b21	a-	.14	.00	.44	-
G	Poa bulbosa	-	-	-	3	10	-	-	.15	.21
G	Poa fendleriana	4	4	-	-	-	.04	-	-	-
G	Poa secunda	a-	ab3	ab9	b12	ab8	.03	.04	.08	.21
G	Sitanion hystrix	b28	a-	a2	a3	a-	-	.03	.15	-
G	Sporobolus cryptandrus	-	-	1	-	-	-	.03	-	-
G	Stipa comata	b8	a-	ab5	ab1	a-	-	.03	.01	-
G	Vulpia octoflora (a)	-	ab5	a-	b19	a-	.01	-	.06	-
Total for Annual Grasses		0	168	3	144	101	1.37	0.03	2.16	3.43
Total for Perennial Grasses		247	250	294	285	263	9.23	16.43	18.63	15.37
Total for Grasses		247	418	297	429	364	10.60	16.47	20.79	18.81
F	Agoseris glauca	-	-	-	1	3	.01	-	.00	.06
F	Allium sp.	-	3	-	-	-	.00	-	-	-
F	Astragalus convallarius	7	1	1	8	-	.01	.03	.45	-
F	Astragalus mollissimus	-	6	1	1	1	.01	.00	.03	.03
F	Calochortus nuttallii	-	8	-	4	7	.01	-	.01	.01
F	Chenopodium fremontii (a)	-	-	-	4	-	-	-	.01	-
F	Crepis acuminata	-	-	-	3	-	-	-	.00	-
F	Cryptantha sp.	-	4	-	2	-	.01	-	.03	-
F	Cymopterus sp.	a-	b16	a-	b15	b11	.04	-	.11	.27
F	Descurainia pinnata (a)	-	a4	a-	b29	a4	.01	-	.31	.00
F	Draba nemorosa (a)	-	b96	a-	b87	a3	.21	-	.39	.00
F	Erigeron pumilus	a2	b19	ab13	a-	a5	.04	.05	-	.03
F	Erodium cicutarium (a)	-	8	9	21	5	.16	.41	.45	.03
F	Gilia hutchinifolia (a)	-	bc28	a-	c42	b17	.07	-	.21	.08
F	Haplopappus acaulis	3	7	3	-	-	.01	.00	-	-
F	Heterotheca villosa	a-	b16	b16	c39	b9	.21	.29	.82	.20
F	Hymenoxys acaulis	-	-	-	7	3	-	-	.16	.00
F	Lactuca serriola	-	6	-	-	-	.15	-	-	-
F	Lappula occidentalis (a)	-	b43	a-	c82	b50	.15	-	1.49	.30
F	Lepidium densiflorum (a)	-	b24	a-	b33	a-	.19	-	.20	-
F	Lesquerella sp.	-	-	-	1	-	-	-	.03	-
F	Lychnis drummondii	-	-	-	-	-	-	-	.00	-
F	Machaeranthera grindelioides	a-	b21	a-	a5	a-	.04	-	.06	-
F	Medicago sativa	-	3	2	-	-	.00	.03	-	-
F	Penstemon sp.	-	1	3	1	-	.00	.15	.03	-
F	Petradoria pumila	37	41	32	26	26	2.21	1.35	1.08	1.73
F	Phlox hoodii	bc28	c32	abc13	a11	ab12	.49	.11	.07	.28
F	Phlox longifolia	-	2	-	-	-	.00	-	-	-
F	Plantago patagonica (a)	-	a3	a-	b32	a-	.01	-	.30	-
F	Polygonum douglasii (a)	-	3	-	-	-	.00	-	.00	-

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
F	Ranunculus testiculatus (a)	-	$_{a}$3	$_{a}$-	$_{b}$38	$_{c}$104	.01	-	.18	1.11
F	Salsola iberica (a)	-	-	-	-	1	-	-	-	.00
F	Schoencrambe linifolia	$_{a}$-	$_{b}$17	$_{a}$-	$_{a}$-	$_{a}$3	.07	-	.16	.04
F	Sisymbrium altissimum (a)	-	$_{b}$27	$_{a}$-	$_{a}$5	$_{a}$-	.07	-	.33	-
F	Sphaeralcea coccinea	$_{a}$-	$_{bc}$13	$_{bc}$12	$_{c}$20	$_{ab}$8	.13	.05	.18	.09
F	Streptanthus cordatus	-	3	-	-	2	.00	-	-	.00
F	Tragopogon dubius	$_{b}$14	$_{ab}$5	$_{a}$-	$_{a}$-	$_{a}$-	.02	-	-	-
Total for Annual Forbs		0	239	9	373	184	0.88	0.41	3.90	1.55
Total for Perennial Forbs		91	224	96	144	90	3.53	2.07	3.27	2.77
Total for Forbs		91	463	105	517	274	4.42	2.48	7.17	4.32

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

BROWSE TRENDS--
Management unit 13B, Study no: 7

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Amelanchier utahensis	0	0	0	0	-	-	.38	.85
B	Artemisia nova	0	1	1	1	-	-	-	-
B	Artemisia tridentata wyomingensis	0	1	1	0	-	.38	.38	-
B	Atriplex canescens	1	1	1	1	-	.00	-	-
B	Chrysothamnus nauseosus	4	7	6	2	.98	1.62	.33	-
B	Chrysothamnus viscidiflorus	0	0	0	1	-	-	-	-
B	Ephedra viridis	9	8	7	7	1.35	.86	.57	.62
B	Gutierrezia sarothrae	0	11	4	2	-	.02	.00	.38
B	Juniperus osteosperma	0	6	3	3	2.70	3.67	2.62	4.00
B	Leptodactylon pungens	4	4	5	2	.01	.18	.15	.15
B	Opuntia sp.	2	2	3	3	.03	.00	-	.03
B	Pinus edulis	0	6	5	5	4.77	4.36	3.08	4.01
B	Purshia tridentata	1	1	2	1	.15	.30	.18	.00
Total for Browse		21	48	38	28	9.99	11.42	7.69	10.05

CANOPY COVER, LINE INTERCEPT--
Management unit 13B, Study no: 7

Species	Percent Cover		
	'00	'05	'10
Artemisia tridentata wyomingensis	-	.35	-
Atriplex canescens	-	.21	.16
Chrysothamnus nauseosus	-	.41	-
Ephedra viridis	-	.26	.05
Gutierrezia sarothrae	-	-	.08
Juniperus osteosperma	4.59	8.56	6.69
Leptodactylon pungens	-	-	.13
Pinus edulis	4.19	7.21	7.78
Purshia tridentata	-	.58	.31

POINT-QUARTER TREE DATA--
Management unit 13B, Study no: 7

Species	Trees per Acre			
	'95	'00	'05	'10
Juniperus osteosperma	105	142	150	134
Pinus edulis	170	177	101	102

Average diameter (in)			
'95	'00	'05	'10
3.7	3.3	5.4	5.2
2.9	2.6	4.2	3.4

BASIC COVER--
Management unit 13B, Study no: 7

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	11.25	26.70	33.01	34.45	31.42
Rock	.25	4.64	6.08	3.90	3.43
Pavement	0	.13	2.52	1.02	2.69
Litter	65.00	37.74	47.32	28.86	38.46
Cryptogams	.25	.53	2.33	.78	1.62
Bare Ground	23.25	33.34	38.60	45.54	33.77

SOIL ANALYSIS DATA --
Management unit 13B, Study no: 7, Study Name: Steamboat Mesa North

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.5	7.7	56.6	25.1	21.3	1.9	8.7	92.8	0.7

PELLET GROUP DATA--
Management unit 13B, Study no: 7

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	18	32	29	14
Elk	1	-	5	9
Deer	19	9	30	13
Cattle	6	8	5	3

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	1 (3)	5 (13)
42 (105)	61 (150)	53 (131)
17 (43)	-	7 (18)

BROWSE CHARACTERISTICS--
Management unit 13B, Study no: 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)
Amelanchier utahensis									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	29/62
00	**0**	0	0	-	-	0	0	0	63/76
05	**0**	0	0	-	-	0	0	0	34/58
10	**0**	0	0	-	-	0	0	0	32/34
Artemisia nova									
86	**0**	0	0	0	-	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**20**	0	100	0	-	0	0	0	5/13
05	**20**	0	0	100	-	0	100	0	7/24
10	**20**	0	100	0	-	100	0	0	6/13
Artemisia tridentata wyomingensis									
86	**66**	0	100	0	-	0	0	0	22/19
95	**0**	0	0	0	-	0	0	0	9/14
00	**20**	0	100	0	-	0	100	0	9/15
05	**20**	0	0	100	-	0	100	0	14/14
10	**0**	0	0	0	-	0	0	0	12/19
Atriplex canescens									
86	**66**	0	0	100	-	0	0	0	-/-
95	**20**	0	100	0	-	0	100	0	38/41
00	**20**	0	0	100	-	0	0	0	34/79
05	**40**	50	0	50	-	0	50	0	34/49
10	**20**	0	0	100	-	0	0	100	17/23
Cercocarpus montanus									
86	**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	55/32
10	**0**	0	0	-	-	0	0	0	41/38
Chrysothamnus nauseosus									
86	**0**	0	0	0	-	0	0	0	-/-
95	**100**	0	100	0	-	0	0	0	27/34
00	**140**	0	86	14	-	29	0	0	37/45
05	**120**	0	50	50	-	17	17	17	24/30
10	**40**	0	50	50	-	0	0	50	24/37

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus									
86	**0**	0	0	0	-	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**0**	0	0	0	-	0	0	0	-/-
05	**0**	0	0	0	-	0	0	0	-/-
10	**20**	0	0	100	-	0	0	100	15/18
Ephedra viridis									
86	**133**	0	100	0	-	0	100	0	18/11
95	**540**	33	56	11	-	22	7	0	17/22
00	**400**	5	65	30	-	15	60	5	21/29
05	**500**	44	40	16	-	0	20	8	25/38
10	**220**	64	36	0	-	0	0	0	22/33
Gutierrezia sarothrae									
86	**66**	0	0	100	333	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	7/15
00	**560**	7	82	11	-	0	0	4	5/10
05	**140**	0	100	0	20	0	0	0	11/15
10	**100**	20	80	0	-	0	0	0	5/8
Juniperus osteosperma									
86	**66**	0	100	-	-	0	0	0	83/58
95	**0**	0	0	-	-	0	0	0	-/-
00	**120**	17	83	-	-	0	0	0	-/-
05	**60**	0	100	-	-	0	0	0	-/-
10	**60**	33	67	-	-	0	0	0	-/-
Leptodactylon pungens									
86	**0**	0	0	-	-	0	0	0	-/-
95	**80**	0	100	-	-	0	0	0	5/10
00	**120**	0	100	-	-	0	0	0	5/10
05	**120**	0	100	-	-	0	0	0	4/8
10	**40**	0	100	-	-	0	0	0	5/14
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
95	**60**	33	67	0	-	0	0	0	5/18
00	**60**	33	67	0	-	0	0	0	4/10
05	**60**	33	33	33	-	0	0	0	4/17
10	**120**	0	100	0	-	0	0	0	4/16
Pinus edulis									
86	**332**	60	40	0	-	0	0	0	81/47
95	**0**	0	0	0	-	0	0	0	-/-
00	**120**	0	100	0	-	0	0	0	-/-
05	**100**	0	100	0	-	0	0	20	-/-
10	**100**	20	60	20	-	0	0	20	-/-

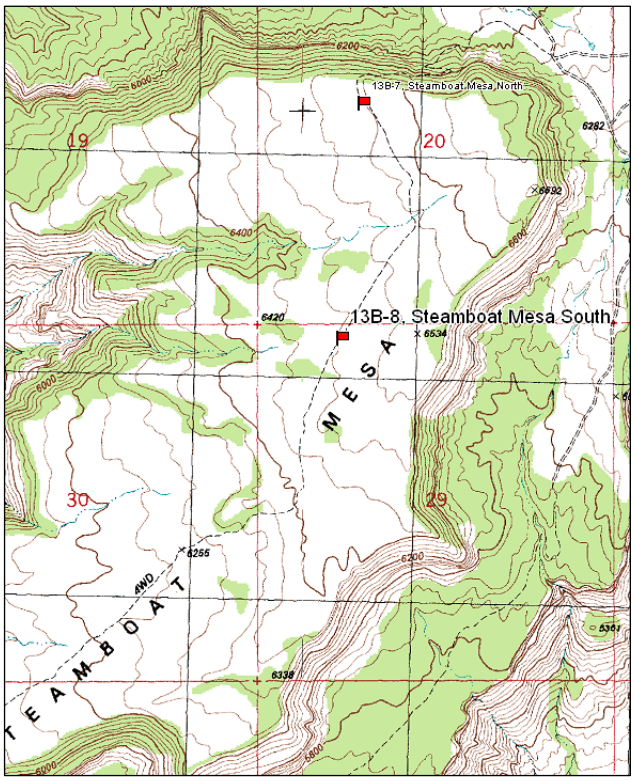
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Purshia tridentata									
86	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	20/40
00	**40**	0	100	-	-	0	100	0	24/89
05	**140**	0	100	-	-	0	100	0	12/37
10	**60**	0	100	-	-	100	0	0	40/41

STAEMBOAT MESA SOUTH - TREND STUDY NO. 13B-8-10

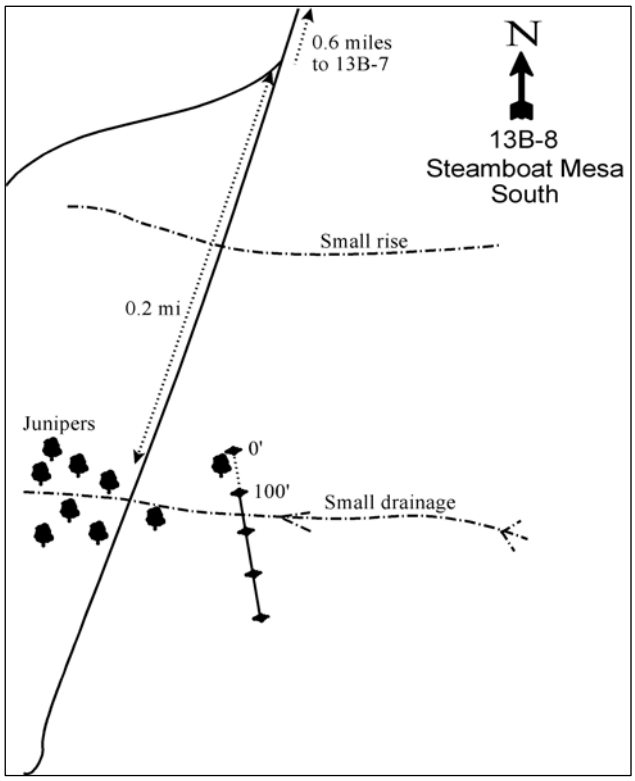
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 6500 ft. (1982 m)
Aspect: Southwest
Slope: 4%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
Start from site number 13B-7, Steamboat Mesa North. Continue south on the same road for 0.6 miles to a fork. Proceed straight 0.2 miles (halfway to an exclosure) to a large Juniper in a sagebrush-grass flat. The baseline 0-foot stake (tag #7812) is located north of the tree.

Map Name: Steamboat Mesa



Diagrammatic Sketch:



Township: 23S Range: 26E Section: 29

GPS: NAD 83, UTM 12S 666589 E 4294353 N

STEAMBOAT MESA SOUTH - TREND STUDY NO. 13B-8

Site Information

Site Description: Located approximately three-quarters of a mile south of study site 13B-7, the Steamboat Mesa South site samples a habitat type once dominated by native vegetation, although not in a completely natural condition. This open rolling site may be an example of a former sagebrush park undergoing a conversion to an annual grass-sagebrush type due to excessive livestock use. A large exclosure is located to the south of the study. The Steamboat Mesa fire burned 172 acres on and around the site in the summer of 2009, removing nearly all of the browse species. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Steamboat Mesa allotment. Two pellet group transects are also located on Steamboat Mesa. The lower elevation transect (6,300 feet) showed an average of 27 deer days use/acre (67 ddu/ha) between 1986 and 1997. The pellet transect located at 6,700 feet, and closer to this study, averaged 23 deer days use/acre (56 ddu/ha) for the same time period. Pellet group data collected along the transect indicated heavy deer use in 2000, light deer use in 2005, and moderately heavy deer use in 2010. The estimated cattle use has decreased from moderate use in 2000 to light use in 2010. Estimated elk use has been very light since 2005 (Table - Pellet Group Data).

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) was the key browse species before the 2009 burn. Prior to the fire, the sagebrush population was comprised of a mixture of young and smaller mature plants with moderate to very heavy use. Following the fire, only several young sagebrush plants were sampled and there was no measurable cover (Table - Browse Trends). Winterfat (*Ceratoides lanata*) was also sampled on this site, but in very low numbers (Table - Browse Characteristics). Escape and thermal cover is provided by scattered Utah juniper (*Juniperus osteosperma*) trees along washes and ridge tops. Most of the trees have been highlined and many were burnt in the fire.

Herbaceous Understory: Grasses are fairly diverse, but are dominated by the annual species cheatgrass (*Bromus tectorum*). The native perennial species needle and thread (*Stipa comata*) has been prevalent, but has fluctuated substantially in nested frequency and cover over the sample years. Other common perennial species include galleta (*Hilaria jamesii*), Indian ricegrass (*Oryzopsis hymenoides*) and Sandberg bluegrass (*Poa secunda*). The weedy species bulbous bluegrass (*Poa bulbosa*) became more abundant in 2010, following the fire. Forbs are diverse on the site, but are not overly abundant. Scarlet globemallow (*Sphaeralcea coccinea*) is the dominant perennial forb, and the only forb that provided over 1% cover (Table - Herbaceous Trends). It was noted in 2010 that many of the herbaceous plants had vigorous growth, likely from released resources from the fire.

Soil: The soil texture is a sandy clay loam with a neutral soil reaction (pH 6.9). Phosphorous may have limited availability for plant growth and development at only 4.9 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover has fluctuated with the increases and decreases of vegetation cover that is provided primarily by annual species (Table - Basic Cover). This helps illustrate the point that you cannot depend on annuals to provide consistent litter or vegetation cover from year to year. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 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. The levels of decadence and poor vigor remained good in the primary browse species, Wyoming big sagebrush. Recruitment of young sagebrush plants was very high at nearly half of the population.
- **1995 to 2000 - stable (0):** The density of Wyoming big sagebrush increased by 53% from 1,620 plants/acre to 2,480 plants/acre, but there was little change in cover. Much of the increase in density is due to an increase in the recruitment of young sagebrush plants, which is very high at 50%.

- **2000 to 2005 - slightly down (-1):** Wyoming big sagebrush density decreased 38% to 1,540 plants/acre, though cover again remained similar. The change in density was due to a large decrease in the recruitment of young plants, but recruitment remained good at 13%. However, decadence in sagebrush increased to 21% and plants displaying poor vigor increased to 23%.
- **2005 to 2010 - down (-2):** A wildfire removed nearly all of the browse from this site.

Grass:

- **1986 to 1995 - slightly down (-1):** The sum of nested frequency of perennial grasses remained similar, but there was a negative change in the composition of perennial grasses. There was a significant decrease in the nested frequency of needle and thread and a significant increase in the low growing, early germinating species Sandberg bluegrass.
- **1995 to 2000 - up (+2):** The perennial grass sum of nested frequency increased by 31% and cover increased from 3% to 20%. There was a significant increase in the nested frequency of needle and thread and a significant decrease in the nested frequency of cheatgrass.
- **2000 to 2005 - down (-2):** The sum of nested frequency of perennial grasses decreased by 52% and cover decreased to 5%. There was a significant increase in the nested frequency of cheatgrass and cheatgrass cover increased from 3% to 52%.
- **2005 to 2010 - slightly up (+1):** There was a 15% increase in the sum of nested frequency of perennial grasses and cover increased to 6%. Cheatgrass decreased significantly in nested frequency and cover decreased to 15%.

Forb:

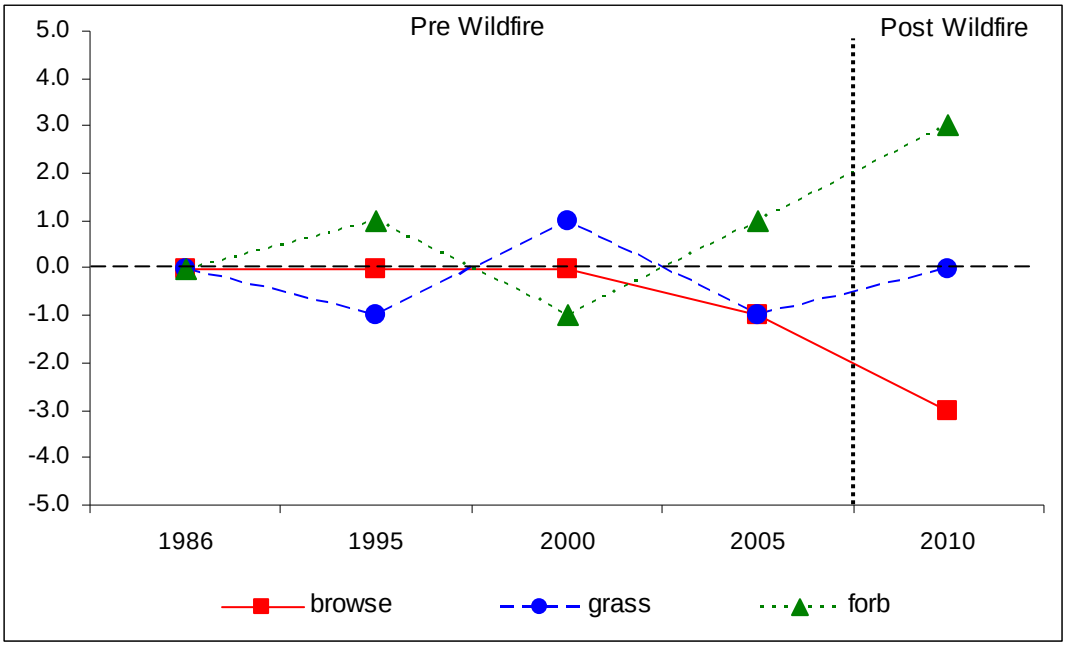
- **1986 to 1995 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 20% due to a significant increase in the nested frequency of segolily (*Calochortus nuttallii*), woolly milkvetch (*Astragalus mollissimus*) and prickly lettuce (*Lactuca serriola*). However, there was a significant decrease in the dominant perennial forb scarlet globemallow.
- **1995 to 2000 - down (-2):** The perennial forb sum of nested frequency decreased by 81% and cover decreased from 2% to less than 1%. There was also a substantial decrease in annual forb frequency.
- **2000 to 2005 - up (+2):** There was over a two-fold increase in the sum of nested frequency of perennial forbs and cover increased to 3%. Almost all of the increase was due to a significant increase in the nested frequency of scarlet globemallow.
- **2005 to 2010 - up (+2):** The perennial forb sum of nested frequency again increased more than two-fold and cover increased to 7%. Again, most of the increase was due to a significant increase in the nested frequency of scarlet globemallow, but the nested frequency of segolily increased significantly as well.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13B, study no: 8

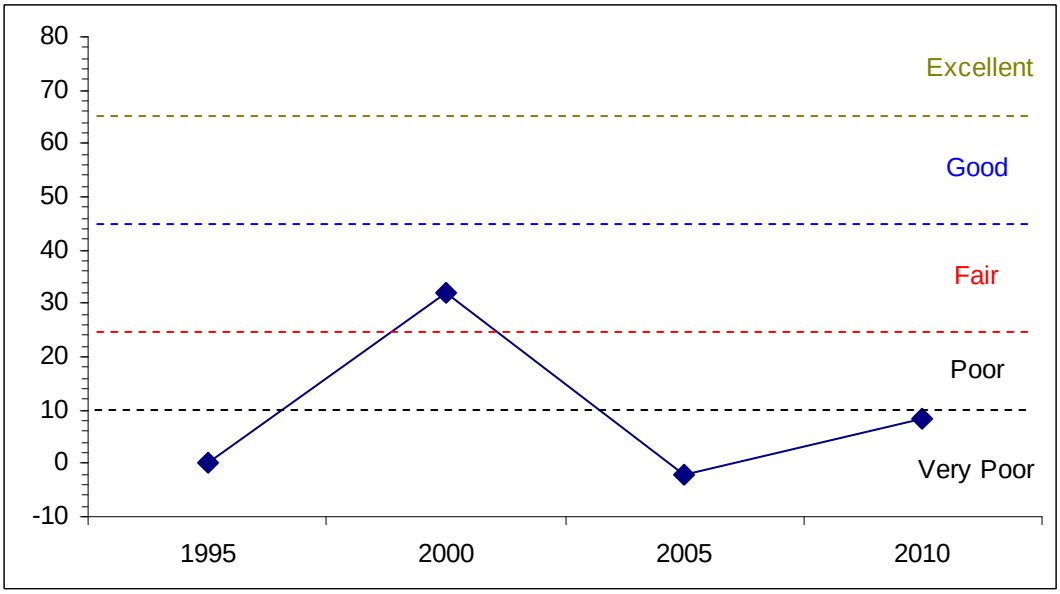
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	1.9	0.0	0.0	6.0	-12.1	4.4	0.0	**0.2**	Very Poor
00	2.9	0.0	0.0	30.0	-2.3	1.4	0.0	**32.0**	Fair
05	3.1	0.0	0.0	8.7	-20.0	6.2	0.0	**-2.0**	Very Poor
10	0.0	0.0	0.0	9.4	-11.1	10.0	0.0	**8.3**	Very Poor-Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13B, Study no: 8



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 13B, Study no: 8



HERBACEOUS TRENDS--
Management unit 13B, Study no: 8

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	a-	a7	a-	a2	b27	.01	-	.38	.82
G	Bromus tectorum (a)	-	c341	a181	d379	b302	15.05	3.09	51.76	14.73
G	Hilaria jamesii	a17	b52	b52	a18	a10	.79	1.58	.25	.06
G	Oryzopsis hymenoides	6	20	7	14	14	.77	.21	.60	.19
G	Poa bulbosa	a-	a-	a-	a6	b29	-	-	.18	1.52
G	Poa fendleriana	c26	bc16	ab5	a-	ab3	.05	.16	.00	.03
G	Poa secunda	a-	c117	b54	b53	c101	.65	.52	.78	2.44
G	Sitanion hystrix	b11	a-	a-	a-	a-	-	-	-	-
G	Sporobolus cryptandrus	a7	a-	b19	a-	a-	-	.81	-	-
G	Stipa comata	c257	b91	c260	b98	a36	.70	16.47	2.30	1.16
G	Vulpia octoflora (a)	-	b231	a6	a25	a21	1.08	.01	.40	.05
Total for Annual Grasses		0	572	187	404	323	16.14	3.11	52.16	14.78
Total for Perennial Grasses		324	303	397	191	220	2.99	19.77	4.51	6.23
Total for Grasses		324	875	584	595	543	19.14	22.88	56.68	21.01
F	Astragalus mollissimus	a-	b29	a-	b15	b12	.24	-	.09	.03
F	Astragalus sp.	-	-	-	-	4	-	-	-	.01
F	Calochortus nuttallii	a-	c59	a-	b14	a78	.14	-	.04	1.20
F	Cymopterus sp.	-	6	-	-	10	.01	-	-	.16
F	Descurainia pinnata (a)	-	-	-	6	2	-	-	.02	.00
F	Draba nemorosa (a)	-	b15	c51	a-	b14	.02	.16	-	.04
F	Erigeron pumilus	a-	a-	b11	a-	c30	.00	.02	-	.55
F	Erodium cicutarium (a)	-	a-	b16	a-	b15	-	.03	-	.57
F	Gilia hutchinifolia (a)	-	b32	a2	a1	b30	.08	.00	.00	.26
F	Grindelia squarrosa	-	1	-	-	-	.00	-	-	-
F	Hedysarum sp.	-	6	-	-	-	.18	-	-	-
F	Heterotheca villosa	-	-	-	-	3	-	-	-	.00
F	Lactuca serriola	a-	b30	a-	a2	a9	.08	-	.00	.02
F	Lappula occidentalis (a)	-	b16	a-	a-	c32	.06	-	-	.18
F	Lepidium densiflorum (a)	-	c201	a-	d236	b38	.95	-	2.82	.10
F	Leucelene ericoides	-	9	10	6	-	.16	.33	.30	-
F	Lupinus sp.	-	-	-	-	5	-	-	-	.01
F	Machaeranthera grindelioides	a-	b10	a-	ab3	a-	.03	-	.01	-
F	Microsteris gracilis (a)	-	-	-	-	1	-	-	-	.00
F	Phlox hoodii	-	4	-	-	-	.03	-	-	-
F	Phlox longifolia	-	4	-	2	-	.01	-	.00	-
F	Plantago patagonica (a)	-	c232	b64	c248	a2	2.34	.22	5.65	.00
F	Polygonum douglasii (a)	-	2	-	-	4	.00	-	-	.01
F	Ranunculus testiculatus (a)	-	3	-	-	7	.00	-	-	.02
F	Schoencrambe linifolia	a-	b35	a-	a5	a5	.08	-	.09	.01
F	Sisymbrium altissimum (a)	-	c50	a-	c58	b8	.18	-	.59	.05
F	Sphaeralcea coccinea	c207	b108	a45	b111	c168	1.09	.34	2.56	5.05
F	Tragopogon dubius	c69	b21	a-	a-	a-	.05	-	-	-
F	Trifolium sp.	-	2	-	-	4	.00	-	-	.06

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
F	Unknown forb-perennial	$_{b}$15	$_{b}$24	$_{a}$-	$_{a}$-	$_{a}$-	.06	-	-	-
F	Zigadenus paniculatus	-	-	-	-	3	-	-	-	.00
Total for Annual Forbs		0	551	133	549	153	3.66	0.41	9.10	1.25
Total for Perennial Forbs		291	348	66	158	331	2.20	0.69	3.11	7.13
Total for Forbs		291	899	199	707	484	5.86	1.11	12.22	8.39

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

BROWSE TRENDS--
Management unit 13B, Study no: 8

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia tridentata wyomingensis	40	45	40	1	1.53	2.34	2.50	-
B	Ceratoides lanata	2	2	0	1	-	-	.00	-
B	Gutierrezia sarothrae	0	0	1	0	-	-	-	-
B	Juniperus osteosperma	0	1	0	0	-	-	.00	-
B	Pinus edulis	0	1	1	0	1.82	.98	-	-
Total for Browse		42	49	42	2	3.36	3.32	2.51	0

CANOPY COVER, LINE INTERCEPT--
Management unit 13B, Study no: 8

Species	Percent Cover		
	'00	'05	'10
Artemisia tridentata wyomingensis	-	2.66	-
Ceratoides lanata	-	.51	-
Juniperus osteosperma	3.40	3.79	1.91
Pinus edulis	1.39	1.60	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13B, Study no: 8

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata wyomingensis	2.1	2.9

BASIC COVER--
Management unit 13B, Study no: 8

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	6.00	44.37	29.38	70.27	35.05
Rock	0	0	0	0	0
Pavement	0	0	0	0	0
Litter	67.00	60.84	51.45	35.38	37.30
Cryptogams	0	1.98	.86	.05	.68
Bare Ground	27.00	14.81	43.76	10.03	38.33

SOIL ANALYSIS DATA --
Management unit 13B, Study no: 8, Study Name: Steamboat Mesa South

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.0	6.9	54.6	23.1	25.3	1.4	4.9	67.2	0.5

PELLET GROUP DATA--
Management unit 13B, Study no: 8

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	5	41	2	9
Elk	-	-	1	4
Deer	18	33	5	22
Cattle	21	17	12	2

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	2 (5)	13 (33)
86 (212)	13 (33)	68 (167)
46 (113)	23 (56)	4 (11)

BROWSE CHARACTERISTICS--
Management unit 13B, Study no: 8

		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 wyomingensis									
86	**2331**	51	46	3	133	46	37	0	17/12
95	**1620**	46	52	2	160	27	1	2	17/25
00	**2480**	50	48	2	20	28	44	2	14/21
05	**1540**	13	66	21	20	10	75	23	15/21
10	**40**	100	0	0	-	0	0	0	11/17
Ceratoides lanata									
86	**66**	0	100	-	-	0	100	0	14/11
95	**60**	67	33	-	-	0	0	0	11/16
00	**100**	0	100	-	-	0	0	0	14/15
05	**0**	0	0	-	-	0	0	0	16/19
10	**20**	0	100	-	-	0	0	0	12/22
Chrysothamnus nauseosus									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	19/28
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-

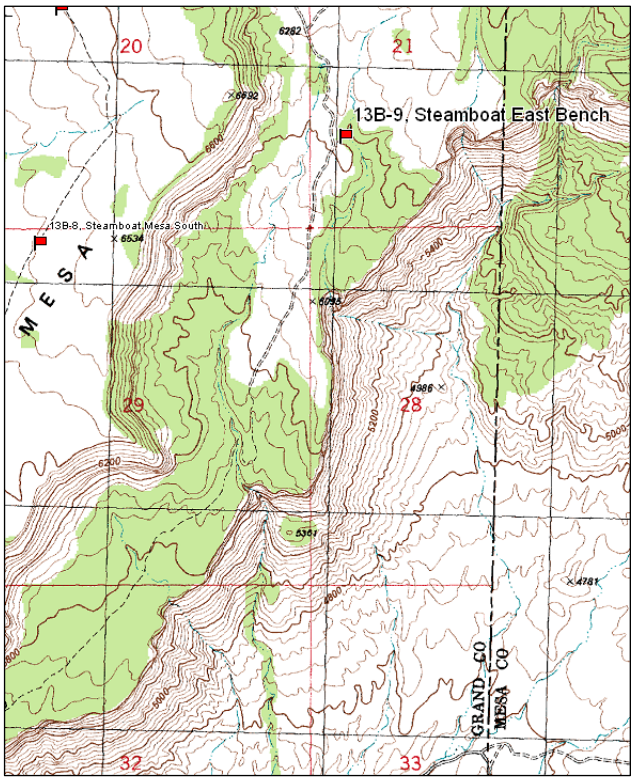
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	100	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	4/15
10	**0**	0	0	-	-	0	0	0	5/15
Pinus edulis									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**20**	0	100	-	-	0	0	0	-/-
05	**20**	0	100	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-

STEAMBOAT EAST BENCH - TREND STUDY NO. 13B-9-10

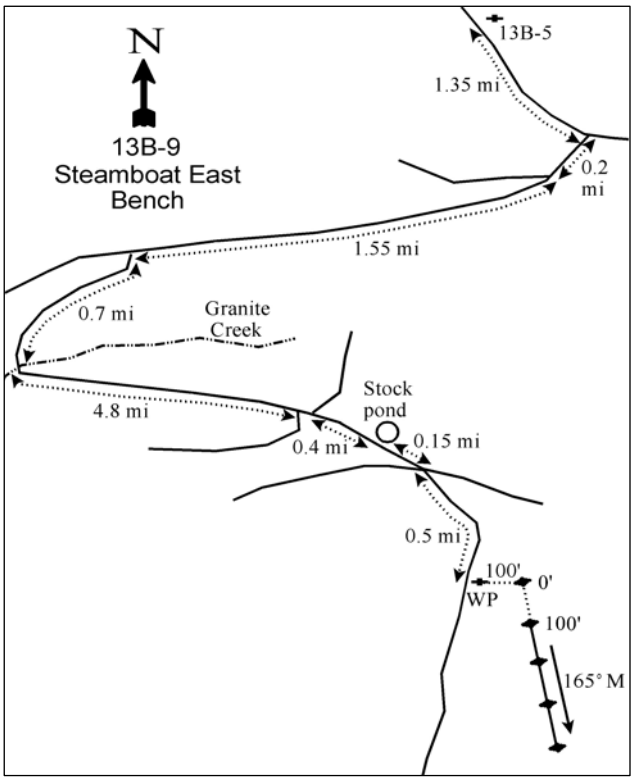
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 6200 ft. (1890 m)
Aspect: South-Southwest
Slope: 7%
Transect bearing: 165° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the Buckhorn Draw transect (13B-5), continue southeast for 1.35 miles to the "Granary" intersection. Turn right and go 0.2 miles to a fork. Stay left and go 1.55 miles. Turn left and go down this road 0.7 miles to Granite Creek. Cross the creek and proceed 4.8 miles to a fork. Stay left, then right at another fork which connects back to the main road, traveling 0.4 miles to a stock pond. Continue 0.15 miles to a fork with many branches (the right goes up on Steamboat Mesa). Stay on the same road (straight through the intersection and up a steep hill) for 0.5 miles to an old Pinyon-Juniper chaining and a 2 ½ foot tall rebar witness post on the left, 6 feet off the road. The 0-foot end of the baseline is 100 feet east of the witness post and is marked by a rebar tagged #7890.

Map Name: Steamboat Mesa



Diagrammatic Sketch:



Township: 23S Range: 26E Section: 21

GPS: NAD 83, UTM 12S 667958 E 4294860 N

STEAMBOAT EAST BENCH - TREND STUDY NO. 13B-9

Site Information

Site Description: The study site is located on a narrow bench (one-half mile wide) below Steamboat Mesa, bounded on the west by the sheer sandstone cliffs of Steamboat Mesa and on the east by deep canyons of the Dolores River. The northern part of the bench was included in the 1968 Steamboat Mesa allotment chaining. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Steamboat Mesa allotment. The area supports a moderately dense stand of pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*) and a variety of shrubs and herbaceous plants. Drainage off the bench is to the south. The pellet group data has estimated light use by deer, elk and cattle since 2000 (Table - Pellet Group Data). A dead horse was located near the road by the site in 2010.

Browse: The site supports a variety of browse species. Preferred species include: Utah serviceberry (*Amelanchier utahensis*), black sagebrush (*Artemisia nova*), Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*), true mountain mahogany (*Cercocarpus montanus*) and green ephedra (*Ephedra viridis*). Most of these key browse species occur in low to very low cover and density. For example, true mountain mahogany provides the most forage and has provided an average of around 3% cover (Table - Browse Trends) and has had a density of between 120 to 240 plants per acre since 1995. Mature mahogany plants are large, averaging over 5 feet in height making them partly unavailable to browsing. Use of mahogany has been mostly light with some years displaying more moderate use (Table - Browse Characteristics). All of the other preferred browse species combined have provided only 1% or less cover in any sample year. Pinyon and juniper trees dominate the site providing nearly all of the browse cover on the site (Table - Browse Trends) and with high density measurements (Table - Point-Quarter Tree Data).

Herbaceous Understory: Perennial grasses are diverse and fairly abundant on the site. The seeded species, crested wheatgrass (*Agropyron cristatum*), is the dominant grass species in cover. Other common perennial grasses include Indian ricegrass (*Oryzopsis hymenoides*), galleta (*Hilaria jamesii*) and bottlebrush squirreltail (*Sitanion hystrix*). The annual grass species, cheatgrass (*Bromus tectorum*), is prevalent on the site, as well, and has at times been the dominant grass species on the site. Forbs provide little forage or ground cover and most have low growth forms. Rock goldenrod (*Petradoria pumila*) is the most abundant forb on the site (Table - Herbaceous Trends).

Soil: The soil texture is a sandy clay loam that is moderately deep. Phosphorus has limited availability for plant growth and development at only 2 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Overall, the vegetation and litter cover provide adequate soil protection and bare ground cover is relatively low (Table - Basic Cover). However, some erosion is evident in areas disturbed by roads. Some slight pedestalling around plants and large rocks has also been noted. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1986 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 any of the preferred browse species.
- **1995 to 2000 - stable (0):** There was a slight decrease in the density of Wyoming big sagebrush and true mountain mahogany, but there was little change in cover. Pinyon and juniper cover remained high.
- **2000 to 2005 - slightly down (-1):** Wyoming big sagebrush was no longer sampled on the site in 2005. The density of true mountain mahogany increased, but cover decreased slightly. Decadence of black sagebrush increased from 0% to 35%.

- **2005 to 2010 - stable (0):** The density of true mountain mahogany and black sagebrush both decreased slightly, but the density of Wyoming big sagebrush increased. Cover of true mountain mahogany increased to 2000 levels.

Grass:

- **1986 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though the composition changed slightly with a significant increase in the nested frequency of crested wheatgrass and a significant decrease in the nested frequency of bottlebrush squirreltail.
- **1995 to 2000 - stable (0):** The sum of nested frequency of perennial grasses decreased by 18%, but cover increased from 3% to 8%. The increase in cover was due to a large increase in the cover of crested wheatgrass. Cheatgrass decreased significantly in nested frequency and cover decreased from 3% to near 0%.
- **2000 to 2005 - stable (0):** There was a 12% increase in the sum of nested frequency of perennial grasses, but cover decreased to 5%. Cheatgrass increased significantly in nested frequency and cover increased to 3%.
- **2005 to 2010 - slightly up (+1):** The sum of nested frequency of perennial grasses increased 11% and cover increased to 7%. There was little change in cheatgrass nested frequency or cover.

Forb:

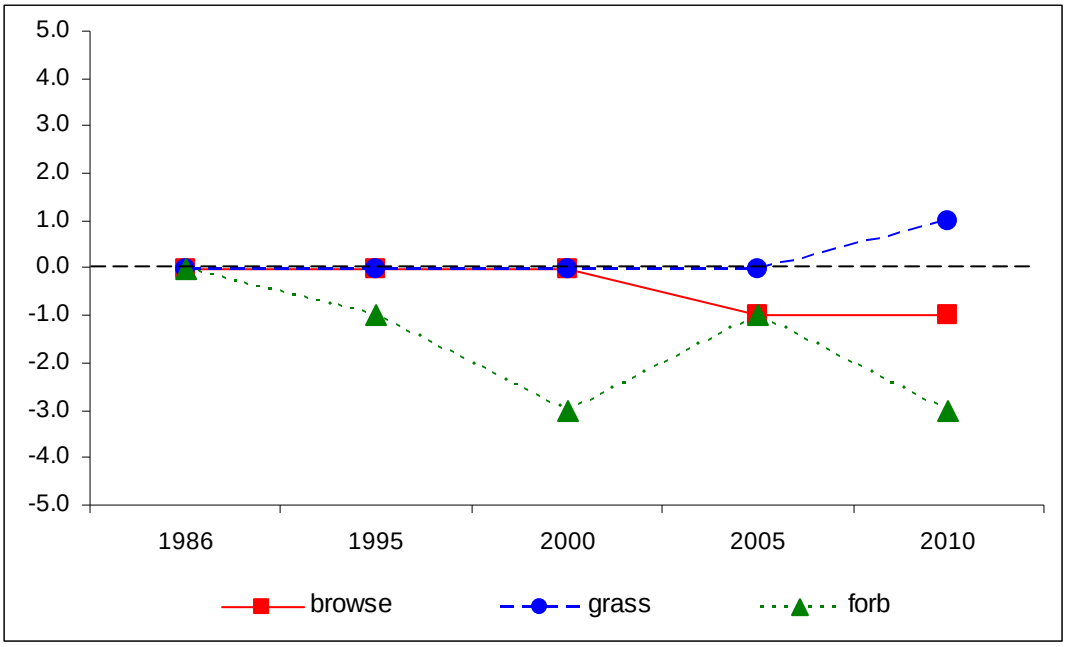
- **1986 to 1995 - slightly down (-1):** Perennial forb sum of nested frequency decreased by 15% with a significant decrease in the nested frequency of stemless goldenweed (*Haplopappus acaulis*).
- **1995 to 2000 - down (-2):** There was a 62% decrease in the sum of nested frequency of perennial forbs, though cover remained similar.
- **2000 to 2005 - up (+2):** The sum of nested frequency of perennial forbs increased more than three-fold and cover increased to 4%. Most of the increase was due to a significant increase in the nested frequency of one species, Drummond campion (*Lychnis drummondii*).
- **2005 to 2010 - down (-2):** The sum of nested frequency of perennial forbs decreased 50% and cover decreased to 3%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13B, study no: 9

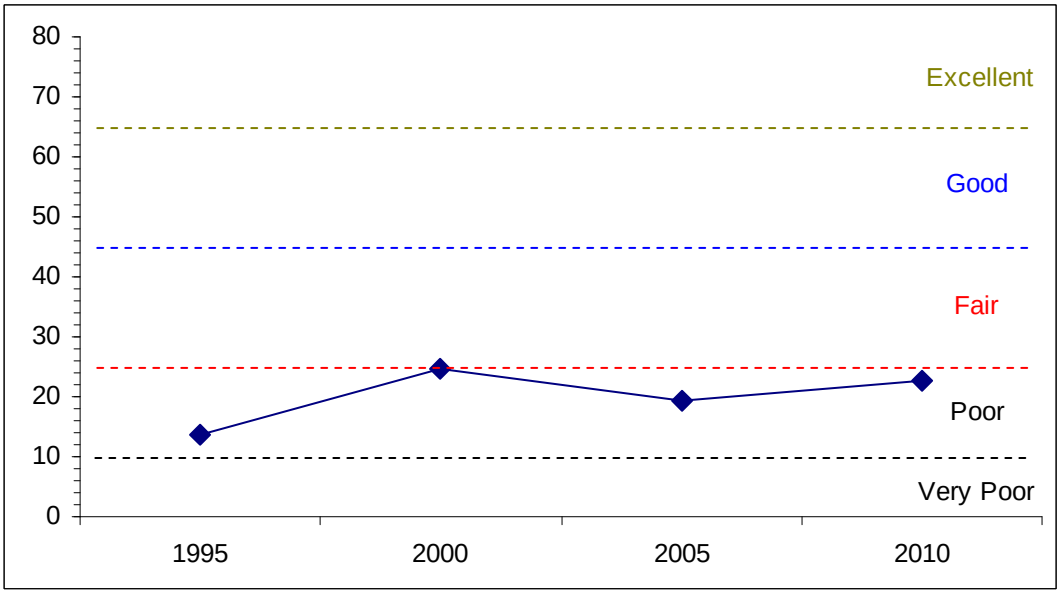
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	6.4	0.0	0.0	6.9	-2.3	2.8	0.0	**13.8**	Poor
00	5.8	0.0	0.0	15.6	-0.1	3.3	0.0	**24.6**	Poor-Fair
05	2.9	0.0	0.0	10.9	-2.0	7.4	0.0	**19.2**	Poor
10	4.2	0.0	0.0	14.7	-1.9	5.7	0.0	**22.7**	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13B, Study no: 9



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 13B, Study no: 9



HERBACEOUS TRENDS--
Management unit 13B, Study no: 9

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	a63	b106	ab96	ab80	b108	2.00	5.21	2.82	4.86
G	Aristida purpurea	a-	b16	b13	ab12	a-	.40	.84	.33	-
G	Bromus tectorum (a)	-	c243	a6	b139	b144	3.00	.09	2.62	2.52
G	Hilaria jamesii	a-	ab14	b18	b19	b16	.48	1.01	1.24	.59
G	Oryzopsis hymenoides	b29	ab17	a11	a6	ab29	.46	.68	.19	1.33
G	Poa bulbosa	-	-	-	-	1	-	-	-	.03
G	Poa fendleriana	b15	b15	a-	b10	ab5	.03	-	.19	.03
G	Poa secunda	a-	a-	ab2	b11	ab6	-	.00	.20	.18
G	Sitanion hystrix	b62	a7	a4	a21	a10	.04	.04	.45	.33
G	Stipa comata	-	-	-	2	3	-	-	.00	.00
G	Vulpia octoflora (a)	-	ab4	a-	b12	a-	.01	-	.02	-
Total for Annual Grasses		0	247	6	151	144	3.01	0.09	2.64	2.52
Total for Perennial Grasses		169	175	144	161	178	3.43	7.80	5.44	7.38
Total for Grasses		169	422	150	312	322	6.45	7.89	8.09	9.90
F	Arabis drummondi	-	9	-	-	-	.02	-	-	-
F	Artemisia dracunculus	-	-	-	7	-	-	-	.01	-
F	Astragalus convallarius	-	-	-	9	-	-	-	.30	-
F	Astragalus mollissimus	b15	ab10	a-	b10	ab8	.05	-	.07	.25
F	Astragalus sp.	-	4	-	-	-	.01	-	-	-
F	Calochortus nuttallii	-	5	-	2	3	.01	-	.00	.00
F	Chenopodium fremontii (a)	-	-	-	2	-	-	-	.00	-
F	Cryptantha sp.	a-	b23	a-	b12	a-	.06	-	.08	-
F	Cymopterus sp.	a-	c16	a-	ab5	bc9	.04	-	.02	.21
F	Descurainia pinnata (a)	-	a-	a-	b17	ab3	-	-	.23	.01
F	Draba nemorosa (a)	-	a4	a-	b68	a3	.01	-	.29	.01
F	Erigeron pumilus	2	-	-	-	5	-	-	-	.04
F	Erodium cicutarium (a)	-	ab18	a5	b34	a3	.04	.01	.22	.01
F	Euphorbia sp.	b13	a4	a-	a-	a-	.01	-	-	-
F	Gilia hutchinifolia (a)	-	b28	a-	c53	b13	.08	-	.26	.03
F	Haplopappus acaulis	c70	b31	b29	a3	a-	.39	.24	.04	-
F	Heterotheca villosa	-	12	4	4	4	.16	.15	.01	.15
F	Hymenoxys acaulis	a-	a-	ab5	ab4	b19	-	.06	.01	.42
F	Lactuca serriola	-	1	-	-	-	.00	-	-	-
F	Lappula occidentalis (a)	-	2	-	10	36	.00	-	.02	.11
F	Lepidium densiflorum (a)	-	-	-	1	-	-	-	.01	-
F	Lesquerella ludoviciana	10	-	-	-	-	-	-	.00	-
F	Lithospermum sp.	-	2	-	-	1	.00	-	-	.03
F	Lupinus sp.	-	-	-	-	3	-	-	-	.00
F	Lychnis drummondii	a-	a11	a-	b101	a-	.02	-	2.25	-
F	Machaeranthera grindelioides	10	-	-	3	-	-	-	.00	-
F	Medicago sativa	-	-	-	-	1	.01	-	.00	.15
F	Penstemon sp.	3	5	-	2	3	.04	-	.01	.04
F	Petradoria pumila	28	14	16	13	22	.47	1.12	.50	1.23

Type	Species	Nested Frequency					Average Cover %			
		'86	'95	'00	'05	'10	'95	'00	'05	'10
F	Phlox hoodii	25	11	10	18	18	.05	.07	.25	.22
F	Physaria sp.	1	-	-	-	-	-	-	-	-
F	Ranunculus testiculatus (a)	-	-	-	-	4	-	-	-	.01
F	Sisymbrium altissimum (a)	$_{a}$1	$_{b}$13	$_{a}$-	$_{a}$2	$_{a}$-	.03	-	.00	-
F	Streptanthus cordatus	-	7	-	8	4	.02	-	.10	.03
F	Townsendia incana	3	-	-	-	-	-	-	-	-
F	Tragopogon dubius	$_{b}$17	$_{a}$3	$_{a}$-	$_{a}$-	$_{a}$1	.00	-	-	.03
Total for Annual Forbs		1	65	5	187	62	0.16	0.00	1.05	0.19
Total for Perennial Forbs		197	168	64	201	101	1.40	1.66	3.71	2.83
Total for Forbs		198	233	69	388	163	1.57	1.67	4.76	3.02

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

BROWSE TRENDS--
Management unit 13B, Study no: 9

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Amelanchier utahensis	1	0	1	1	-	-	-	.03
B	Artemisia nova	13	13	12	10	.85	1.00	.37	.22
B	Artemisia tridentata wyomingensis	5	1	0	3	.18	.15	-	-
B	Cercocarpus montanus	10	5	9	9	3.25	2.76	1.58	2.61
B	Echinocactus sp.	0	0	0	1	-	-	-	-
B	Ephedra viridis	1	1	1	1	.15	.15	.03	-
B	Gutierrezia sarothrae	30	32	21	27	.71	1.28	.76	1.32
B	Juniperus osteosperma	0	7	8	6	2.95	5.73	3.52	7.59
B	Opuntia sp.	1	2	1	3	-	.03	.15	.15
B	Pinus edulis	0	16	16	15	11.50	12.08	5.91	9.19
B	Sclerocactus sp.	1	5	2	1	.00	.06	.00	-
B	Symphoricarpos oreophilus	1	1	2	0	.15	.15	.15	-
B	Yucca harrimaniae	1	2	1	2	.00	.00	-	-
Total for Browse		64	85	74	79	19.75	23.42	12.49	21.13

CANOPY COVER, LINE INTERCEPT--
Management unit 13B, Study no: 9

Species	Percent Cover		
	'00	'05	'10
Amelanchier utahensis	-	1.39	.11
Artemisia nova	-	.66	.18
Artemisia tridentata wyomingensis	-	-	.35
Cercocarpus montanus	-	3.08	4.16
Ephedra viridis	-	.26	.41
Gutierrezia sarothrae	-	.68	.81
Juniperus osteosperma	9.00	10.44	8.06
Opuntia sp.	-	.05	.15
Pinus edulis	12.19	17.83	15.66
Pinus monophylla	-	-	.15
Sclerocactus sp.	-	.03	-
Symphoricarpos oreophilus	-	.23	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13B, Study no: 9

Species	Average leader growth (in)	
	'05	'10
Cercocarpus montanus	3.1	0.9

POINT-QUARTER TREE DATA--
Management unit 13B, Study no: 9

Species	Trees per Acre			
	'95	'00	'05	'10
Juniperus osteosperma	47	63	66	61
Pinus edulis	134	274	184	195

Average diameter (in)			
'95	'00	'05	'10
6.3	4.9	8.2	7.0
2.8	2.4	3.9	2.9

BASIC COVER--
Management unit 13B, Study no: 9

Cover Type	Average Cover %				
	'86	'95	'00	'05	'10
Vegetation	2.00	27.71	32.60	22.95	34.04
Rock	7.00	15.66	11.94	11.42	13.64
Pavement	1.75	.52	6.53	1.84	4.97
Litter	55.50	41.47	50.87	37.79	44.57
Cryptogams	1.00	.80	1.73	.43	1.50
Bare Ground	32.75	26.00	28.85	37.29	26.26

SOIL ANALYSIS DATA --
Management unit 13B, Study no: 9, Study Name: Steamboat East Bench

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.7	7.3	57.6	17.1	25.2	2.0	2.0	80.0	0.6

PELLET GROUP DATA--
Management unit 13B, Study no: 9

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	17	15	28	19
Elk	9	-	8	3
Deer	6	10	16	10
Cattle	-	1	2	2

Days use per acre (ha)		
'00	'05	'10
-	-	-
7 (19)	7 (18)	7 (17)
17 (42)	3 (6)	16 (40)
-	5 (13)	8 (20)

BROWSE CHARACTERISTICS--
Management unit 13B, Study no: 9

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
86	**0**	0	0	-	-	0	0	0	-/-
95	**20**	100	0	-	40	0	0	0	119/169
00	**0**	0	0	-	-	0	0	0	109/167
05	**20**	100	0	-	-	0	0	0	89/119
10	**20**	100	0	-	20	0	0	0	69/98
Artemisia nova									
86	**1198**	31	36	33	-	50	6	6	8/11
95	**440**	27	68	5	40	55	18	0	10/18
00	**440**	5	95	0	-	5	0	0	7/17
05	**400**	10	55	35	40	5	20	0	9/21
10	**300**	27	60	13	-	0	0	7	10/22
Artemisia tridentata wyomingensis									
86	**132**	25	25	50	-	50	25	25	5/7
95	**120**	17	50	33	-	0	33	0	14/22
00	**40**	0	100	0	-	0	100	0	9/17
05	**0**	0	0	0	-	0	0	0	14/20
10	**120**	17	83	0	-	67	0	0	11/24
Atriplex canescens									
86	**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	31/39
10	**0**	0	0	-	-	0	0	0	35/36
Cercocarpus montanus									
86	**0**	0	0	0	-	0	0	0	-/-
95	**240**	50	42	8	40	8	0	8	68/94
00	**120**	33	50	17	-	17	0	0	74/92
05	**240**	67	17	17	-	42	8	8	55/59
10	**200**	50	40	10	120	20	10	10	48/51

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus hololeucus									
86	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	43/56
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	43/68
Echinocactus sp.									
86	**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	**40**	0	100	-	-	0	0	0	6/11
Ephedra viridis									
86	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	34/35
00	**20**	0	100	-	-	0	0	0	33/57
05	**20**	0	100	-	-	100	0	0	33/57
10	**20**	0	100	-	-	0	0	0	39/55
Gutierrezia sarothrae									
86	**1565**	15	83	2	-	0	0	0	8/10
95	**1680**	8	88	4	260	0	0	1	9/13
00	**1300**	3	68	29	-	0	0	29	6/11
05	**700**	9	89	3	20	0	0	3	15/23
10	**1640**	9	90	1	-	0	0	1	7/12
Juniperus osteosperma									
86	**0**	0	0	0	33	0	0	0	-/-
95	**0**	0	0	0	-	0	0	0	-/-
00	**140**	14	86	0	-	0	0	0	-/-
05	**160**	25	63	13	-	0	0	0	-/-
10	**120**	17	83	0	20	0	0	0	-/-
Opuntia sp.									
86	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	3/11
00	**40**	0	100	-	-	0	0	0	3/12
05	**40**	0	100	-	-	0	0	0	3/13
10	**80**	0	100	-	-	0	0	50	14/16
Pinus edulis									
86	**331**	30	60	10	-	0	0	10	81/39
95	**0**	0	0	0	20	0	0	0	-/-
00	**460**	52	48	0	20	0	0	0	-/-
05	**460**	35	65	0	-	0	0	0	-/-
10	**340**	71	29	0	20	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)
Purshia tridentata									
86	**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	34/48
10	**0**	0	0	-	-	0	0	0	41/91
Sclerocactus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
95	**40**	50	50	-	-	0	0	0	11/8
00	**160**	0	100	-	-	0	0	0	5/7
05	**40**	0	100	-	-	0	0	0	5/6
10	**20**	0	100	-	-	0	0	0	5/4
Symphoricarpos oreophilus									
86	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	30/57
00	**20**	0	100	-	-	0	0	0	-/-
05	**100**	0	100	-	-	0	0	0	32/59
10	**0**	0	0	-	-	0	0	0	29/53
Yucca harrimaniae									
86	**832**	28	68	4	-	0	0	4	12/16
95	**20**	0	100	0	-	0	0	0	4/2
00	**40**	100	0	0	-	0	0	0	12/13
05	**20**	0	100	0	-	0	0	0	11/15
10	**40**	0	100	0	-	0	0	0	11/16

SUMMARY
WILDLIFE MANAGEMENT UNIT 13B - DOLORES TRIANGLE

Community Types

Deer winter range within a unit is summarized into three categories based on ecological potentials which inlude low potential, mid-level potential and high potential. Low potential sites include desert shrub, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and cliffrose (*Cowania mexicana* ssp. *stansburiana*) communities. Mid-level potential sites include mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) communities. High potential sites include mountain brush communities. Black sagebrush (*A. nova*) and basin big sagebrush (*A. tridentata* ssp. *tridentata*) communities are placed within the low potential or mid-level potential scales based on precipitation and elevation. Deer summer range is summarized separately from winter range as a fourth category and typically includes aspen (*Populus tremuloides*) and high elevation mountain brush communities. Nine interagency range trend studies were sampled in Unit 13B during the summer of 2010. All nine of the range trend studies in the unit [Lower Westwater-Dolores (13B-1), Upper Westwater-Dolores (13B-2), Fish Park (13B-3), Red Cliffs (13B-4), Buckhorn Draw (13B-5), Ryan Creek (13B-6), Steamboat Mesa North (13B-7), Steamboat Mesa South (13B-8) and Steamboat East Bench (13B-9)] are categorized as low potential sites for deer winter range. All of the studies except the two Westwater studies are also considered to be elk winter range. Four studies sample chained and seeded pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) communities; two studies sample Wyoming big sagebrush communities; two studies sample former basin big sagebrush communities that have converted to cheatgrass (*Bromus tectorum*); one study samples a blackbrush community. There were no studies in this unit that were categorized as high potential or mid-level potential deer winter range, or summer range.

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation and Palmer Drought Severity Index (PDSI) data for the unit were compiled from the National Oceanic and Atmospheric Administration (NOAA) Physical Sciences Division (PSD) as part of the Southeast Division (Division 7). The Southeast Division had historic annual mean precipitation of 9.07 inches from 1895 to 2010. Over the course of the study years in Unit 13B, the mean annual PDSI displayed several periods of prolonged drought. Moderate to extreme wet years in the Southeast Division included 1983-1985, 1993, 2005 and 2010, and moderate to extreme drought years included 1989-1990, 2000, 2002-2003 and 2009 (Figure 1 and Figure 2) (Time Series Data 2011).

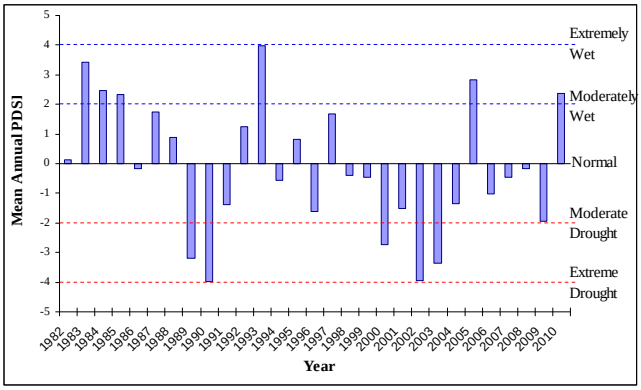


Figure 1. The 29 year mean annual Palmer Drought Severity Index (PDSI) for the Southeast Division (Division 7). The PDSI is based on climate data gathered from 1895 to 2010. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is ≥4.0 = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and ≤-4.0 = Extreme Drought (Time Series Data 2011).

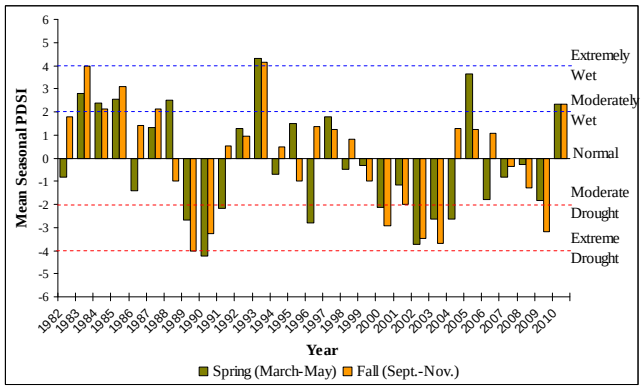


Figure 2. The 29 year mean spring (March-May) and fall (Sept.-Nov.) Palmer Drought Severity Index (PDSI) for the Southeast Division (Division 7). The PDSI is based on climate data gathered from 1895 to 2010. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is ≥4.0 = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and ≤-4.0 = Extreme Drought (Time Series Data 2011).

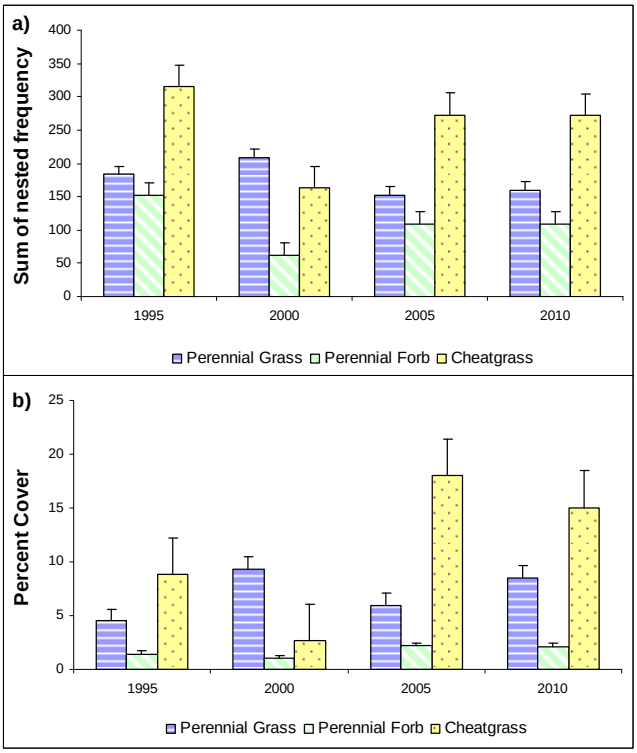


Figure 3. a) Low potential sites mean perennial grass, perennial forb and cheatgrass sum of nested frequency (n=9) by year for WMU 13B, Delores Triangle. **b)** Low potential sites mean perennial grass, perennial forb and cheatgrass cover (n=9) by year for WMU 13B.

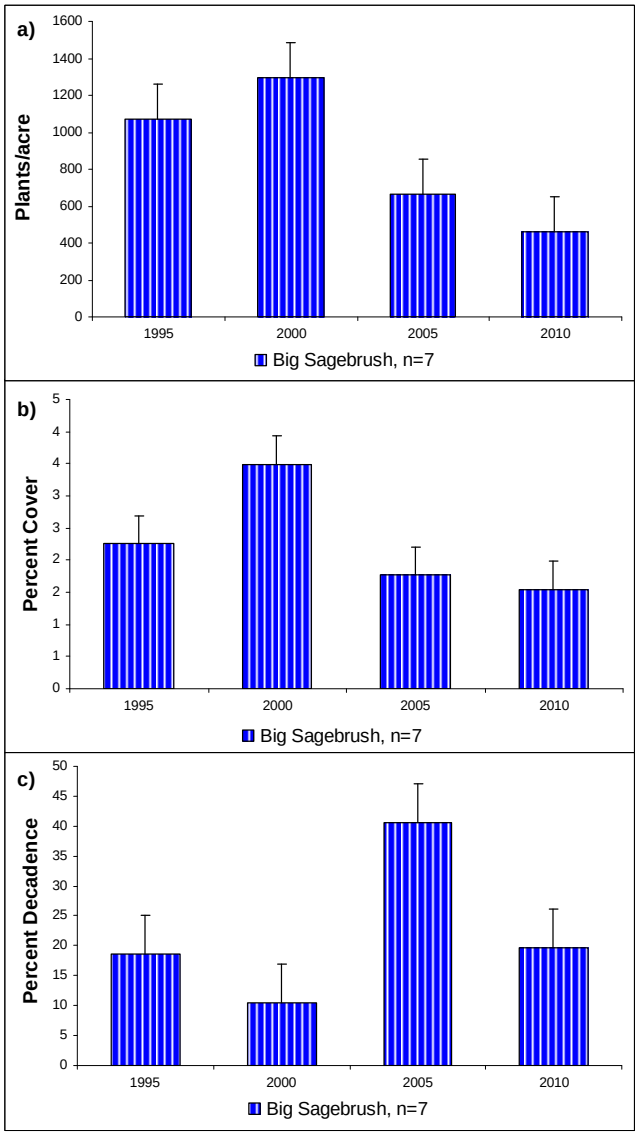


Figure 4. a) Low potential sites mean density of big sagebrush (*Artemisia tridentata*) by year for WMU 13B, Dolores Triangle. **b)** Low potential sites mean cover of big sagebrush by year for WMU 13B. **c)** Low potential sites mean population decadence of big sagebrush by year for WMU 13B.

Wyoming Big Sagebrush Communities (Low Potential Winter Range)

Browse: The low potential cumulative median browse trend remained stable throughout the early years of the study, decreased slightly in 2005 and remained lower in 2010 (Figure 5). Desirable browse species are limited on most of the study sites in the unit. Two of the studies, Upper Westwater-Dolores and Ryan Creek, burned in wildfires prior to the collection of browse cover in 1995, removing sagebrush from the sites. The Steamboat Mesa South study burned in a 2009 wildfire that removed all of the browse from that site, as well. The Red Cliffs study is dominated by blackbrush (*Coleogyne ramosissima*) and the most common preferred browse species on the Steamboat East Bench study is true mountain mahogany (*Cercocarpus montanus*). For information on the trends of these species, refer to the study discussion section. Wyoming big sagebrush and basin big sagebrush are typically the most common preferred browse species on the studies within the unit. For the purposes of this summary, Wyoming big sagebrush and basin big sagebrush measurements were combined and will be referred to simply as big sagebrush. The mean density of big sagebrush decreased significantly in 2005 with a general decrease in density across the study sites. Mean density decreased further in 2010 (Figure 4a), primarily due to the fire that removed sagebrush from the Steamboat Mesa South study. The density of big sagebrush on the other studies in the unit remained similar in 2010. The mean cover of big sagebrush increased significantly in 2000, but decreased significantly in 2005 (Figure 4b). Mean decadence of big sagebrush is typically moderate on the unit, but was significantly higher in 2005 than in any other sample year (Figure 4c).

Herbaceous Understory: The low potential median cumulative grass trend has fluctuated over the course of the study years. It was slightly down in 2995 and 2005, but was slightly up in 2000 and 2010 making the overall trend fairly stable (Figure 5). Despite the stable trend, grasses within these communities are generally in poor condition. Grasses are not particularly diverse or abundant, and are typically dominated by one or two species. The annual species cheatgrass (*Bromus tectorum*) is common on within the unit and is the dominant or co-dominant grass species on most of the studies. The increaser species bulbous bluegrass (*Poa bulbosa*) has been sampled at low, but increasing, frequency and cover on the Fish Park study and the three studies in the Steamboat Mesa area. The mean sum of nested frequency of perennial grasses increased in 2000 with a significant decrease in the mean nested frequency of cheatgrass, but the sum of nested frequency of perennial grasses decreased significantly in 2005 with the significant increase in cheatgrass nested frequency (Figure 3a). Mean cover followed similar trends as nested frequency, though perennial grass cover increased significantly in 2010. Also, the mean cover of cheatgrass was much higher in 2005 than other sample years (Figure 3b).

The low potential median cumulative forb trend for the unit increased slightly in 1995, was down in 2000, but increased slightly again in 2005. Overall, the trend for forbs has remained relatively stable over the sample years (Figure 5). Perennial forbs are also in fairly poor condition across the unit with annual forbs typically being more common on the studies. The mean sum of nested frequency of perennial forbs decreased significantly in 2000 and despite a significant increase in 2005, the mean perennial forb sum of nested frequency remained significantly lower than in 1995 (Figure 3a). The mean cover of perennial forbs was significantly higher in 2005 and 2010 than in 1995 and 2000 (Figure 3b).

Utilization: Pellet group transect data indicates that deer predominantly use the study areas. The mean deer days use/acre on the unit has been moderately heavy over the course of the study years, with less use in 2005. Elk use is light on most studies. The increase in the mean elk days use/acre is due a large, steady increase in the use by elk on the Fish Park study. The mean cattle use on the unit is moderate (Figure 6) with the heaviest use sampled on the two Westwater studies, the Buckhorn Draw study and the Steamboat Mesa South study.

Deer Desirable Components Index (DCI): The low potential deer DCI has fluctuated slightly over the sample years, primarily due to the perennial and annual grass cover scores. The ranking of the DCI has ranged from very poor-poor to poor-fair throughout the sample years (Table 1 and Figure 7).

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	4.9	3.1	1.8	9.0	-7.1	2.9	0.0	**14.7**	Poor
00	5.9	2.9	1.1	16.8	-2.5	2.1	0.0	**26.3**	Poor-Fair
05	4.0	1.0	0.3	11.1	-12.6	4.3	0.0	**8.3**	Very Poor-Poor
10	4.1	2.3	0.8	15.1	-10.3	3.8	0.0	**15.8**	Poor

Table 1. Low potential scale mean deer DCI scores (n=9) by year for WMU 13B, Dolores Triangle. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

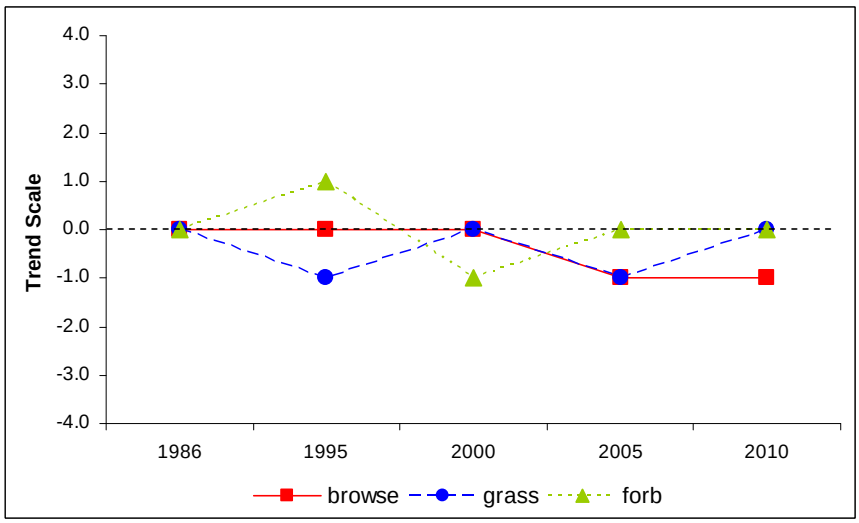


Figure 5. Low potential sites (n=9) cumulative median browse, grass and forb trends by year for WMU 13B, Dolores Triangle.

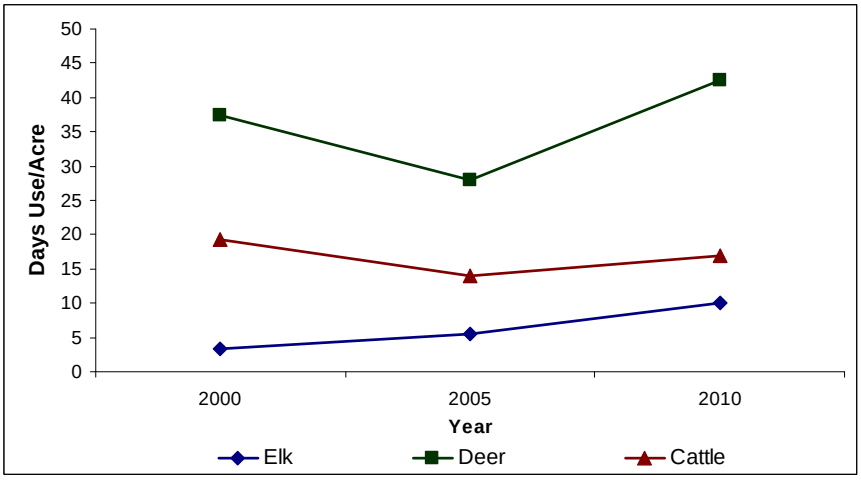


Figure 6. Low potential sites (n=9) mean animal days use/acre by year for WMU 13B, Dolores Triangle.

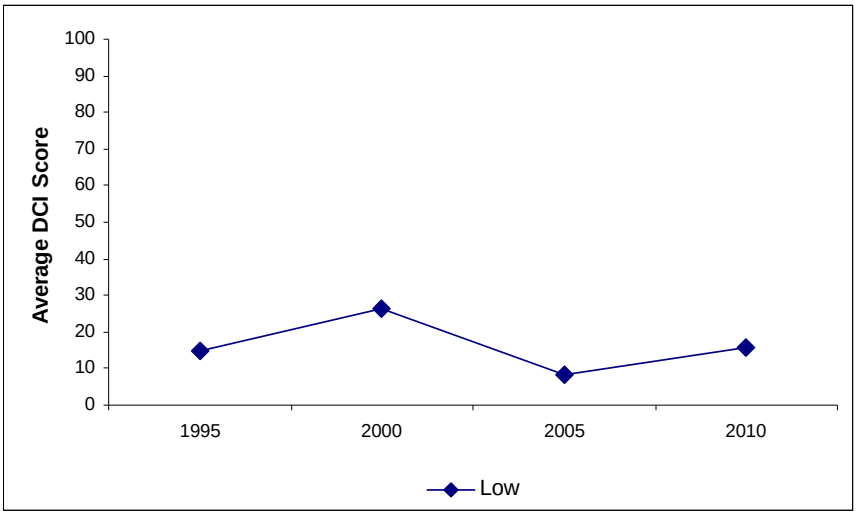


Figure 7. Mean low (n=9) potential scale deer DCI scores by year for WMU 13B, Dolores Triangle. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high. No mid-level or high potential sites were sampled in this unit.

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