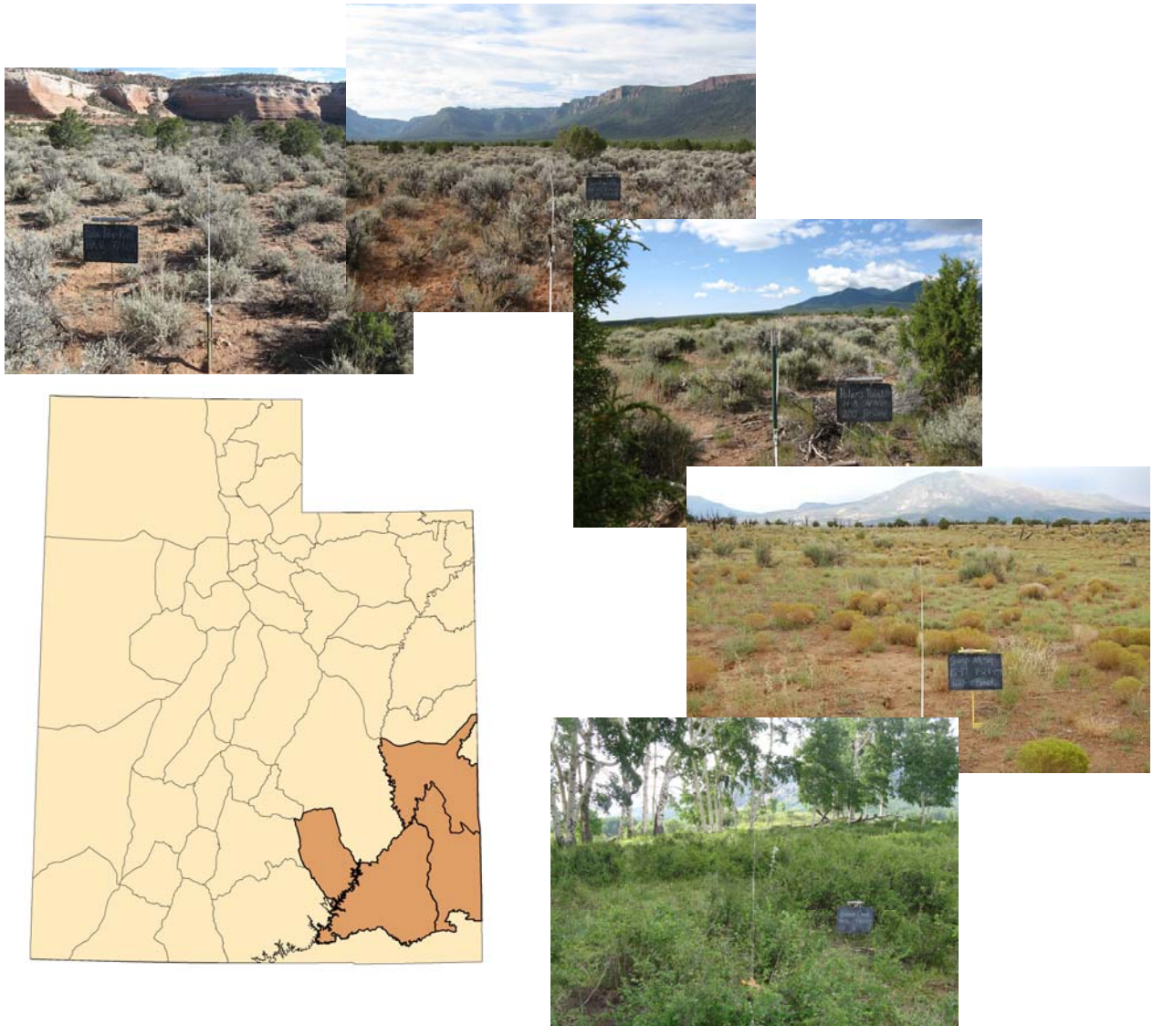
UTAH BIG GAME RANGE TREND STUDIES
2009 Volume I



PUBLICATION NUMBER 10-37
REPORT FOR FEDERAL AID PROJECT W-82-R-54

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

UTAH BIG GAME
RANGE TREND STUDIES
2009 Volume I

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Performance Report for Federal Aid Project W-82-R-54

Publication No. 10-37

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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-54

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 2009 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Southeastern Region. 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:

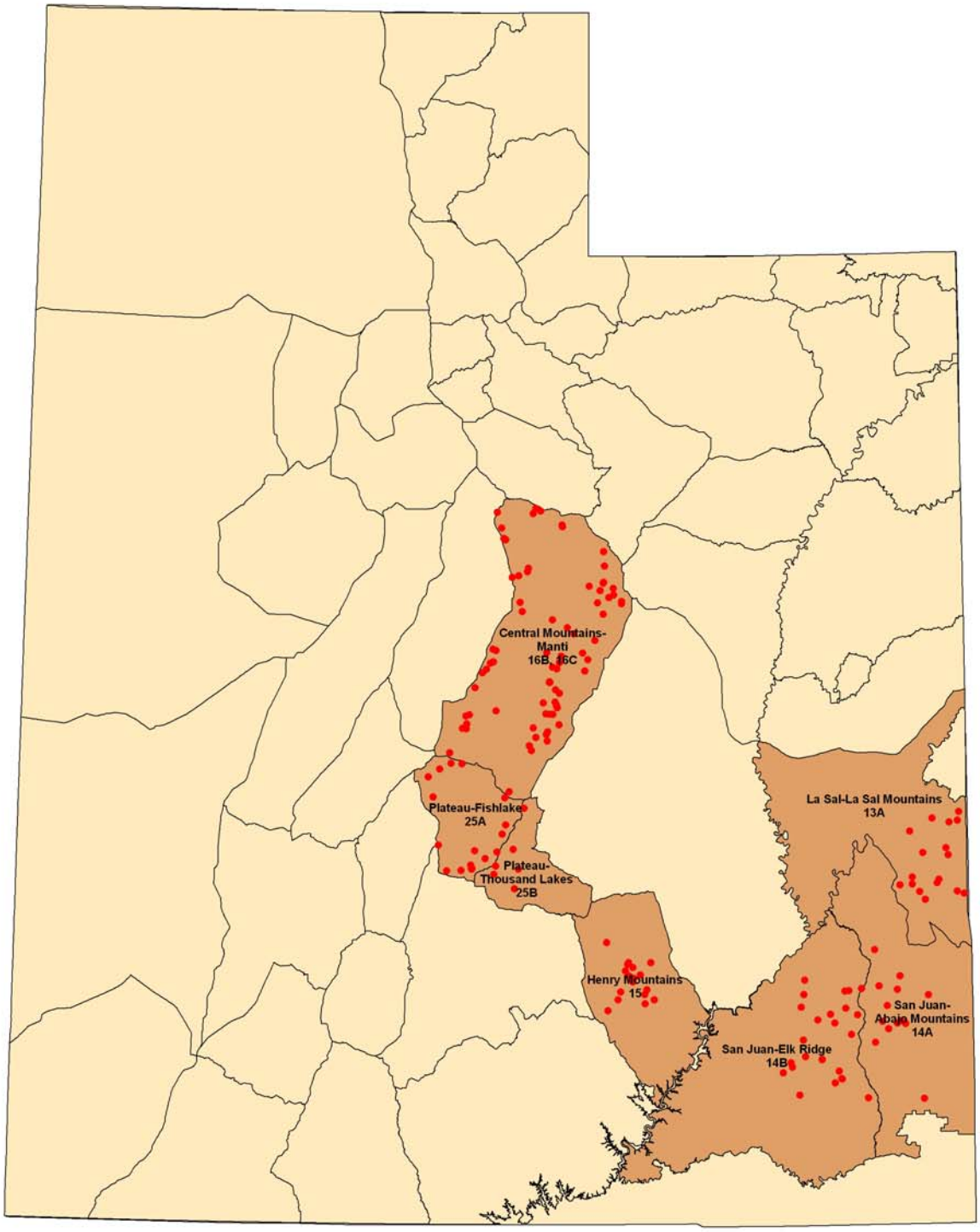
Bureau of Land Management
- Monticello Resource Area
- Moab resource Area

Manti-LaSal National Forest
- Ferron Ranger District
- Moab Ranger District
- Monitcello Ranger District
- Sanpete Ranger District

Fishlake National Forest
- Loa-Teasdale Ranger District
- Fillmore Ranger District

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

Utah Management Units Surveyed in 2009



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.

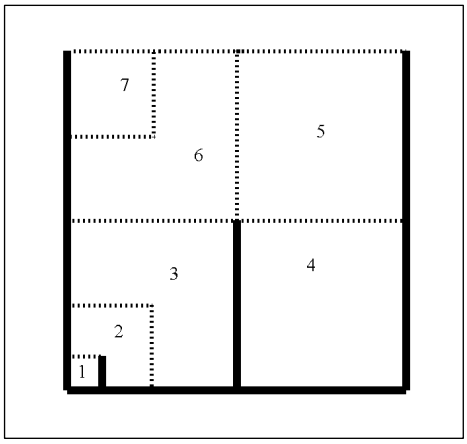


Figure 1. Cover classes of the 1/4 m^2 sampling quadrat.

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.

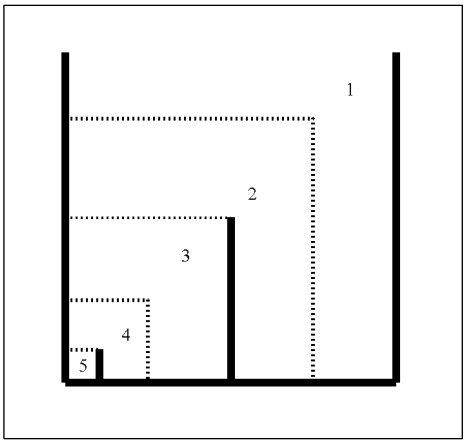


Figure 2. Nested frequency sub-quadrats of the 1/4 m^2 sampling quadrat.

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	0	46.05	40.37	45.25	50.69
Cryptogams	0	1.50	8.07	2.74	2.00
Bare Ground	0	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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[2]U.S. Department of Interior Bureau of Land Management. 1999. Utilization Studies and Residual Measurements, Interagency Technical Reference, BLM/RS/ST-96/004+1730.

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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.

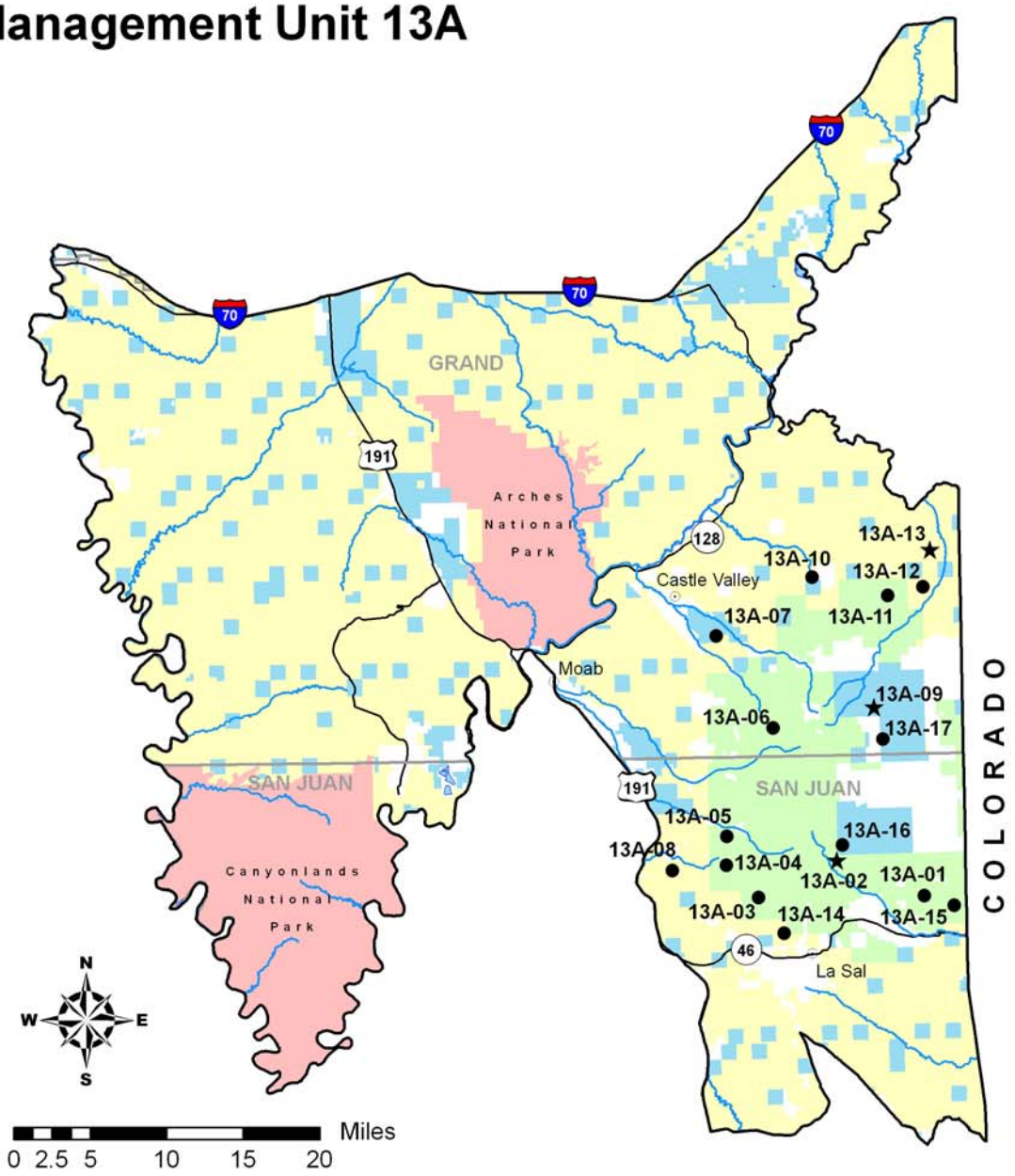
The name and directions for locating the site are given on the location page. Also included on this page are the vegetation type, range type, NRCS ecological site description, land ownership, elevation, aspect, slope, arrangement and diagrammatic sketch of the baseline, and the location on a topographical 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.

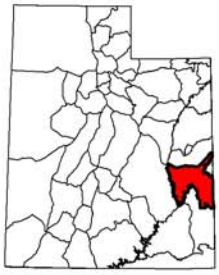
Summaries and evaluations at the end of each management unit address range trends in these key areas. This report will serve to identify and verify changes that are occurring on key areas for big game.

Management Unit 13A



- Transect Location
- Suspended Study
- City
- County Boundary
- River
- Road
- Water Body
- BLM
- USFS
- NPS
- SITLA
- Private

Unit Location



WILDLIFE MANAGEMENT UNIT 13A - LA SAL MOUNTAINS

Boundary Description

Grand and San Juan Counties - Boundary begins at the junction of Interstate 70 and the Green River; then south on the Green River to the Colorado River; then north on the Colorado River to Highway SR-191; south on SR-191 to the Big Indian road; east on this road to the Lisbon Valley road; east on this road to the Island Mesa road; east on this road to the Colorado state line; north on the state line to the Dolores River; northwest on this river to the Colorado River; northeast on this river to the Colorado state line; north on this line to I-70; west on I-70 to the Green River and beginning point.

Management Unit Description

The boundaries of this unit encompass a very large and varied area. The predominant vegetation in the northern part and along the western portion of the unit is a desert shrub type which receives little use by deer or elk. This lower country is inhabited mostly by desert bighorn and antelope. The deer and elk range is centered on and around the La Sal Mountains. From the bare talus peaks at 12,700 feet, the mountain levels off to an 8,000 foot plateau, then slopes gently down to the desert below at about 4,000 feet. Deer generally winter on the mesas at 8,000 feet or lower. South-facing slopes in steep canyons and the lower desert areas also provide some additional wintering areas. The 1967 range inventory (Coles and Pederson 1968) identified 450,240 acres of deer winter range, making up approximately 46% of the unit. Much of the winter range is within the pinyon-juniper type, where many range rehabilitation projects have been completed through the years. The desert shrub type, which comprises about 25% of the winter range, is used mostly during severe winters.

BLM administered land comprise 59% of the winter range on this herd unit. The Forest Service manages the higher mesas, which represent 19% of the winter range. State ownership is also substantial. The major use of the federal and state land is livestock grazing. There is currently limited activities pertaining to mining, oil, and gas drilling. Recreation and tourism is a major influence on the area, but most of this activity is concentrated in the lower desert areas, along the Colorado River and in National Parks. On private land around Moab, Castle Valley, Fisher Valley, and La Sal, there are farming and ranching operations.

Key Areas

Key big game areas are: the Fisher Valley - Fisher Mesa area (USFS and BLM, approximately 2,900 acres), lower Castle Valley severe winter range (BLM and state, 3,800 acres), Upper Castle Valley and Porcupine Draw (USFS, 1,280 acres), Bromley Ridge (USFS, 1,000 acres), Black Ridge (BLM, 1,400 acres), Pole Canyon - Slaughter Flats - Buck Hollow (USFS, 9,500 acres) and North Beaver Mesa (USFS and BLM, 600 acres). In a published Manti-La Sal Forest Management Plan (USDA Forest Service 2006), these areas are identified as general big game winter range. No key winter range was identified on the Moab District.

Much of the winter range around the La Sal Mountains has had some kind of treatment to provide improved grazing and winter range conditions. The treatments are mainly pinyon-juniper chaining and seeding projects, roller-chopper treatments of old chainings, sagebrush removal, and contour trenching on the more eroded sites. A majority of the range trend studies established on the unit sample these treated types. Chained areas are found on North Beaver Mesa, Black Ridge, Amasas Back, Slaughter Flat, Buck Hollow and Two-Mile Chaining. Due to the wide difference in treatment years, from 1960 to the late 1970's, early 1980's and early 1990's, there is considerable variability to what stage of succession they are in. On most the areas studied, except for Amasas Back, pinyon-juniper encroachment is not yet a problem. The key browse species is mountain or Wyoming big sagebrush (*Artemisia tridentata* ssp. *vaseyana* and *A. tridentata* ssp. *wyomingensis*, respectively) which dominate most sites. The higher elevation treatments on North Beaver Mesa, Buck Hollow and Two-Mile Chaining also have a variety of other browse and abundant quantities of grass. Treatments on critical deer winter range on Slaughter Flat, Upper Fisher Valley and Black Ridge have a

moderately dense stand of Wyoming big sagebrush with an understory of crested wheatgrass. These sites are limited in their ability to produce other desirable browse.

The majority of the key areas identified are managed by the BLM or USFS. The Forest Service has range studies over all the key areas. Ecological site data (SVIM) is available for the studies on BLM administered land. All of the key areas studied are also grazed by domestic livestock. The BLM areas are generally grazed by cattle in spring (May - June). Fisher Valley also has fall and winter cattle use. North Beaver Mesa is grazed November to May 31. The Forest Service land on upper North Beaver Mesa is grazed by cattle May 1 to June 15 and October 16 to November 25. The Forest Service allotments are under a rest/deferred rotation grazing system. Use generally occurs from June to mid-October.

Range Trend Studies

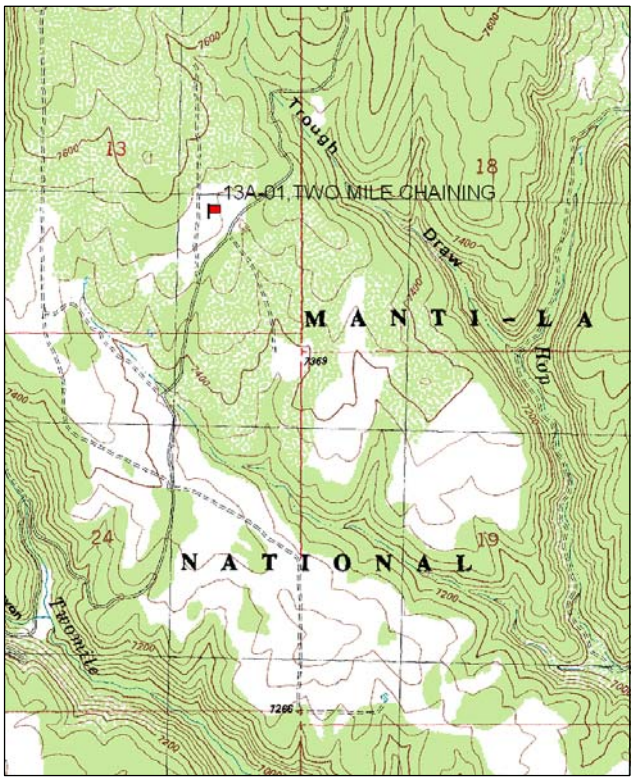
Locations for herd unit 13A trend studies were determined in an Interagency meeting in Moab in 1986. However, they could not be incorporated into the range crew schedule until the summer of 1987. Studies established in June of 1987 that were sampled in 2009 included seven studies on crucial deer winter range [Buck Hollow (13A-3), Slaughter Flat (13A-4), Amasas Back (13A-5), Round Mountain (13A-7), Black Ridge (13A-8), Upper Fisher Valley (13A-10) and Below Polar Rim (13A-12)], two studies on transitional deer and elk ranges [Two Mile Chaining (13A-1) and North Beaver Mesa (13A-11)], and one study on deer and elk summer range [Bald Mesa (13A-6)]. Meetings again with Interagency personnel in the summer of 1994 determined that an additional two sites would need to be added because of the increases in the elk population [Lower Lacky Fan (13A-14) and Hideout Mesa (13A-15)]. In 2004, two original summer range sites (13A-2 and 13A-9) were suspended and replaced with two new sites [Beaver Creek (13A-16) and Bar-A (13A-17)].

TWO MILE CHAINING - TREND STUDY NO. 13A-1-09

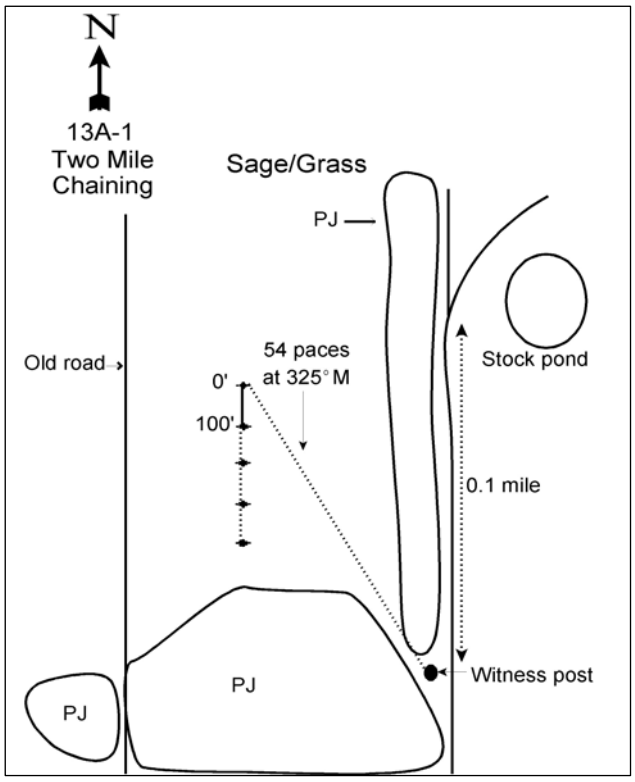
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Spring/Fall, Crucial Elk Winter
NRCS Ecological Site Description: Mountain Stony Loam (Mountain Big Sagebrush), R048AY448UT
Land Ownership: US Forest Service
Elevation: 7,530 ft (2,295 m)
Aspect: Southeast
Slope: 4%
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
Travel east on SR 46 through the town of La Sal to mile marker 16. Continue 0.1 miles, then turn left off the highway. Proceed 1.2 miles to a fork. Turn right and proceed toward Buckeye Reservoir for 0.8 miles to another fork. Stay left and continue 2.95 miles to a witness post (fencepost) on the left side of the road. The transect is located in the chaining opposite a fork further up the road and can be reached from the witness post by walking 54 paces northwest (325°M). The 0-foot baseline stake is a l-foot tall fencepost, tagged #7813.

Map Name: Ray Mesa



Diagrammatic Sketch:



Township: 28S, Range: 25E, Section: 13

GPS: NAD 83, UTM 12S 665079 E 4248100 N

TWO MILE CHAINING - TREND STUDY NO. 13A-1

Site Information

Site Description: The study is located in the Two Mile Chaining on the south end of the La Sal Mountains. Nine hundred acres were chained and seeded in 1978. This site is located on the South Paradox allotment which receives summer/fall cattle use. The Hang Dog fire on Ray Mesa burned 6,000 acres about 300 yards from the edge of this site in 2002. Pellet group data indicates a decline in elk use and an increase in deer use since 1999 (Table - Pellet Group Data).

Browse: Mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*) is the dominant browse species on the site with a good component of Utah serviceberry (*Amelanchier utahensis*). Both species are mostly mature populations, but maintain good recruitment of young plants (Table - Browse Characteristics). Pinyon pine (*Pinus edulis*) has begun to reestablish on this site. Estimated density of pinyon has remained similar, but the average basal diameter of pinyon has been increasing over time (Table - Point-Quarter Tree Data).

Herbaceous Understory: Species diversity is relatively high and plants are vigorous. Seeded grasses, crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*A. intermedium*) and smooth brome (*Bromus inermis*), are well established and productive. However, the introduced species, bulbous bluegrass (*Poa bulbosa*), is the dominant grass species on the site (Table - Herbaceous Trends).

Forbs were diverse and abundant at the outset of the study in 1987, but both variables have decreased on the site over time. Silvery lupine (*Lupinus argenteus*) was the dominant forb at the outset of the study, but has not been sampled on the site since 2004. Scarlet globemallow (*Sphaeralcea coccinea*) was the dominant forb species in 2009 (Table - Herbaceous Trends).

Soil: The soil is a loam with a slightly acidic pH (6.5). Phosphorus is marginally available for plant growth and development at 8 ppm (Tiedemann and Lopez 2004). Organic matter is well below average for the unit, with the sites in this herd unit averaging 3.5% organic matter (Table - Soil Analysis Data). The erosion condition was classified as slight due to soil movement and pedestaling in 2004 and 2009.

Trend Assessments

Browse:

- **1987 to 1994 - slightly down (-1):** Differences in density of browse species may be related to the larger sample area used in 1994; therefore, trend for browse was determined using other parameters. Decadence of the primary browse species, mountain big sagebrush, increased from 12% to 42%, and plants displaying poor vigor increased from 2% to 10% in the same period.
- **1994 to 1999 - slightly down (-1):** Density of mountain big sagebrush has decreased by 15%, and cover of sagebrush decreased from 61% of the browse cover to 39%. However, decadence of sagebrush decreased to 24%.
- **1999 to 2004 - stable (0):** Density of the key browse species, mountain big sagebrush and serviceberry, decreased slightly, but mature mountain big sagebrush has increased with a decrease in the recruitment of young sagebrush.
- **2004 to 2009 - stable (0):** Density of mountain big sagebrush changed little, while density of serviceberry increased slightly. Sagebrush plants displaying poor vigor increased from 9% to 22%. Recruitment of young serviceberry plants increased to 44% of the population.

Grass:

- **1987 to 1994 - slightly down (-1):** Sum of nested frequency of perennial grasses decreased by 13%, prairie junegrass (*Koleria cristata*) and needle-and-thread grass (*Stipa comata*) decreased significantly in nested frequency.

- **1994 to 1999 - stable (0):** There was a slight increase in the sum of nested frequency of perennial grasses. Most of this increase was from the significant increase in nested frequency of mutton bluegrass (*Poa fendleriana*).
- **1999 to 2004 - stable (0):** Sum of nested frequency of perennial grasses decreased by 22%, but this is primarily due to the significant decrease in the nested frequency of the introduced grass, bulbous bluegrass.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, and no significant change in nested frequency of any species.

Forb:

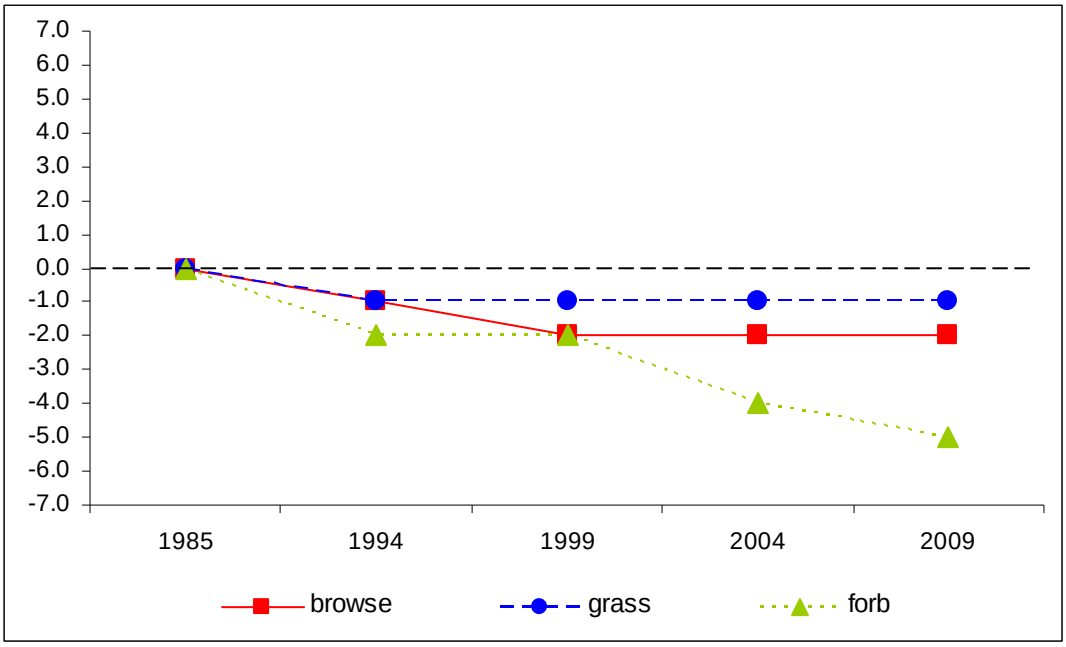
- **1987 to 1994 - down (-2):** Sum of nested frequency of perennial forbs decreased by 64%. Most of the native perennial species decreased significantly in nested frequency including silvery lupine, mat penstemon (*Penstemon caespitosus*), and desert Indian paintbrush (*Castilleja chromosa*).
- **1994 to 1999 - stable (0):** The sum of nested frequency of perennial forbs decreased slightly with a significant increase in the nested frequency of silvery lupine.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 35% and the formerly dominant forb, silvery lupine, was not sampled on the site.
- **2004 to 2009 - slightly down (-1):** There was a 20% decrease in the sum of nested frequency of perennial forbs with a significant decrease in the nested frequency of timber poisonvetch (*Astragalus convallarius*).

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 13A, study no: 1

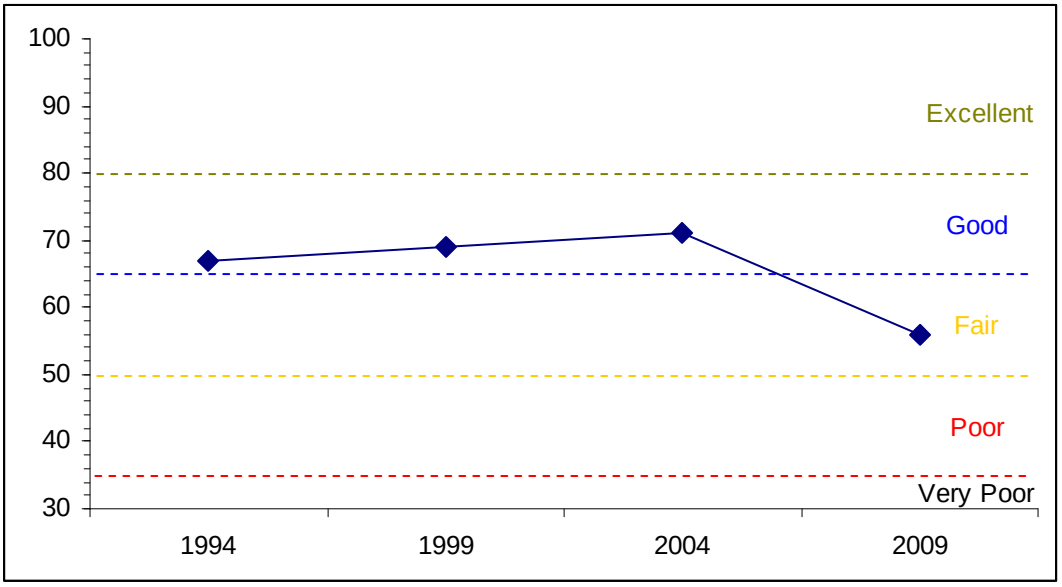
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	25.3	4.6	3.8	23.0	0.0	10.0	0.0	**66.7**	Fair-Good
99	19.6	9.8	7.5	27.8	0.0	4.3	0.0	**69.0**	Good
04	26.5	9.5	6.7	22.7	0.0	5.3	0.0	**70.7**	Good
09	20.0	10.1	9.2	14.6	0.0	2.3	0.0	**56.2**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A Study no: 1



DESIRABLE COMPONENTS INDEX TREND: MID-LEVEL POTENTIAL
Management unit 13A, Study no: 1



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	Carex sp.	-	-	-	-	-	.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	Agoseris glauca	-	-	-	-	-	-	-	.00	-
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	Unknown forb-perennial	6	-	-	-	-	-	-	-	-
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

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
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 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

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
Gutierrezia sarothrae	-	-	.06
Opuntia sp.	-	.65	.71
Pinus edulis	3.59	11.86	13.43
Quercus gambelii	-	1.23	1.43
Symphoricarpos oreophilus	-	-	.08

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

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

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Pinus edulis	201	175	213	2.1	2.8	3.2

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

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

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)

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)
Amelanchier utahensis									
87	**66**	100	0	0	66	0	0	0	-/-
94	**480**	38	58	4	-	21	4	0	41/42
99	**440**	23	68	9	60	36	32	9	51/53
04	**400**	30	65	5	60	5	70	0	42/46
09	**680**	44	53	3	-	26	12	3	51/53
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
Cercocarpus montanus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	101/113
09	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus depressus									
87	**0**	0	0	0	-	0	0	0	-/-
94	**560**	0	100	0	80	0	0	0	16/22
99	**1580**	6	94	0	40	33	0	0	4/9
04	**1500**	1	97	1	20	17	49	1	5/9
09	**1720**	9	90	1	-	7	0	0	5/10
Chrysothamnus viscidiflorus viscidiflorus									
87	**6199**	25	75	0	66	14	1	1	5/8
94	**7300**	3	96	0	2500	0	0	1	9/20
99	**8500**	6	93	1	-	2	0	.23	5/10
04	**5680**	2	96	2	20	4	0	1	6/11
09	**5840**	4	92	3	40	3	0	2	5/12
Coleogyne ramosissima									
87	**66**	0	100	-	-	0	0	0	11/4
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**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)
Coryphantha vivipara arizonica									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	0	100	-	-	0	0	0	3/5
04	**100**	20	80	-	-	0	0	0	2/4
09	**100**	0	100	-	-	0	0	0	3/5
Eriogonum microthecum									
87	**0**	0	0	-	-	0	0	0	-/-
94	**280**	0	100	-	20	0	0	0	8/8
99	**400**	5	95	-	20	15	0	0	5/7
04	**340**	0	100	-	-	6	0	0	7/7
09	**400**	0	100	-	-	5	0	0	10/10
Gutierrezia sarothrae									
87	**66**	0	100	-	-	0	0	0	8/6
94	**0**	0	0	-	-	0	0	0	7/9
99	**160**	13	88	-	-	0	0	0	11/8
04	**180**	0	100	-	-	0	0	0	8/10
09	**140**	0	100	-	-	0	0	0	8/9
Opuntia sp.									
87	**199**	0	100	0	-	0	0	67	3/6
94	**1480**	16	69	15	40	3	0	7	2/7
99	**1320**	30	65	5	20	0	0	0	3/9
04	**1800**	1	90	9	40	0	0	9	4/8
09	**1880**	5	91	3	-	0	0	4	3/8
Pinus edulis									
87	**133**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**340**	53	47	-	80	0	0	0	-/-
04	**380**	32	68	-	40	0	0	0	-/-
09	**280**	14	86	-	20	0	0	7	-/-
Purshia tridentata									
87	**0**	0	0	-	66	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	12/28
99	**20**	0	100	-	-	0	0	0	12/40
04	**20**	0	100	-	-	100	0	0	10/23
09	**20**	0	100	-	-	0	100	0	15/33
Quercus gambelii									
87	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**220**	18	82	0	20	0	0	0	43/18
04	**140**	14	14	71	-	0	0	0	43/19
09	**120**	17	83	0	-	17	0	0	7/8

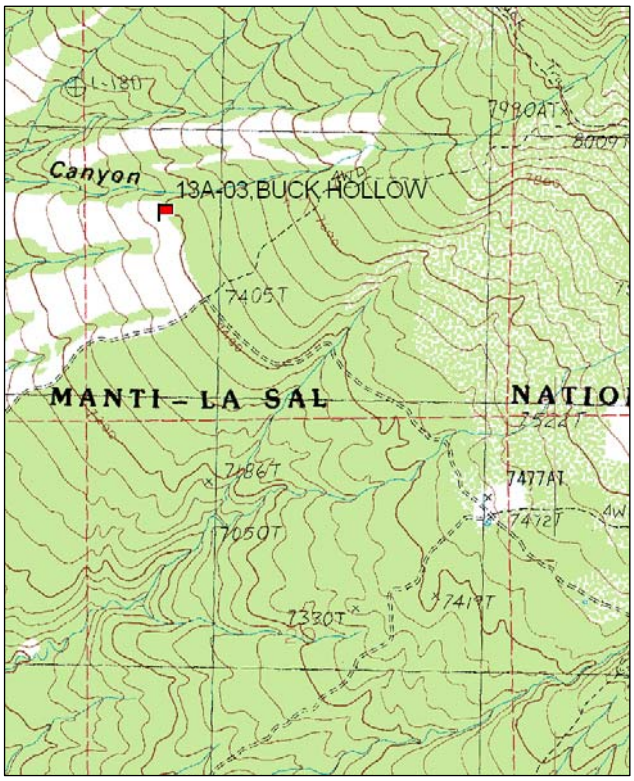
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus									
87	**0**	0	0	-	66	0	0	0	-/-
94	**80**	0	100	-	-	25	0	0	8/19
99	**40**	50	50	-	-	0	0	0	22/36
04	**80**	0	100	-	-	0	0	0	10/12
09	**80**	50	50	-	-	0	25	0	14/28

BUCK HOLLOW - TREND STUDY NO. 13A-3-09

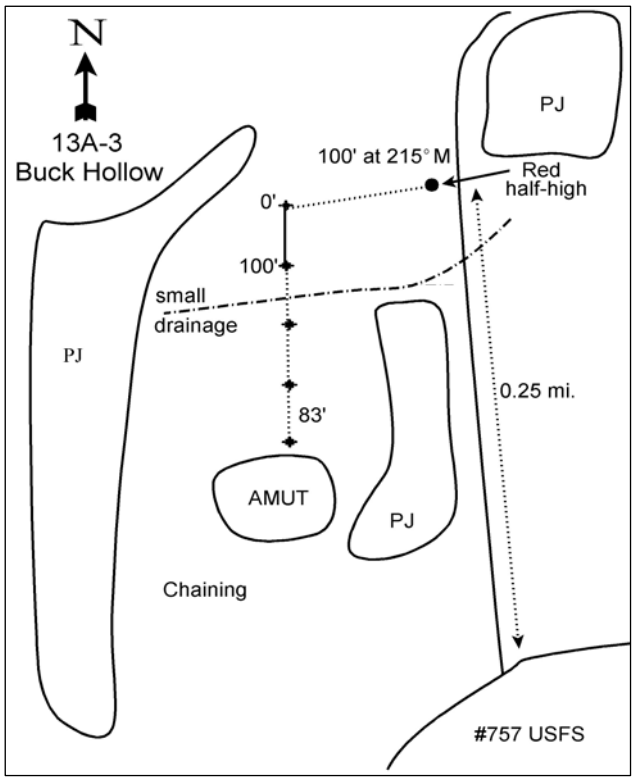
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Stony Sand (Utah Juniper - Pinyon), R035XY323UT
Land Ownership: US Forest Service
Elevation: 7,400 ft (2,255 m)
Aspect: Southwest
Slope: 5%-10%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)
Site Notes: Needs rebar on line 4

Description:
From La Sal Junction, proceed east on SR 46 for 0.3 miles past mile marker 5. Turn left onto County Road 130 and travel 2.95 miles to a fork. Bear right on road #166 and go 0.8 miles to another fork. Bear right, and continue 1.3 miles to a cattleguard marking the Forest Service boundary. Continue 1.55 miles to a fork, turn left and go 0.25 miles. A red witness post (1 ½ foot tall fencepost) is located on the left side of the road. The transect starts 100 feet out in the chaining. The study is marked by half high green t-posts.
***An alternate route is to take SR 191 south from Moab. At mile marker 113, continue 0.15 miles south and turn left (east) on county road #166. Continue south on main road for 11.4 miles to a fork, and turn left (east). Go 1.3 miles to the cattleguard and Forest Service boundary listed above. Follow remainder of directions as noted above.

Map Name: LaSal West



Diagrammatic Sketch:



Township: 28S, Range: 24E, Section: 17

GPS: NAD 83, UTM 12S 647710 E 4247863 N

BUCK HOLLOW - TREND STUDY NO. 13A-3

Site Information

Site Description: The Buck Hollow study samples a chaining within the wide-ranging pinyon-juniper type on the south slope of the La Sal Mountains. The 700 acre Buck Hollow chaining and seeding project was completed in 1982. The site is now dominated by seeded grasses which contribute over half of the total vegetation cover. Scattered clumps of unchained, mature pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) provide excellent escape cover. Estimated deer use has been moderately high on the site with a slight decline in use from 1999 to 2004. Estimated elk use has been light in all sample years. Estimated cattle use was moderate in 1999, but decreased to light use in 2004 and 2009 (Table - Pellet Group Data). This study site is part of the La Sal grazing allotment.

Browse: Besides scattered clumps of Utah serviceberry (*Amelanchier utahensis*) and true mountain mahogany (*Cercocarpus montanus*), there is little other desirable browse within the chaining. Four-wing saltbush (*Atriplex canescens*) was seeded on the site with some nearby plants being measured for height/crown, but no plants have been sampled on the transect. There are some patches of Gambel oak (*Quercus gambelii*) that are lightly browsed. There is some reinvasion and/or releasing of young pinyon and juniper that escaped the chaining. Estimated density and basal diameter has remained similar for both species since 1999 (Table - Point Quarter Tree Data), though pinyon canopy cover has tripled from 1999 to 2009 (Table - Canopy Cover).

Herbaceous Understory: The seeded grasses, smooth brome (*Bromus inermis*), intermediate wheatgrass (*Agropyron intermedium*), and crested wheatgrass (*A. cristatum*) are the prevalent forage available in this chaining. Combined, they have provided almost all of the grass cover and over 60% of the total vegetation cover since 1994. Several other grass species are present including Indian ricegrass (*Oryzopsis hymenoides*), bottlebrush squirreltail (*Sitanion hystrix*), and a sedge (*Carex sp.*). Perennial forbs provide a good amount of cover on the site, but only three species, alfalfa (*Medicago sativa*), timber poisonvetch (*Astragalus convallarius*), and scarlet globemallow (*Sphlaeralcea coccinea*), are prevalent. These three species combined have provided from 74%-93% of the total forb cover since 1994 (Table - Herbaceous Trends).

Soil: The soil is a reddish-brown sandy clay loam with stones throughout the upper profile. It is mildly alkaline (7.6 pH) and has an effective rooting depth of almost 13 inches. Besides the good cover of perennial grasses, litter left in place from the chaining also provides excellent soil protection. There is definite soil movement in the surrounding mature pinyon-juniper woodland type. The erosion condition class determined soil movement on the site as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1987 to 1994 - stable (0):** The browse species are not a significant contributor to the productivity of this site as they provide only 15% of the total vegetation cover, with 100% of the total browse cover provided by pinyon pine.
- **1994 to 1999 - stable (0):** Pinyon remains the only browse species that provides any substantial cover on the site.
- **1999 to 2004 - stable (0):** Pinyon remains the dominant browse species. Cover of true mountain mahogany rose slightly, but is still less than 1%.
- **2004 to 2009 - stable (0):** Pinyon remains the dominant browse species. Cover of true mountain mahogany decreased to 1999 levels.

Grass:

- **1987 to 1994 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 14%. There was a significant decrease in nested frequency of intermediate and crested wheatgrass, and a significant increase in nested frequency of smooth brome.

- **1994 to 1999 - stable (0):** The sum of nested frequency of perennial grasses changed little, though cover of perennial grasses increased from 15% to 20%. There was a significant decrease in nested frequency of bottlebrush squirreltail.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 14%, and cover of perennial grasses decreased to 15% again. There was a significant decrease in the nested frequency of intermediate wheatgrass. Cheatgrass (*Bromus tectorum*) was sampled for the first time in low frequency and cover.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 11%, though there was little change in the cover of perennial grasses.

Forb:

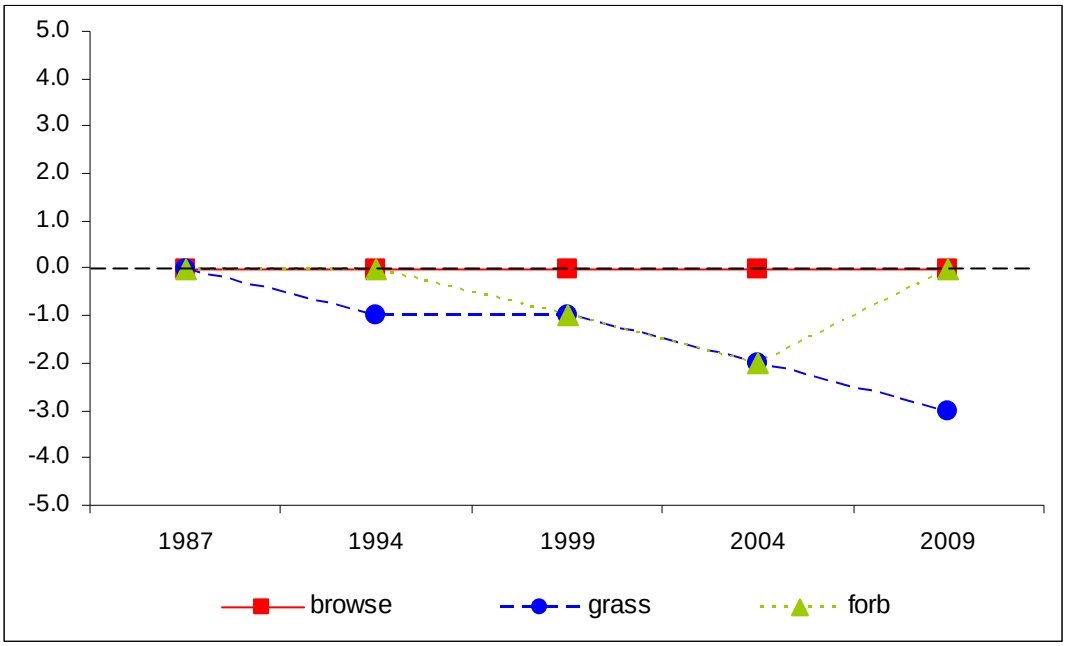
- **1987 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial forbs.
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 20%, but cover increased more than two-fold from 3% to 7%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 13%, and cover decreased to 5%.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased by 28%, though cover remained similar.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 13A, study no: 3

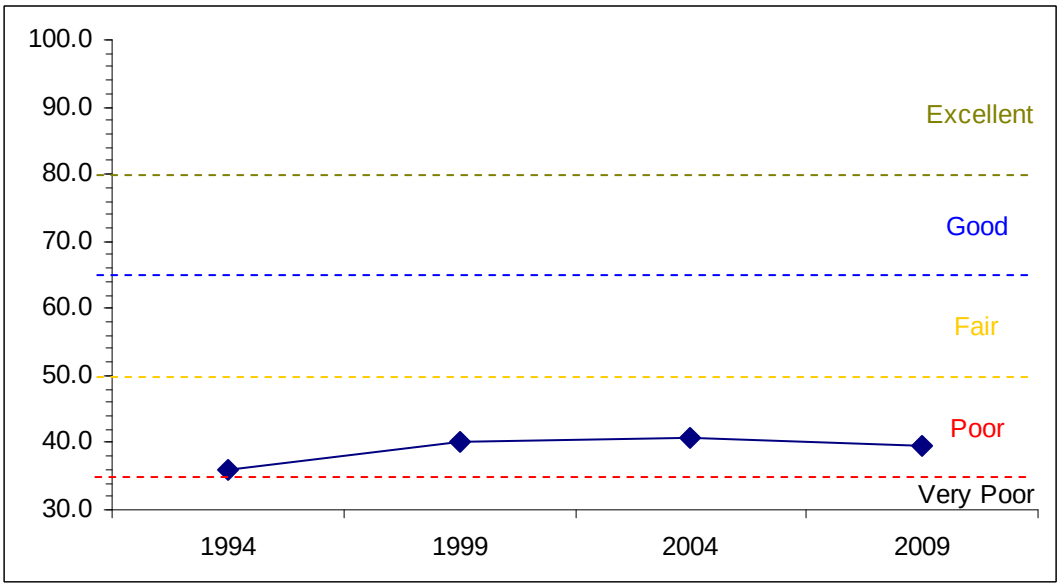
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	0	0	0	30	0	6	0	**36**	VeryPoor-Poor
99	0	0	0	30	0	10	0	**40**	Poor
04	1	0	0	30	0	10	0	**41**	Poor
09	0	0	0	30	0	9	0	**39**	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 3



DESIRABLE COMPONENTS INDEX TREND: MID-LEVEL POTENTIAL
Management unit 13A, Study no: 3



HERBACEOUS TRENDS--
Management unit 13A, Study no: 3

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{c}$119	$_{a}$58	$_{ab}$80	$_{bc}$97	$_{ab}$78	.88	2.45	3.74	2.53

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron intermedium	$_{c}$290	$_{b}$208	$_{b}$205	$_{a}$139	$_{a}$123	6.18	6.94	2.75	2.72
G	Bromus inermis	$_{a}$150	$_{b}$208	$_{b}$231	$_{b}$223	$_{b}$205	7.42	10.11	8.41	10.11
G	Bromus tectorum (a)	-	-	-	13	2	-	-	.02	.01
G	Carex sp.	9	23	19	13	5	.46	.44	.16	.46
G	Oryzopsis hymenoides	5	-	-	-	2	-	.00	-	.03
G	Poa fendleriana	-	3	8	4	12	.03	.09	.02	.39
G	Poa secunda	-	-	6	-	1	-	.06	.00	.00
G	Sitanion hystrix	$_{b}$34	$_{b}$21	$_{a}$3	$_{a}$-	$_{a}$-	.13	.03	.00	-
G	Sporobolus cryptandrus	-	-	-	-	-	-	-	.03	-
Total for Annual Grasses		0	0	0	13	2	0	0	0.01	0.00
Total for Perennial Grasses		607	521	552	476	426	15.12	20.14	15.14	16.27
Total for Grasses		607	521	552	489	428	15.12	20.14	15.16	16.28
F	Alyssum sp. (a)	-	-	-	-	-	.00	-	-	-
F	Arabis hirsuta	2	-	6	-	-	-	.01	-	-
F	Aster sp.	-	2	-	-	-	.03	-	-	.03
F	Astragalus convallarius	18	21	22	29	32	.37	1.35	1.49	1.41
F	Chaenactis douglasii	3	3	-	-	-	.01	-	-	-
F	Collinsia parviflora (a)	-	3	-	-	5	.00	-	-	.01
F	Cruciferae	4	-	-	-	-	-	-	-	-
F	Cryptantha sp.	$_{a}$-	$_{b}$17	$_{a}$4	$_{a}$1	$_{ab}$10	.06	.01	.00	.01
F	Descurainia pinnata (a)	-	7	1	-	-	.01	.01	-	-
F	Gilia sp. (a)	-	3	-	-	-	.00	-	-	-
F	Lesquerella sp.	$_{b}$22	$_{a}$-	$_{a}$-	$_{a}$5	$_{b}$11	-	-	.01	.07
F	Machaeranthera canescens	-	-	-	-	3	-	-	-	.00
F	Machaeranthera spp	-	1	-	-	-	.00	-	-	-
F	Medicago sativa	$_{a}$1	$_{b}$28	$_{b}$27	$_{b}$22	$_{b}$26	1.64	4.81	2.38	2.16
F	Melilotus officinalis	$_{c}$53	$_{b}$18	$_{a}$-	$_{a}$-	$_{a}$-	.16	-	-	-
F	Penstemon sp.	$_{a}$-	$_{b}$24	$_{b}$21	$_{a}$6	$_{ab}$13	.13	.17	.04	.22
F	Phacelia sp.	$_{b}$10	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
F	Phlox austromontana	-	14	10	9	5	.25	.09	.19	.03
F	Phlox longifolia	-	-	-	-	1	-	-	-	.00
F	Physaria chambersii	$_{a}$-	$_{b}$14	$_{b}$16	$_{a}$-	$_{a}$-	.03	.20	-	-
F	Polygonum douglasii (a)	-	10	1	11	14	.02	.00	.08	.05
F	Sanguisorba minor	3	-	-	-	-	-	-	-	-
F	Senecio multilobatus	-	-	2	2	-	-	.03	.06	-
F	Sphaeralcea coccinea	$_{a}$11	$_{a}$12	$_{ab}$15	$_{b}$35	$_{b}$38	.25	.28	.75	.63
F	Tragopogon dubius	3	2	-	-	-	.03	-	-	-
F	Trifolium sp.	-	-	2	-	-	-	.03	-	-
F	Unknown forb-perennial	4	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	23	2	11	19	0.05	0.01	0.07	0.06
Total for Perennial Forbs		134	156	125	109	139	3.00	7.01	4.94	4.59
Total for Forbs		134	179	127	120	158	3.05	7.02	5.02	4.66

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

BROWSE TRENDS--
Management unit 13A, Study no: 3

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	2	0	1	1	.00	-	.00	.00
B	Cercocarpus montanus	4	4	5	5	.00	.15	.53	.15
B	Juniperus osteosperma	0	4	6	6	-	.15	.38	.15
B	Opuntia sp.	0	1	1	8	-	.00	.00	.04
B	Pinus edulis	0	4	6	5	2.64	3.98	3.06	3.82
B	Symphoricarpos oreophilus	1	0	0	0	.00	-	-	-
Total for Browse		7	13	19	25	2.64	4.28	3.97	4.17

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 3

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	.05	-
Cercocarpus montanus	-	.80	2.41
Juniperus osteosperma	2.00	1.79	1.41
Opuntia sp.	-	-	.06
Pinus edulis	3.59	7.81	12.11

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 3

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	5.8	3.1
Cercocarpus montanus	7.3	1.0

POINT-QUARTER TREE DATA--
Management unit 13A, Study no: 3

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	64	68	61
Pinus edulis	115	106	101

Average diameter (in)		
'99	'04	'09
3.3	2.5	2.2
3.9	3.7	2.7

BASIC COVER--
Management unit 13A, Study no: 3

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	11.25	24.78	34.29	24.39	28.29
Rock	2.50	4.80	5.32	6.10	4.20
Pavement	2.25	.96	4.56	5.10	3.35
Litter	72.75	53.42	61.43	54.18	52.18
Cryptogams	0	0	.12	.21	.16
Bare Ground	11.25	14.31	12.04	20.52	17.88

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 3, Study Name: Buck Hollow

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.7	7.6	52.9	21.8	25.3	4.5	25	144	0.7

PELLET GROUP DATA--
Management unit 13A, Study no: 3

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	10	19	15	25
Elk	14	12	14	5
Deer	17	29	42	42
Cattle	2	6	1	4

Days use per acre (ha)		
'99	'04	'09
-	-	-
15 (37)	11 (28)	12 (30)
66 (163)	42 (104)	48 (117)
20 (49)	4 (9)	7 (16)

BROWSE CHARACTERISTICS--
Management unit 13A, 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)
Amelanchier utahensis									
87	**665**	85	15	-	699	45	5	10	59/28
94	**40**	50	50	-	-	0	0	0	66/75
99	**0**	0	0	-	-	0	0	0	59/73
04	**20**	100	0	-	580	0	0	0	74/80
09	**20**	100	0	-	-	0	0	0	69/78
Atriplex canescens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	18/14
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	26/20
09	**0**	0	0	-	-	0	0	0	30/26
Cercocarpus montanus									
87	**66**	50	50	-	-	50	50	0	21/19
94	**100**	0	100	-	-	20	0	0	33/30
99	**100**	0	100	-	-	80	0	0	48/38
04	**100**	20	80	-	20	0	100	0	44/39
09	**100**	0	100	-	-	0	60	0	45/41
Ephedra viridis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	37/34

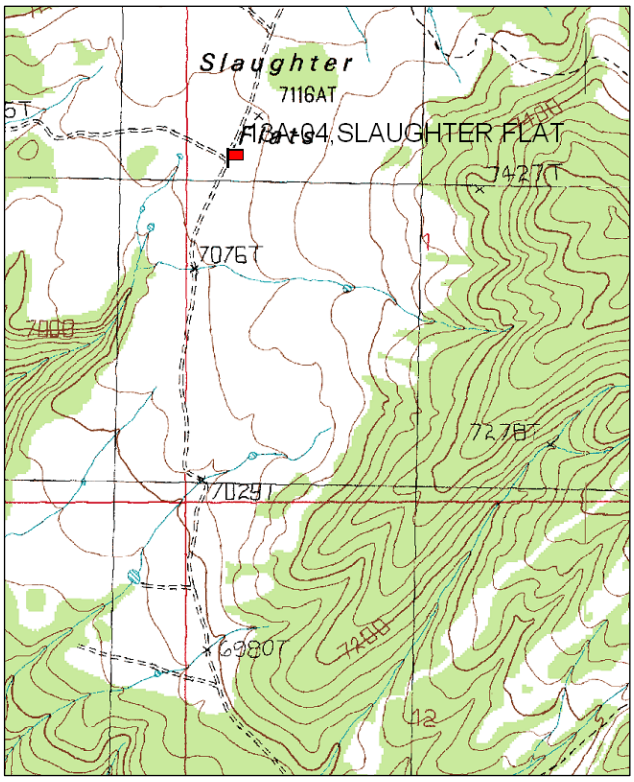
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	11/12
Juniperus osteosperma									
87	**33**	0	100	-	66	0	0	0	51/197
94	**0**	0	0	-	-	0	0	0	-/-
99	**100**	100	0	-	-	0	0	0	-/-
04	**120**	100	0	-	-	0	0	0	-/-
09	**120**	17	83	-	-	0	17	0	-/-
Opuntia sp.									
87	**33**	0	100	-	-	0	0	0	12/6
94	**0**	0	0	-	-	0	0	0	4/19
99	**20**	0	100	-	-	0	0	0	8/18
04	**20**	0	100	-	-	0	0	0	5/18
09	**220**	0	100	-	-	0	0	0	4/12
Pinus edulis									
87	**132**	75	25	-	33	0	0	0	35/24
94	**0**	0	0	-	-	0	0	0	-/-
99	**100**	80	20	-	-	0	0	0	-/-
04	**120**	33	67	-	-	0	0	0	-/-
09	**100**	0	100	-	-	0	0	0	-/-
Quercus gambelii									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	33/30
09	**0**	0	0	-	-	0	0	0	14/15
Symphoricarpos oreophilus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**20**	0	100	-	-	0	0	0	30/55
99	**0**	0	0	-	-	0	0	0	26/52
04	**0**	0	0	-	-	0	0	0	26/46
09	**0**	0	0	-	-	0	0	0	25/51

SLAUGHTER FLAT - TREND STUDY NO. 13A-4-09

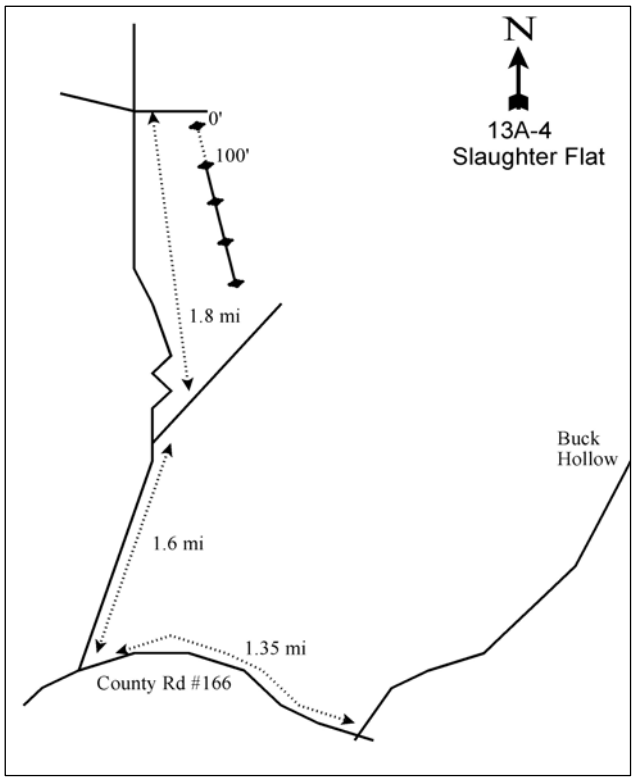
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Loam (Basin Big Sagebrush), R035XY306UT
Land Ownership: US Forest Service
Elevation: 7,100 ft (2,164 m)
Aspect: Flat
Slope: 0%-2%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
Take SR 191 south from Moab, at mile marker 113, continue 0.15 miles south and turn left (east) on county road #166. Continue south on main road for 10.05 miles and turn left (east). Go 1.6 miles to a fork. Stay left at fork and drive 1.8 miles to a witness post on the right. The transect is located in the SE quarter, marked by short fence posts. The transect starts 90 feet away from the intersection at 157 degrees magnetic. The 0-foot baseline stake is tagged #7125.

Map Name: Mount Tukuhnikivatz



Diagrammatic Sketch:



Township: 28S, Range: 23E, Section: 1

GPS: NAD 83, UTM 12S 644300 E 4251252 N

SLAUGHTER FLAT - TREND STUDY NO. 13A-4

Site Information

Site Description: The study is located in an open flat valley between pinyon-juniper ridges to the east and west. In 1974, 940 acres were chained and seeded. The chaining extends to the north of the study. The study site is now a sagebrush-grass community. Pellet group data estimates that elk use this site more heavily than deer. Deer use showed a decrease from 2004 to 2009, while elk use showed an increase in the same years. Cattle use was estimated to be mostly moderate since 1999 (Table - Pellet Group Data). This Forest Service land is part of the Squaw Spring grazing allotment.

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the key browse species on the site. Identification of the sagebrush subspecies was difficult because of hybridization with other sagebrush subspecies and different varieties which may have been seeded onto the site after the chaining treatment. All of the sagebrush on this site is classified as Wyoming big sagebrush in this study. Sagebrush provides the majority of the browse cover on this site. Density of sagebrush has averaged around 2,600 plants/acre since 1994, but the proportion of young plants in the population has decreased over that time. The population of sagebrush shows moderate to heavy use (Table - Browse Characteristics).

Stickyleaf low rabbitbrush (*Chysothamnus viscidiflorus* ssp. *viscidiflorus*) is prominent because of its relatively high density and cover. Other more palatable browse species are uncommon, comprising only a minor percentage of the browse population (Table - Browse Characteristics). There are a few small pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees scattered across the site (Table - Point-Quarter Tree Data).

Herbaceous Understory: Grasses are an important vegetation component on this site with the most abundant perennial species being needle-and-thread (*Stipa comata*), mutton bluegrass (*Poa fendleriana*), crested wheatgrass (*Agropyron cristatum*), and Indian ricegrass (*Oryzopsis hymenoides*). The sum of nested frequency of perennial grasses has decreased steadily since the outset of the study. Cheatgrass (*Bromus tectorum*) has increased in nested frequency and cover since 1994, and is now a co-dominant grass species on the site (Table - Herbaceous Trends).

Forbs are relatively diverse on the site, but provide little cover. The sum of nested frequency and cover of perennial forbs have fluctuated dramatically between sample years. Cover of perennial forbs has ranged from a high of 3% to a low of less than 1% (Table - Herbaceous Trends).

Soil: The soil is an orange, sandy clay loam with an effective rooting depth of almost 14 inches, and a loose structure on the surface. The soil has a neutral pH (7.2). Phosphorus has limited availability for plant growth and development at 5.4 ppm (Tiedemann and Lopez 2004). There is soil loss from the bare interspaces and evidence of sheet and rill erosion, but no gullies are on the site. There is some pedestaling of the bunch grasses. The soil erosion condition class was rated to be stable in 2004 and 2009.

Trend Assessments

Browse:

- **1987 to 1994 - slightly down (-1):** Differences in density of browse species may be related to the larger sample area used in 1994; therefore, trend for browse was determined using other parameters. The proportion of sagebrush plants displaying poor vigor increased from 6% to 21%. Recruitment of young sagebrush plants decreased from 26% of the population to 13%.
- **1994 to 1999 - slightly down (-1):** Density of sagebrush decreased by 13% and decadence increased from 10% to 20%. However, the proportion of sagebrush plants displaying poor vigor decreased to 7% and recruitment of young plants increased slightly.

- **1999 to 2004 - slightly down (-1):** Density of sagebrush decreased by 9% and recruitment of young plants decreased to just 2% of the population. Cover of sagebrush decreased slightly.
- **2004 to 2009 - stable (0):** Sagebrush density, vigor, decadence, and recruitment of young remained similar. Cover of sagebrush increased to around 12%.

Grass:

- **1987 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses. There was a significant increase in the nested frequency of western wheatgrass (*Agropyron smithii*), Indian ricegrass, and Sandberg bluegrass (*Poa secunda*). There was a significant decrease in the nested frequency of mutton bluegrass and needle-and-thread grass.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial grasses decreased by 23%, though cover remained similar. There was a significant decrease in the nested frequency of Indian ricegrass, mutton bluegrass, Sandburg bluegrass, and needle-and-thread grass. There was a significant increase in nested frequency of crested wheatgrass. Cheatgrass increased significantly in nested frequency, and cover increased from less than 1% to 7%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 19%, but cover remained similar. There was a significant decrease in nested frequency of crested wheatgrass, western wheatgrass, and Sandburg bluegrass. There was a significant increase in the nested frequency of needle-and-thread grass.
- **2004 to 2009 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial grasses, and cover decreased markedly. However, nested frequency of cheatgrass decreased significantly and cover of cheatgrass decreased. There was a significant increase in the nested frequency of crested wheatgrass.

Forb:

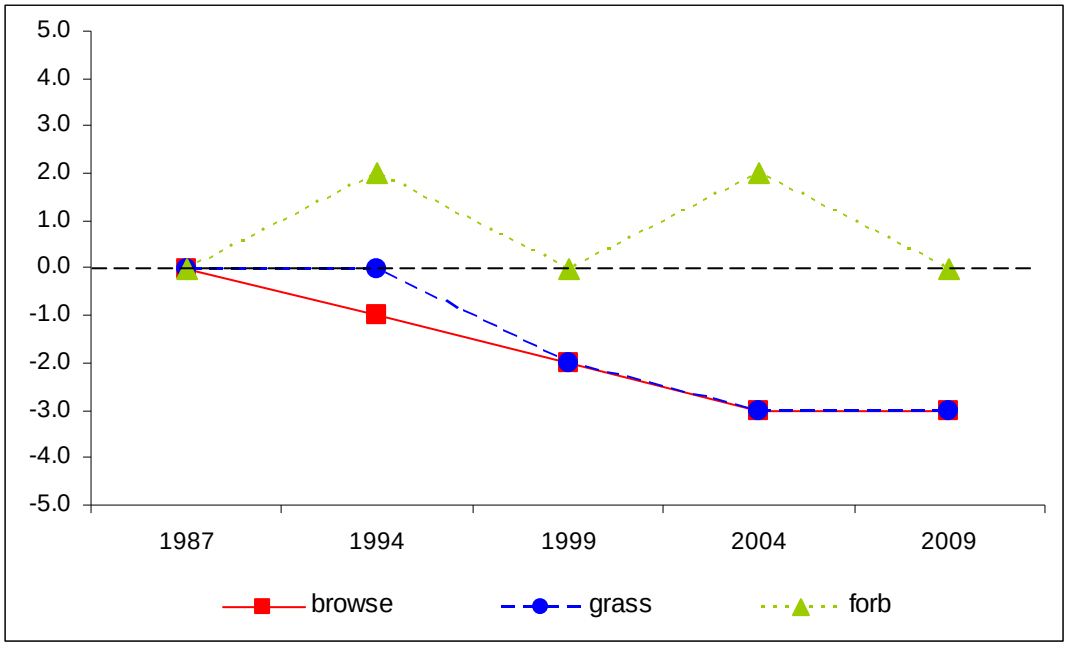
- **1987 to 1994 - up (+2):** The sum of nested frequency of perennial forbs increased 85%. There was a significant increase in the nested frequency of several desirable forbs including scarlet globemallow (*Sphlaeralcea coccinea*).
- **1994 to 1999 - down (-2):** There was a marked decrease in the sum of nested frequency of perennial forbs, and cover fell from about 3% to less than 1%. There was a significant decrease in the nested frequency of several desirable forbs including hollyleaf clover (*Trifolium gymnocarpon*).
- **1999 to 2004 - up (+2):** There was a large increase in the sum of nested frequency of perennial forbs, and cover increased to 3%.There was a significant increase in the nested frequency of hollyleaf clover, longleaf phlox (*Phlox longifolia*), and timber poisonvetch (*Astragalus convallarius*).
- **2004 to 2009 - down (-2):** There was again a dramatic decrease in the sum of nested frequency of perennial forbs, cover decreased to less than 1%. There was a significant decrease in longleaf phlox and timber poisonvetch.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13A, study no: 4

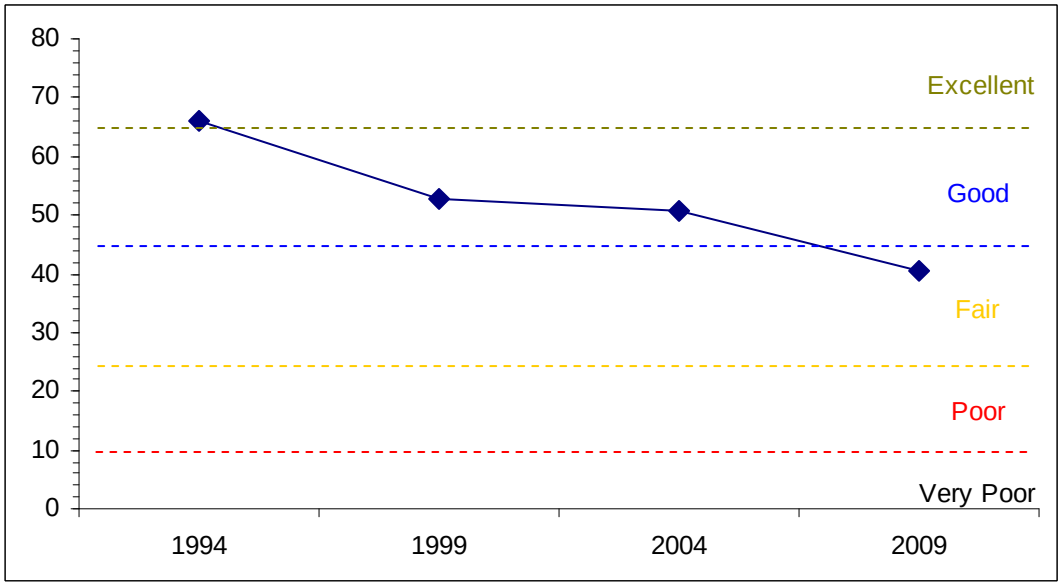
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	13	12	7	30	0	5	0	**66**	Good-Excellent
99	13	9	8	27	-6	1	0	**53**	Good
04	12	8	1	29	-4	6	0	**51**	Good
09	14	8	1	20	-4	1	0	**41**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 4



DESIRABLE COMPONENTS INDEX TREND: LOW POTENTIAL SCALE
Management unit 13A, Study no: 4



HERBACEOUS TRENDS--
Management unit 13A, Study no: 4

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{a}$57	$_{a}$79	$_{c}$211	$_{a}$94	$_{b}$153	2.23	8.42	6.65	4.74
G	Agropyron smithii	$_{a}$8	$_{b}$42	$_{b}$64	$_{a}$13	$_{a}$6	.31	.49	.09	.03
G	Bromus inermis	-	1	1	-	-	.00	.00	-	-
G	Bromus tectorum (a)	-	$_{a}$83	$_{c}$237	$_{c}$212	$_{b}$173	.32	7.39	5.36	4.69
G	Oryzopsis hymenoides	$_{a}$24	$_{b}$66	$_{a}$25	$_{a}$35	$_{a}$7	1.71	.83	1.22	.10
G	Poa fendleriana	$_{d}$232	$_{c}$146	$_{b}$97	$_{ab}$75	$_{a}$42	3.84	2.91	1.77	1.40
G	Poa secunda	$_{b}$20	$_{c}$47	$_{b}$14	$_{a}$-	$_{a}$-	.53	.07	-	-
G	Sitanion hystrix	$_{b}$24	$_{b}$18	$_{a}$1	$_{a}$4	$_{a}$1	.13	.03	.03	.03
G	Stipa comata	$_{c}$221	$_{b}$168	$_{a}$26	$_{b}$135	$_{b}$130	6.00	.63	4.50	3.59
G	Vulpia octoflora (a)	-	$_{a}$1	$_{a}$1	$_{a}$5	$_{b}$22	.00	.00	.15	.07
Total for Annual Grasses		0	84	238	217	195	0.32	7.39	5.51	4.76
Total for Perennial Grasses		586	567	439	356	339	14.77	13.41	14.28	9.90
Total for Grasses		586	651	677	573	534	15.10	20.81	19.80	14.66
F	Agoseris glauca	-	-	-	1	-	-	-	.00	-
F	Antennaria rosea	-	3	-	-	-	.00	-	.03	-
F	Arabis sp.	$_{a}$-	$_{b}$17	$_{a}$-	$_{a}$-	$_{a}$-	.04	-	-	-
F	Astragalus convallarius	$_{ab}$11	$_{c}$35	$_{a}$3	$_{bc}$28	$_{a}$1	1.37	.00	1.37	.01
F	Castilleja chromosa	6	4	-	-	-	.04	-	-	-
F	Cirsium sp.	-	3	-	-	-	.00	-	-	-
F	Cordylanthus wrightii (a)	$_{ab}$16	$_{ab}$17	$_{a}$2	$_{b}$21	$_{a}$-	.04	.03	.15	-
F	Crepis acuminata	$_{b}$9	$_{ab}$5	$_{a}$-	$_{a}$2	$_{a}$-	.01	-	.00	-
F	Cryptantha sp.	12	8	-	3	-	.02	-	.00	-
F	Draba reptans (a)	-	$_{b}$39	$_{a}$4	$_{a}$-	$_{a}$-	.09	.00	-	-
F	Erigeron pumilus	8	3	1	4	4	.00	.00	.03	.01
F	Gayophytum ramosissimum(a)	-	13	-	-	-	.02	-	-	-
F	Lappula occidentalis (a)	-	5	-	11	-	.01	-	.05	-
F	Microsteris gracilis (a)	-	$_{b}$73	$_{a}$15	$_{a}$7	$_{a}$3	.38	.03	.04	.00
F	Petradoria pumila	-	3	-	-	-	.03	-	-	-
F	Phlox longifolia	$_{a}$-	$_{c}$98	$_{a}$-	$_{b}$37	$_{a}$6	.27	-	.17	.01
F	Polygonum douglasii (a)	-	$_{b}$49	$_{a}$-	$_{a}$8	$_{a}$6	.10	-	.03	.01
F	Ranunculus testiculatus (a)	-	$_{a}$12	$_{a}$-	$_{a}$-	$_{b}$52	.02	-	-	.56
F	Sphaeralcea coccinea	$_{a}$17	$_{b}$78	$_{b}$64	$_{b}$78	$_{b}$57	.57	.71	1.21	.39
F	Taraxacum officinale	$_{a}$1	$_{b}$12	$_{a}$-	$_{a}$2	$_{a}$-	.04	-	.00	-
F	Tragopogon dubius	1	-	-	-	-	-	-	-	-
F	Trifolium gymnocarpon	$_{c}$118	$_{c}$102	$_{a}$3	$_{b}$47	$_{b}$41	.32	.00	.21	.22
F	Unknown forb-perennial	3	-	-	-	-	-	-	-	-
F	Zigadenus paniculatus	$_{b}$15	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
Total for Annual Forbs		16	208	21	47	61	0.68	0.06	0.27	0.58
Total for Perennial Forbs		201	371	71	202	109	2.74	0.72	3.05	0.65
Total for Forbs		217	579	92	249	170	3.43	0.79	3.33	1.24

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

BROWSE TRENDS--
Management unit 13A, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	68	69	66	70	10.17	10.57	9.43	11.55
B	Chrysothamnus nauseosus albicaulis	1	1	0	0	.00	.00	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	83	86	84	82	4.55	5.58	5.60	5.90
B	Coryphantha vivipara arizonica	0	2	1	0	-	.00	.03	.03
B	Eriogonum microthecum	0	1	1	0	-	.00	.00	-
B	Gutierrezia sarothrae	6	2	1	4	.02	.15	.00	.06
B	Juniperus osteosperma	0	1	1	1	.15	.38	.38	.38
B	Opuntia polyacantha	42	44	45	41	.89	1.16	1.41	1.57
B	Pediocactus simpsonii	0	1	0	0	-	.00	-	-
B	Pinus edulis	0	1	1	1	1.16	.93	1.00	1.97
Total for Browse		200	208	200	199	16.95	18.79	17.86	21.49

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 4

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	9.68	11.16
Chrysothamnus viscidiflorus viscidiflorus	5.76	4.63
Eriogonum microthecum	.01	-
Gutierrezia sarothrae	-	.06
Juniperus osteosperma	-	.15
Opuntia polyacantha	1.96	1.16
Pinus edulis	1.29	1.63

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 4

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.4	1.1

POINT-QUARTER TREE DATA--
Management unit 13A, Study no: 4

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	16	24	25
Pinus edulis	18	22	22

Average diameter (in)		
'99	'04	'09
2.9	3.5	2.4
2.7	3.8	2.6

BASIC COVER--
Management unit 13A, Study no: 4

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	12.75	35.90	38.68	42.65	37.47
Rock	0	.27	.06	.07	.01
Pavement	0	.24	.52	.29	.06
Litter	53.25	39.65	41.77	34.25	42.13
Cryptogams	.75	.36	.52	.65	.07
Bare Ground	33.25	35.01	37.35	37.05	34.38

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 4, Study Name: Saughter Flat

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.5	7.2	52.9	19.8	27.3	1.9	50.4	89.6	0.4

PELLET GROUP DATA--
Management unit 13A, Study no: 4

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	11	19	11	39	-	-	-
Elk	41	34	33	16	53 (131)	37 (91)	67 (165)
Deer	14	36	28	15	25 (62)	27 (68)	7 (17)
Cattle	1	1	1	9	22 (53)	1 (2)	18 (45)

BROWSE CHARACTERISTICS--
Management unit 13A, 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									
87	**33**	100	0	-	-	0	100	0	-/-
94	**0**	0	0	-	-	0	0	0	44/54
99	**0**	0	0	-	-	0	0	0	37/51
04	**0**	0	0	-	-	0	0	0	52/67
09	**0**	0	0	-	-	0	0	0	48/53
Artemisia tridentata wyomingensis									
87	**3298**	26	66	8	-	40	22	6	23/22
94	**2940**	13	77	10	440	14	2	21	19/28
99	**2560**	16	64	20	60	34	20	7	20/28
04	**2340**	2	74	25	440	58	29	12	19/29
09	**2480**	1	76	23	20	27	44	17	19/28
Chrysothamnus nauseosus albicaulis									
87	**33**	0	100	0	-	0	100	0	31/28
94	**20**	0	0	100	-	0	0	0	32/27
99	**20**	0	0	100	-	100	0	0	-/-
04	**0**	0	0	0	-	0	0	0	-/-
09	**0**	0	0	0	-	0	0	0	-/-
Chrysothamnus viscidiflorus viscidiflorus									
87	**4131**	30	58	12	99	3	0	0	5/10
94	**6960**	8	91	1	1380	.28	0	.28	5/12
99	**7340**	15	83	1	220	10	0	0	5/12
04	**7380**	9	88	3	20	0	0	3	7/13
09	**7020**	1	97	2	60	5	2	3	5/12
Coryphantha vivipara arizonica									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**40**	0	100	-	-	0	0	0	3/3
04	**20**	0	100	-	-	0	0	0	4/4
09	**0**	0	0	-	-	0	0	0	4/4
Eriogonum microthecum									
87	**33**	0	100	-	-	0	100	0	12/7
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	6/9
04	**20**	0	100	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-

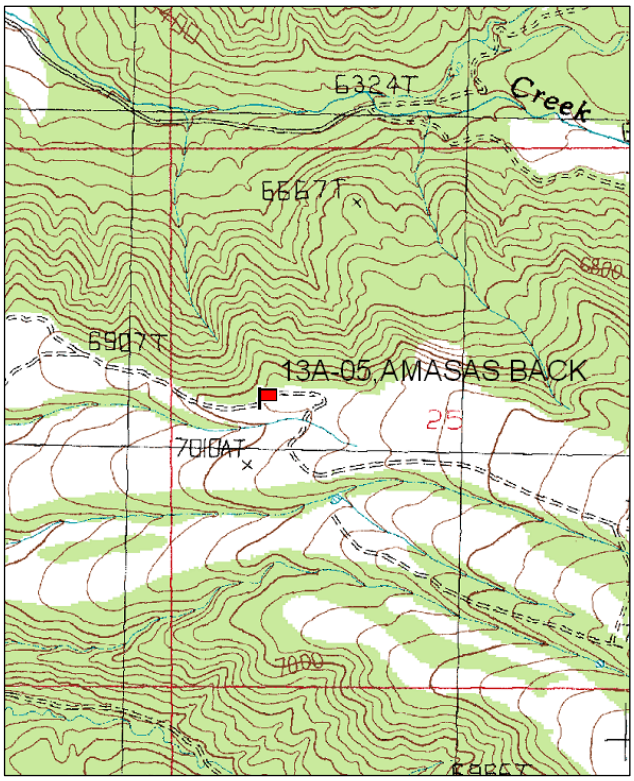
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
87	**232**	28	72	-	33	0	0	0	7/6
94	**200**	50	50	-	120	0	0	0	1/2
99	**40**	0	100	-	-	0	0	0	8/10
04	**120**	0	100	-	-	0	0	0	5/9
09	**120**	0	100	-	-	0	0	0	6/9
Juniperus osteosperma									
87	**33**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-
Opuntia polyacantha									
87	**1165**	37	51	11	133	0	0	26	5/7
94	**2200**	25	67	7	200	0	2	13	4/16
99	**2420**	14	74	12	40	0	2	6	4/10
04	**2300**	11	81	8	-	0	0	.86	5/11
09	**1600**	0	90	10	60	0	0	16	4/11
Pediocactus simpsonii									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	100	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	2/4
Pinus edulis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	100	0	-	20	0	0	0	-/-
04	**20**	100	0	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-
Sarcobatus vermiculatus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	3/10

AMASAS BACK - TREND STUDY NO. 13A-5-09

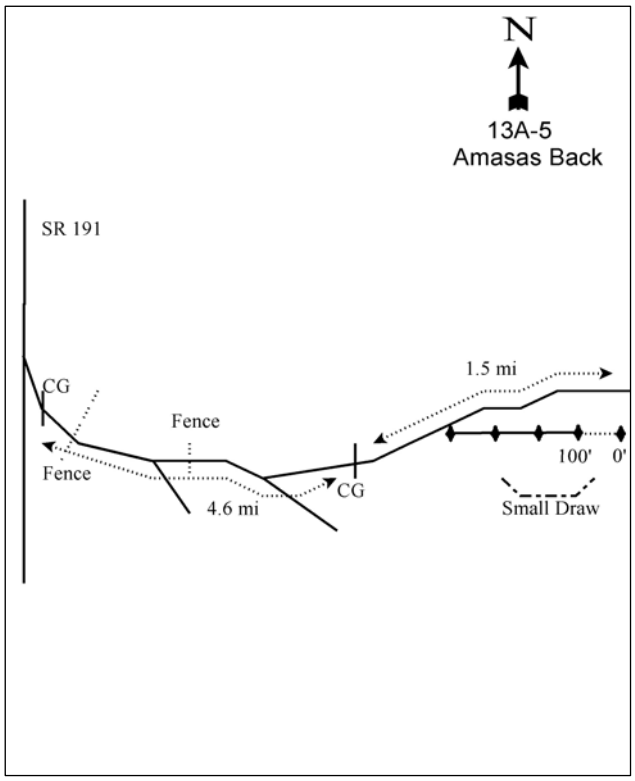
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Spring/Fall/Summer, Crucial Elk Winter
NRCS Ecological Site Description: Upland Stony Sand (Utah Juniper - Pinyon), R035XY323UT
Land Ownership: US Forest Service
Elevation: 7,000 ft (2,133 m)
Aspect: South
Slope: 15%-18%
Transect bearing: 247 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
Traveling south on SR 191 out of Moab, turn east off the highway onto a dirt road just past mile marker 114. Cross the cattleguard and stay right, continuing on the main road for 0.7 miles to a fence. Continue 1.3 miles to a fork. Stay left and go 0.4 miles to another fence. Continue 1.0 miles to a fork. Stay left, go 1.2 miles to the Forest Service boundary cattleguard. Cross the cattleguard and continue 1.5 miles to a witness post. The 0-foot stake is 16 paces from the witness post at a bearing of 165°M. The 0-foot stake is marked by browse tag #7859.

Map Name: Mount Tukuhnikivatz



Diagrammatic Sketch:



Township: 27S, Range: 23E, Section: 25

GPS: NAD 83, UTM 12S 644334 E 4254327 N

AMASAS BACK - TREND STUDY NO. 13A-5

Site Information

Site Description: The study is on a 750 acre chaining and seeding project that was completed in 1978 on the west side of the La Sal Mountains. Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have reestablished in the chaining to a moderate extent. Pellet group estimates show moderate use from both deer and elk (Table - Pellet Group Data).

Browse: Black sagebrush (*Artemisia nova*) is the key browse, although there may be some hybridization with Wyoming big sagebrush. Black sagebrush cover has averaged just over 8% and density has averaged about 2,200 plants/acre since 1994. Recruitment of young sagebrush plants has decreased since the outset of the study. Both vigor and decadence have been good on the black sagebrush population over the duration of the study. Utilization of black sagebrush has been mostly light to moderate (Table - Browse Characteristics). Other desirable browse plants are limited but include green ephedra (*Ephedra veridis*), fourwing saltbush (*Atriplex canescens*) and antelope bitterbrush (*Purshia tridentata*).

Pinyon pine and juniper are becoming more dominant on the chaining. The estimated density and average basal diameter of pinyon and juniper trees has remained similar since 1994 (Table - Point-Quarter Tree Data). Average combined cover of pinyon and juniper has increased since 1994 (Table - Browse Trends). Line intercept, canopy cover has also shown an increase in pinyon and juniper since 2004 (Table - Canopy Cover).

Herbaceous Understory: The herbaceous understory is dominated by cheatgrass (*Bromus tectorum*), however, the nested frequency and cover of cheatgrass have been declining since 1994. The seeded species, crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*A. intermedium*), are the dominant perennial grasses on the site. Other common grass species include galleta (*Hilaria jamesii*) and Indian ricegrass (*Oryzopsis hymenoides*) (Table - Herbaceous Trends).

Perennial forb cover and diversity is low. The number of perennial forb species sampled has steadily declined since 1994. Rock goldenrod (*Petradoria pumila*) provides nearly all of the forb cover on this site (Table - Herbaceous Trends).

Soil: The soil is a very rocky, sandy clay loam with rocks on the surface ranging in size from large rocks to small boulders. The soil is mildly alkaline (7.5 pH) with an effective rooting depth of less than 10 inches. Soil phosphorus has marginal availability for plant growth and development at 7.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The soil erosion condition classification was rated as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1987 to 1994 - stable (0):** Differences in density of browse species may be related to the larger sample area used in 1994; therefore, trend for browse was determined using other parameters. Recruitment of young black sagebrush plants decreased slightly, and the proportion of plants displaying poor vigor increased slightly.
- **1994 to 1999 - down (-2):** The density of black sagebrush decreased by 26%, and cover decreased from 10% to 7%. Black sagebrush plants displaying poor vigor decreased to 6%, but decadence increased from 8% to 18%.
- **1999 to 2004 - stable (0):** There was little change in the density or cover of black sagebrush. Recruitment of young black sagebrush decreased to only 1% of the population.
- **2004 to 2009 - stable (0):** There was a slight increase in the density and cover of black sagebrush. All of the small population of fourwing saltbush was classified as decadent, 80% of which displayed poor vigor.

Grass:

- **1987 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 45%. There was a significant decrease in the nested frequency of intermediate wheatgrass and bottlebrush squirreltail (*Sitanion hystrix*).
- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased slightly. The cover of cheatgrass decreased from 17% to 9%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 23%, though there was little change in cover. There was a significant decrease in the nested frequency of cheatgrass.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 14%. The cover of cheatgrass decreased from 8% to 6%.

Forb:

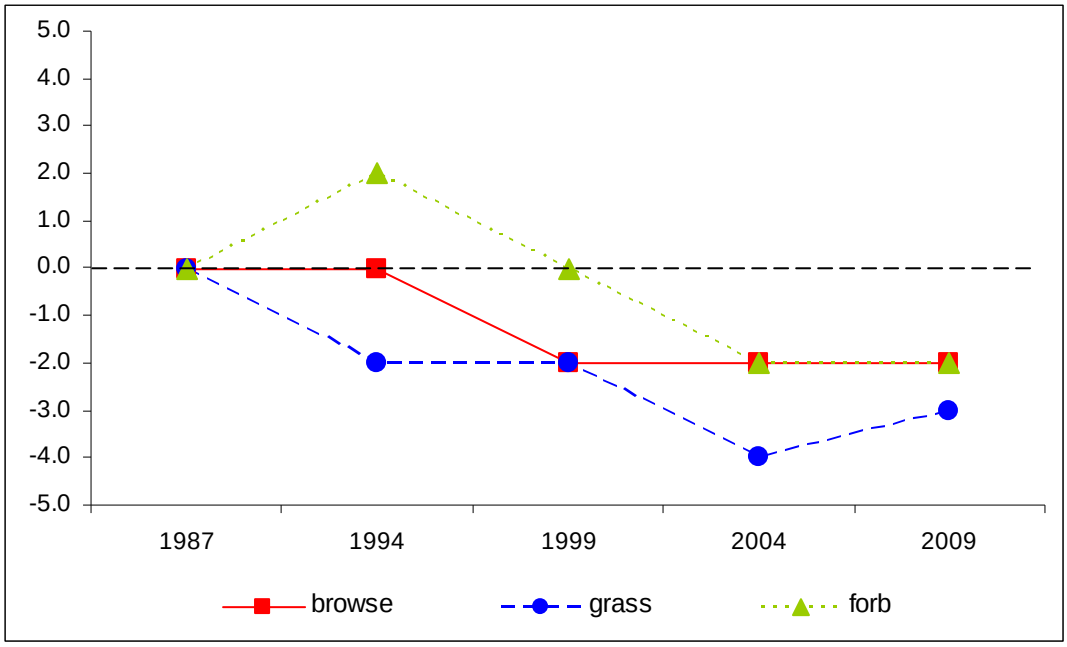
- **1987 to 1994 - up (+2):** There was a three-fold increase in the sum of nested frequency of perennial forbs. There was a significant increase in the nested frequency of rock goldenrod and thickleaf peavine (*Lathyrus lanszwertii*).
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 23%, and cover decreased from 9% to 4%. The number of perennial forb species sampled fell from 10 to 7.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 52%, and cover decreased to 3%. There was a significant decrease in the nested frequency of thickleaf peavine and timber poisonvetch (*Astragalus convallarius*).
- **2004 to 2009 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial forbs, but cover remained similar.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13A, study no: 5

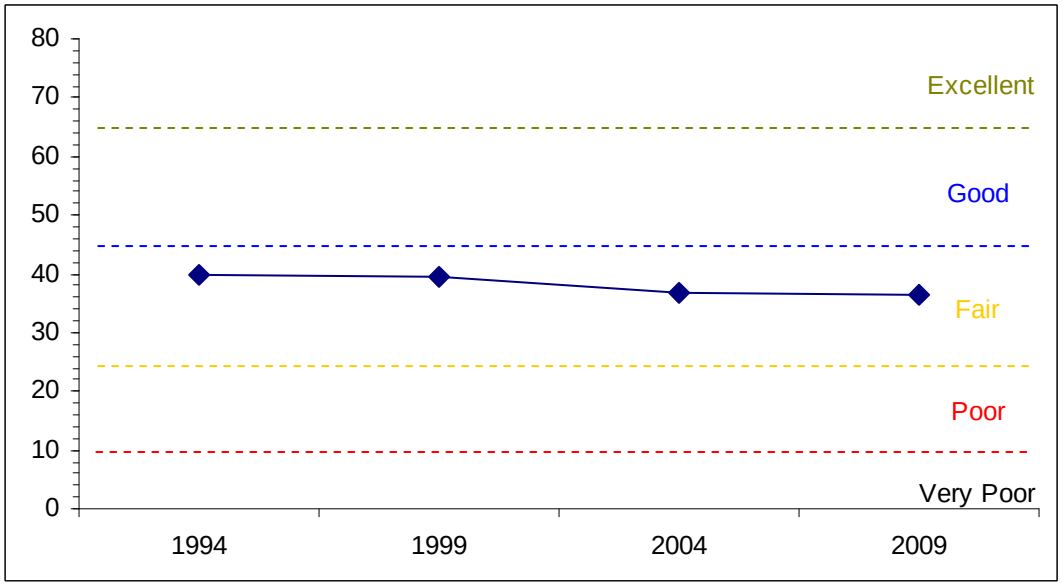
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	14.1	12.8	4.3	11.0	-12.4	10.0	0.0	**39.8**	Fair
99	10.5	9.5	5.5	12.4	-6.8	8.5	0.0	**39.5**	Fair
04	12.6	11.2	0.4	13.5	-6.2	5.2	0.0	**36.7**	Fair
09	12.3	9.9	0.5	12.5	-4.2	5.3	0.0	**36.3**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 5



DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 13A, Study no: 5



HERBACEOUS TRENDS--
Management unit 13A, Study no: 5

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	94	65	83	78	82	2.66	3.08	3.42	2.94
G	Agropyron intermedium	$_{b}$137	$_{a}$48	$_{a}$49	$_{a}$37	$_{a}$36	1.01	1.23	1.18	1.07
G	Bromus japonicus (a)	$_{b}$31	$_{a}$7	$_{a}$2	$_{a}$-	$_{a}$11	.15	.01	-	.01
G	Bromus tectorum (a)	-	$_{b}$317	$_{b}$333	$_{a}$280	$_{a}$276	16.43	9.10	8.30	5.53
G	Hilaria jamesii	$_{a}$-	$_{b}$13	$_{b}$22	$_{b}$17	$_{b}$19	.13	.66	.98	.93
G	Oryzopsis hymenoides	$_{b}$56	$_{ab}$30	$_{ab}$24	$_{a}$19	$_{ab}$31	1.12	.79	.86	.94
G	Poa fendleriana	$_{b}$36	$_{b}$26	$_{ab}$19	$_{a}$6	$_{a}$6	.43	.24	.08	.06
G	Sitanion hystrix	$_{c}$64	$_{b}$33	$_{ab}$16	$_{a}$6	$_{ab}$12	.14	.17	.10	.13
G	Sporobolus cryptandrus	-	-	-	1	1	-	-	.15	.15
G	Vulpia octoflora (a)	-	-	-	-	3	-	-	-	.00
Total for Annual Grasses		31	324	335	280	290	16.58	9.11	8.30	5.55
Total for Perennial Grasses		387	215	213	164	187	5.51	6.18	6.77	6.24
Total for Grasses		418	539	548	444	477	22.09	15.30	15.07	11.79
F	Arabis perennans	$_{b}$12	$_{ab}$6	$_{a}$-	$_{a}$2	$_{a}$-	.01	-	.00	-
F	Astragalus coltoni	2	3	2	-	-	.03	.01	-	-
F	Astragalus convallarius	$_{a}$-	$_{ab}$10	$_{b}$15	$_{a}$2	$_{a}$-	1.54	.43	.18	-
F	Castilleja linariaefolia	-	3	-	-	-	.01	-	-	-
F	Chenopodium fremontii (a)	-	-	-	1	-	-	-	.00	-
F	Cryptantha humilis	-	-	-	-	1	.00	-	-	.00
F	Cymopterus sp.	-	-	1	-	-	-	.03	-	-
F	Descurainia pinnata (a)	-	5	2	-	-	.01	.00	-	-
F	Draba reptans (a)	-	$_{b}$61	$_{a}$3	$_{a}$-	$_{a}$-	.15	.03	-	-
F	Erigeron pumilus	3	-	-	-	-	-	-	-	-
F	Gilia sp. (a)	-	$_{b}$36	$_{a}$5	$_{a}$14	$_{a}$-	.08	.01	.02	-
F	Lathyrus lanszwertii	$_{a}$2	$_{b}$81	$_{b}$56	$_{a}$8	$_{a}$6	2.56	.74	.10	.01
F	Lesquerella sp.	-	1	6	-	-	.00	.01	-	-
F	Machaeranthera canescens	5	3	-	-	-	.00	-	-	-
F	Microsteris gracilis (a)	-	$_{c}$46	$_{a}$5	$_{b}$31	$_{a}$2	.12	.01	.09	.00
F	Petradoria pumila	$_{a}$34	$_{b}$75	$_{b}$62	$_{ab}$48	$_{ab}$45	4.05	2.96	2.20	2.54
F	Phlox longifolia	-	7	-	3	4	.02	-	.00	.00
F	Ranunculus testiculatus (a)	-	6	-	-	-	.04	-	-	-
F	Sphaeralcea coccinea	-	6	8	9	11	.41	.07	.09	.07
Total for Annual Forbs		0	154	15	46	2	0.40	0.07	0.12	0.00
Total for Perennial Forbs		58	195	150	72	67	8.67	4.26	2.60	2.65
Total for Forbs		58	349	165	118	69	9.07	4.33	2.72	2.65

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

BROWSE TRENDS--
Management unit 13A, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia nova	48	47	48	44	10.10	7.46	7.26	8.95
B	Artemisia tridentata wyomingensis	0	1	1	0	-	.00	.38	-
B	Atriplex canescens	3	3	3	3	1.00	.76	1.41	.76
B	Coryphantha vivipara arizonica	0	2	0	0	-	.00	-	-
B	Ephedra viridis	3	2	2	2	.00	.00	.00	.00
B	Gutierrezia sarothrae	12	13	26	33	.50	.03	.26	1.45
B	Juniperus osteosperma	0	11	8	8	4.92	7.59	11.64	10.73
B	Opuntia erinacea	1	0	1	0	.00	-	.00	-
B	Pediocactus simpsonii	0	1	3	1	-	.00	.03	.03
B	Pinus edulis	0	6	6	8	1.18	3.32	4.26	4.68
B	Purshia tridentata	0	0	1	2	-	-	.63	.00
Total for Browse		67	86	99	101	17.71	19.16	25.89	26.62

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 5

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	10.10	10.86
Artemisia tridentata wyomingensis	-	.75	-
Atriplex canescens	-	.80	.36
Ephedra viridis	-	-	.21
Gutierrezia sarothrae	-	.71	2.61
Juniperus osteosperma	1.00	12.80	14.80
Pinus edulis	-	5.23	6.00
Purshia tridentata	-	.10	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 5

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	1.7	0.7
Atriplex canescens	6.4	5.4

POINT-QUARTER TREE DATA--
Management unit 13A, Study no: 5

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	104	99	95
Pinus edulis	89	101	95

Average diameter (in)		
'99	'04	'09
3.8	4.8	2.6
2.7	2.6	2.3

BASIC COVER--
Management unit 13A, Study no: 5

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	4.75	41.08	37.70	42.25	41.55
Rock	17.50	19.76	20.53	22.23	15.80
Pavement	1.25	1.53	5.09	4.92	1.46
Litter	61.50	42.43	42.45	42.45	44.43
Cryptogams	.50	.58	1.34	.59	.57
Bare Ground	14.50	12.41	12.25	11.99	9.36

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 5, Study Name: Amasas Back

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
9.7	7.5	50.9	19.8	29.3	3.5	7.5	96	0.6

PELLET GROUP DATA--
Management unit 13A, Study no: 5

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	9	20	12	29
Elk	7	20	22	13
Deer	13	23	12	18
Cattle	-	-	-	1

Days use per acre (ha)		
'99	'04	'09
-	-	-
54 (133)	19 (46)	37 (91)
34 (84)	20 (50)	15 (38)
-	-	1 (2)

BROWSE CHARACTERISTICS--
Management unit 13A, 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 nova									
87	**2331**	17	74	9	-	27	1	10	12/16
94	**2720**	7	85	8	160	22	1	23	18/31
99	**2020**	8	74	18	-	31	6	6	17/27
04	**2000**	1	82	17	60	52	5	7	14/24
09	**2140**	1	89	10	60	20	7	9	13/23
Artemisia tridentata wyomingensis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	34/56
99	**40**	0	100	-	-	100	0	0	30/34
04	**60**	0	100	-	-	0	100	0	19/36
09	**0**	0	0	-	-	0	0	0	30/66

		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									
87	**0**	0	0	0	-	0	0	0	-/-
94	**80**	25	75	0	-	0	0	0	36/44
99	**100**	40	40	20	-	60	40	0	34/40
04	**100**	0	100	0	-	40	60	0	38/52
09	**100**	0	0	100	-	0	100	80	35/43
Coryphantha vivipara arizonica									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**40**	50	50	-	-	0	0	0	3/8
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Ephedra viridis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**100**	20	80	-	-	0	80	0	11/6
99	**40**	0	100	-	-	0	50	0	19/23
04	**40**	0	100	-	-	50	0	0	15/27
09	**140**	0	100	-	-	0	0	0	14/12
Gutierrezia sarothrae									
87	**0**	0	0	0	-	0	0	0	-/-
94	**660**	18	64	18	40	0	0	3	8/11
99	**420**	19	81	0	-	0	0	0	8/11
04	**3340**	46	54	0	-	0	0	0	7/11
09	**3180**	8	77	15	-	.62	0	13	7/11
Juniperus osteosperma									
87	**99**	0	100	-	-	0	0	0	46/31
94	**0**	0	0	-	-	0	0	0	-/-
99	**220**	27	73	-	-	0	0	0	-/-
04	**160**	13	88	-	-	0	0	0	-/-
09	**180**	11	89	-	-	0	0	0	-/-
Opuntia erinacea									
87	**0**	0	0	-	-	0	0	0	-/-
94	**20**	0	100	-	20	0	0	100	2/4
99	**0**	0	0	-	-	0	0	0	5/15
04	**40**	0	100	-	-	0	0	0	5/21
09	**0**	0	0	-	-	0	0	0	-/-
Pediocactus simpsonii									
87	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**40**	50	50	0	-	0	0	0	1/3
04	**60**	0	67	33	-	0	0	33	4/7
09	**20**	0	100	0	-	0	0	0	3/3

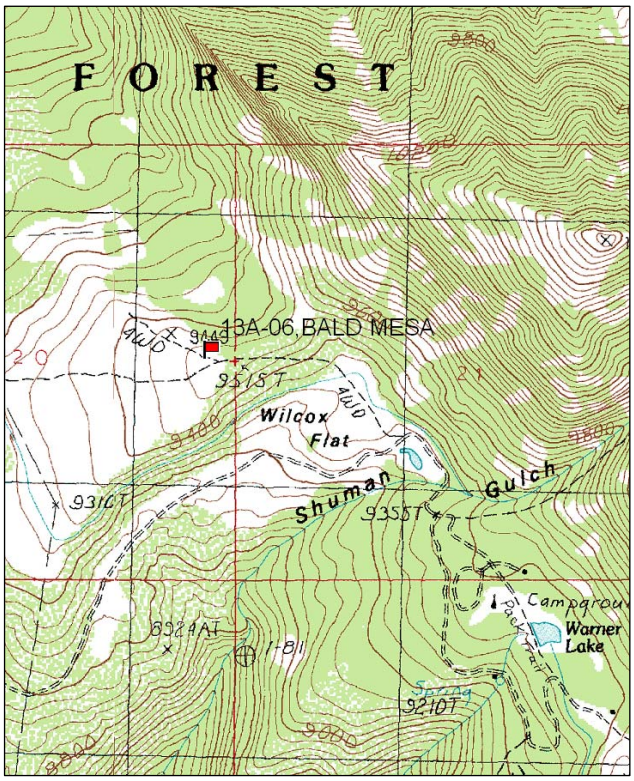
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pinus edulis									
87	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**120**	33	67	0	-	0	0	0	-/-
04	**120**	17	67	17	-	0	0	17	-/-
09	**160**	25	75	0	-	0	0	0	-/-
Purshia tridentata									
87	**33**	0	100	-	-	100	0	0	5/11
94	**0**	0	0	-	-	0	0	0	16/29
99	**0**	0	0	-	-	0	0	0	19/43
04	**20**	0	100	-	-	0	100	0	13/31
09	**80**	0	100	-	-	25	0	25	20/58
Yucca baccata baccata									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	4/8
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	9/15

BALD MESA - TREND STUDY NO. 13A-6-09

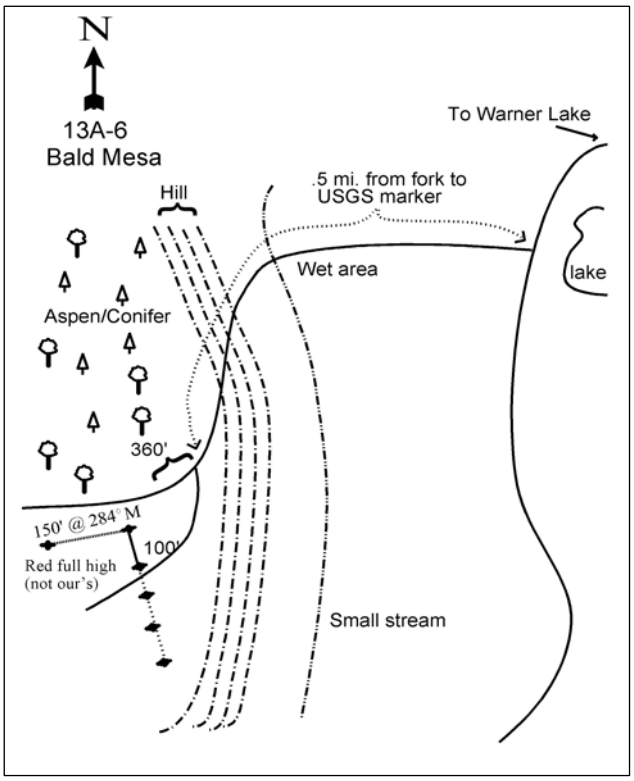
Vegetation Type: Mixed Mountain Brush
Range Type: Crucial Deer Summer, Crucial Elk Summer
NRCS Ecological Site Description: High Mountain Clay, R048AY503UT
Land Ownership: US Forest Service
Elevation: 9,500 ft (2,896 m)
Aspect: Southwest
Slope: 5%
Transect bearing: 185 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From the La Sal Mountain Loop Road, take the Warner Lake Campground road 4.8 miles. Turn left onto a minor road which crosses Wilcox Flat, then turns into a rough, rutted road going up the side of the hill to Bald Mesa. Walk or drive 0.5 miles up this road, continuing past the aspen-conifer edge to a fork in the meadow. Follow the right fork 200 feet to the first baseline stake, located 10 feet off the road to the left. The transect is marked by 12" fence posts.

Map Name: Warner Lake



Diagrammatic Sketch:



Township: 26S, Range: 24E, Section: 20

GPS: NAD 83, UTM 12S 649195 E 4265676 N

BALD MESA - TREND STUDY NO. 13A-6

Site Information

Site Description: This study is just west of the high La Sal peaks and samples a typical high elevation mesa that supports a mountain brush-forb-grass vegetation type. This type occupies only a small percentage of the high country. Here it is bounded to the north and east by aspen (*Populus tremuloides*) and conifer forests. This area is part of the Bald Mesa grazing allotment and is used mostly as summer range for cattle with some big game use. Pellet group data estimated light use by deer and elk, with very heavy use by cattle since 1999 (Table - Pellet Group Data).

Browse: Snowberry (*Symphoricarpos oreophilus*) forms the dominant shrub cover on this site. Preferred browse species found on the site consist of a small number of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and two currant species (*Ribes cereum* ssp. *cereum* and *R. montigenum*). Mountain big sagebrush has been increasing in density on the site over the sample period (Table - Browse Characteristics), likely due to heavy cattle grazing. Because of the moderately high elevation, this site would not normally be used as a winter range; consequently, browse is not a critical component for this site. The browse component provides approximately 30% of the total vegetation cover on average.

Herbaceous Understory: Herbaceous vegetation forms a diverse and dense understory. Perennial forbs are abundant providing an average of 47% of the vegetation cover. These species provide valuable summer forage. More than 30 perennial forb species have been sampled on the site since the outset of the study. Some of the most common species include ballhead sandwort (*Arenaria congesta*), pacific aster (*Aster chilensis*), *Astragulus spp.*, silky lupine (*Lupinus sericeus*), and silverweed cinquefoil (*Potentilla anersina*). There has been a steady decrease in the sum of nested frequency of perennial forbs over the sample years, though cover has remained similar (Table - Herbaceous Trends).

Grasses are also quite dense providing an average of 24% of the vegetation cover over the sample years. Kentucky bluegrass (*Poa pratensis*) is the dominant grass on the site. Other common grass species include Letterman needlegrass (*Stipa lettermani*), needle-and-thread grass (*S. comata*), and bottlebrush squirreltail (*Sitanion hystrix*).

Soil: The clay loam soil is slightly acidic (6.2 pH) and gravelly with scattered rock on the surface. Effective rooting depth is 15 inches. Phosphorus has a low availability for plant growth and development at 6.1 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The erosion condition classification rated soil as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1987 to 1994 - stable (0):** Differences in browse density may be related to the larger sample area used in 1994; therefore, other parameters were used to determine the trend. Since this site is not considered to be winter range, browse is not a crucial element of the site. There was little change in the major browse species.
- **1994 to 1999 - stable (0):** Density of serviceberry decreased 33%, but cover increased slightly.
- **1999 to 2004 - up (+2):** Density of mountain big sagebrush increased more than two-fold, mostly due to a high proportion of young plants. Decadence of sagebrush declined, and vigor remained good. An increase in shrubs may not be desired on this site since it is not winter range.
- **2004 to 2009 - up (+2):** Density of mountain big sagebrush increased by 22%, though cover has not reflected the change in density. That is because much of the increase is due to the recruitment of young plants that do not provide much cover. Decadence and vigor remain very good in the population.

Grass:

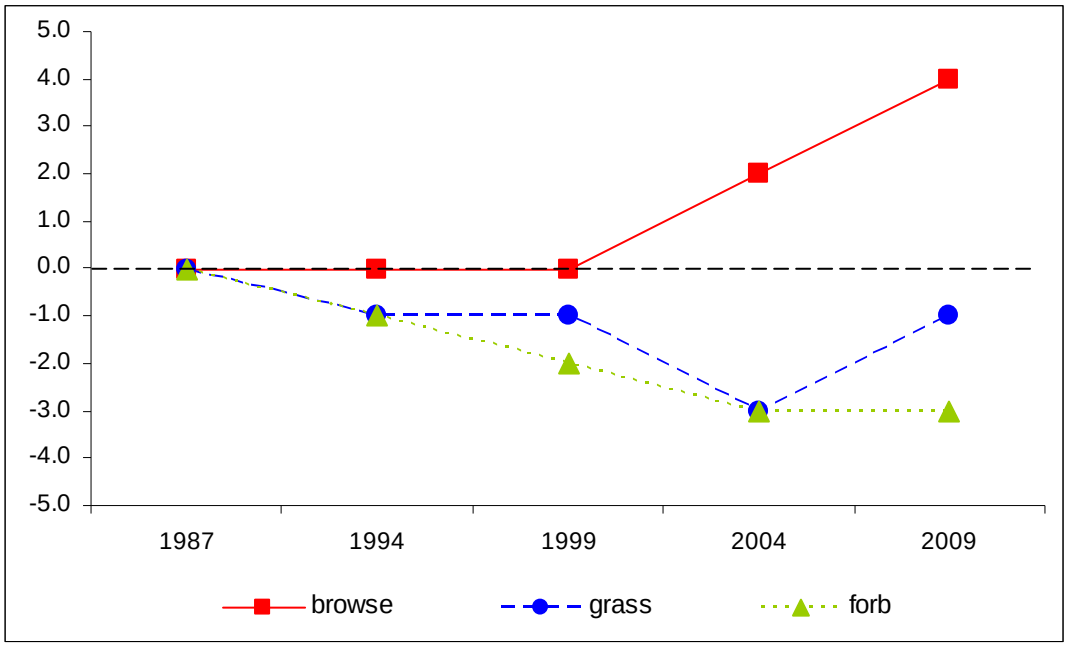
- **1987 to 1994 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 14%. There was a significant decrease in the nested frequency of the *Agropyron sp.*, plains bluegrass (*Poa arida*), and needle-and-thread grass. There was a significant increase in the nested frequency of prairie junegrass (*Koleria cristata*), Kentucky bluegrass, and Letterman needlegrass.
- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased markedly from 16% to 27%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 25%, and cover decreased to 11%. There was a significant decrease in the nested frequency of Kentucky bluegrass.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased 20% and cover increased to 17%. There was a significant increase in the nested frequency of Kentucky bluegrass and Letterman needlegrass.

Forb:

- **1987 to 1994 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 14%. There was a shift in composition as many forbs decreased significantly in nested frequency and others increased.
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial forbs continued to decrease by another 19%. Ballhead sandwort and pacific aster decreased significantly in nested frequency.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by another 13%. There was a significant decrease in nested frequency of dandelion (*Taraxacum officinale*) and thistle (*Cirsium calcareum*). There was a significant increase in the nested frequency of ballhead sandwort and Oregon fleabane (*Erigeron speciosus*).
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover decreased markedly.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 6



HERBACEOUS TRENDS--
Management unit 13A, Study no: 6

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron sp.	b128	a-	a1	a-	a-	-	.01	-	-
G	Bromus anomalus	1	5	-	-	-	.04	-	-	-
G	Carex sp.	4	-	5	8	-	-	.03	.53	-
G	Dactylis glomerata	-	-	5	5	-	-	.04	.03	-
G	Koeleria cristata	a-	b35	b27	b25	b33	.36	.21	.25	.19
G	Phleum pratense	-	-	5	-	-	-	.15	-	-
G	Poa arida	b136	ab28	a17	a3	a-	.54	1.07	.03	-
G	Poa fendleriana	-	-	3	-	-	-	.03	-	-
G	Poa pratensis	b257	c332	c346	a237	b274	12.42	22.36	8.07	13.42
G	Sitanion hystrix	a34	b57	ab45	ab40	ab36	.80	.72	.74	.40
G	Stipa comata	b99	a49	a32	a28	a39	1.14	.68	.33	.44
G	Stipa lettermani	a-	b59	b48	b54	c99	1.08	1.42	.90	2.66
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		659	565	534	400	481	16.42	26.75	10.90	17.14
Total for Grasses		659	565	534	400	481	16.42	26.75	10.90	17.14
F	Achillea millefolium	b102	b125	b110	a42	a44	2.53	2.02	.49	.74
F	Agoseris glauca	-	14	19	7	6	.08	.12	.07	.15
F	Androsace septentrionalis (a)	b16	a-	a-	a-	a-	-	-	-	-
F	Arabis drummondi	b38	a-	a-	a-	a-	-	-	-	-
F	Arenaria congesta	a181	bc240	a195	c255	ab204	8.03	5.33	13.60	7.45
F	Aster chilensis	a-	b50	a-	a12	c103	.89	-	.24	4.43
F	Aster sp.	a-	a-	a-	b13	c29	-	-	.15	.77
F	Astragalus miser	d226	c191	b72	a-	a1	7.73	3.42	-	.03
F	Astragalus sp.	a-	a-	b179	b183	a-	-	7.96	7.79	-
F	Calochortus nuttallii	a-	ab3	b13	a5	ab5	.01	.08	.01	.01
F	Carduus nutans (a)	-	-	-	-	-	-	-	.00	-
F	Castilleja linariaefolia	a-	c19	bc15	ab3	a1	.26	.30	.01	.00
F	Chenopodium album (a)	-	-	1	-	-	-	.00	-	-
F	Cirsium calcareum	b51	c108	b52	a4	a2	1.19	1.97	.19	.03
F	Clematis hirsutissima	b13	a-	a-	a-	a-	-	-	-	-
F	Collinsia parviflora (a)	-	-	1	1	-	-	.00	.00	-
F	Collomia linearis (a)	-	-	-	-	5	-	-	-	.01
F	Comandra pallida	b28	b21	b31	b14	a-	.33	.78	.10	-
F	Crepis acuminata	15	18	18	2	7	.16	.45	.06	.24
F	Delphinium nuttallianum	b75	a8	a-	a6	a-	.08	-	.02	-
F	Erigeron flagellaris	88	52	29	55	25	.33	.21	1.31	.67
F	Erigeron sp.	a-	a-	a-	a-	b7	-	-	-	.10
F	Erigeron speciosus	ab39	bc65	a15	c80	a-	1.98	.27	3.97	-
F	Eriogonum racemosum	61	65	56	56	62	1.35	.84	.89	1.30
F	Eriogonum umbellatum	12	6	2	-	-	.01	.15	-	-
F	Galium boreale	-	5	4	4	-	.53	.41	.18	-
F	Holosteum umbellatum (a)	-	-	5	-	-	-	.01	-	-
F	Ipomopsis aggregata	2	3	3	-	-	.00	.00	-	-

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
F	Lathyrus brachycalyx	a-	a-	a-	a-	b168	-	.53	-	7.02
F	Ligusticum sp.	-	-	-	-	9	-	-	-	.15
F	Lomatium dissectum	-	3	1	7	2	.00	.38	.53	.00
F	Lupinus argenteus	-	8	-	-	-	.33	-	-	-
F	Lupinus sericeus	b117	a49	a41	a40	a32	2.83	2.66	2.12	1.45
F	Lychnis drummondii	-	-	2	-	-	-	.01	-	-
F	Mertensia brevistyla	8	3	-	-	-	.00	-	-	-
F	Penstemon crandallii	a-	a2	a6	ab10	b18	.03	.06	.45	.38
F	Penstemon humilis	-	-	-	-	1	-	-	-	.03
F	Penstemon palmeri	b49	a4	a4	a-	a-	.15	.03	-	-
F	Penstemon strictus	a-	c32	bc31	ab9	a2	.52	.61	.09	.06
F	Petradoria pumila	a-	b26	bc31	bc29	c47	.92	.51	1.46	1.42
F	Phlox sp.	-	3	3	-	-	.15	.03	-	-
F	Polygonum douglasii (a)	-	a1	ab15	b22	a4	.00	.03	.05	.03
F	Potentilla anersina	64	95	78	84	85	2.24	1.72	2.71	2.51
F	Sedum lanceolatum	b22	a1	a-	a2	a-	.00	-	.03	-
F	Senecio integerrimus	c197	b84	a29	a25	a42	1.18	.29	.26	.64
F	Taraxacum officinale	c172	b66	b65	a20	a10	.39	1.35	.35	.10
F	Thalictrum fendleri	-	-	3	-	-	-	.30	-	-
F	Trifolium sp.	1	-	3	-	-	-	.00	-	-
F	Unknown forb-perennial	b34	a-	a-	a-	a-	-	-	-	-
F	Zigadenus paniculatus	2	-	-	-	-	-	-	-	-
Total for Annual Forbs		16	1	22	23	9	0.00	0.05	0.06	0.05
Total for Perennial Forbs		1597	1369	1110	967	912	34.35	32.89	37.12	29.75
Total for Forbs		1613	1370	1132	990	921	34.36	32.94	37.18	29.80

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

BROWSE TRENDS--
Management unit 13A, Study no: 6

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata vaseyana	19	22	23	24	1.96	1.57	1.22	1.41
B	Chrysothamnus viscidiflorus lanceolatus	41	34	37	36	1.79	2.50	2.75	2.63
B	Clematis sp.	0	0	0	0	-	.15	-	-
B	Ribes cereum cereum	0	3	3	3	-	1.33	1.53	2.49
B	Ribes montigenum	0	3	2	1	-	1.26	1.99	.85
B	Ribes sp.	4	0	0	0	2.62	-	-	-
B	Rosa woodsii	1	1	1	0	.15	.00	.00	-
B	Sambucus racemosa	1	3	2	3	.03	.00	.00	.00
B	Symphoricarpos oreophilus	46	49	47	46	13.17	14.17	15.92	12.69
Total for Browse		112	115	115	113	19.72	21.01	23.43	20.07

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 6

Species	Percent Cover	
	'04	'09
Artemisia tridentata vaseyana	.90	1.54
Chrysothamnus viscidiflorus lanceolatus	2.76	4.58
Ribes cereum cereum	2.95	3.09
Ribes montigenum	.15	.98
Sambucus racemosa	-	.46
Symphoricarpos oreophilus	18.35	19.73

BASIC COVER--
Management unit 13A, Study no: 6

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	26.00	66.22	70.77	67.34	67.25
Rock	2.75	1.59	1.36	1.61	2.87
Pavement	0	.20	1.12	1.39	.77
Litter	64.00	39.64	54.87	30.88	48.26
Cryptogams	.50	.12	.06	0	0
Bare Ground	6.75	6.11	5.03	12.82	8.04

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 6, Study Name: Bald Mesa

Effective rooting depth (in)	pH	clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15	6.2	40.2	32.6	27.3	5	6.1	2620.4	0.4

PELLET GROUP DATA--
Management unit 13A, Study no: 6

Type	Quadrat Frequency			
	'94	'99	'04	'09
Elk	4	3	1	1
Deer	-	1	1	-
Cattle	4	17	22	28

Days use per acre (ha)		
'99	'04	'09
9 (22)	5 (13)	3 (7)
-	1 (3)	3 (7)
84 (207)	112 (276)	33 (82)

BROWSE CHARACTERISTICS--
Management unit 13A, 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 vaseyana									
87	**932**	0	43	57	-	36	29	29	15/25
94	**620**	10	58	32	80	10	0	10	16/20
99	**620**	26	48	26	180	58	0	0	14/21
04	**1540**	44	49	6	-	1	0	4	13/17
09	**1880**	20	79	1	160	45	6	2	12/18

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus lanceolatus									
87	**2998**	44	40	16	133	44	9	0	13/21
94	**1340**	9	91	0	-	0	0	0	14/18
99	**1060**	6	94	0	-	4	0	0	14/18
04	**1320**	2	98	0	-	8	0	0	13/18
09	**1300**	3	97	0	-	0	0	6	14/19
Clematis sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	22/16
Ribes cereum cereum									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	0	100	-	-	0	0	0	65/90
04	**60**	0	100	-	-	0	0	0	56/62
09	**60**	0	100	-	-	0	0	0	75/118
Ribes montigenum									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	0	100	-	-	0	0	0	34/37
04	**40**	0	100	-	-	0	0	0	26/24
09	**40**	0	100	-	-	0	0	0	66/77
Ribes sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**180**	0	100	-	-	0	0	0	49/93
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Rosa woodsii									
87	**0**	0	0	-	-	0	0	0	-/-
94	**20**	0	100	-	-	0	0	0	12/19
99	**20**	100	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	27/14
09	**0**	0	0	-	-	0	0	0	-/-
Sambucus racemosa									
87	**0**	0	0	-	-	0	0	0	-/-
94	**60**	0	100	-	-	0	0	0	29/40
99	**60**	33	67	-	-	0	0	0	35/39
04	**40**	0	100	-	-	0	0	0	27/22
09	**100**	20	80	-	-	0	0	0	27/31

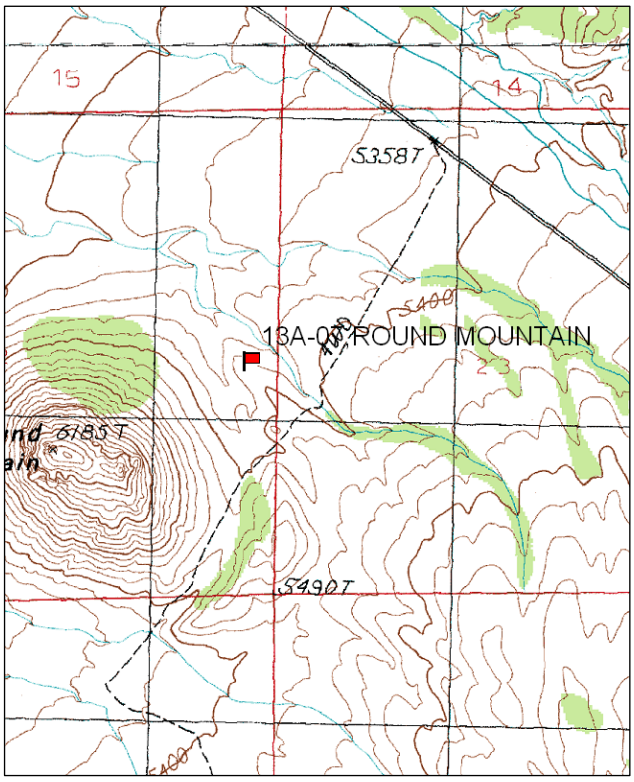
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus									
87	**4798**	72	22	6	1866	31	1	0	25/23
94	**2100**	9	91	0	-	0	0	0	22/50
99	**1400**	7	81	11	80	13	1	0	25/42
04	**1360**	3	94	3	-	0	0	1	21/48
09	**1680**	6	90	4	-	6	18	17	24/46

ROUND MOUNTAIN - TREND STUDY NO. 13A-7-09

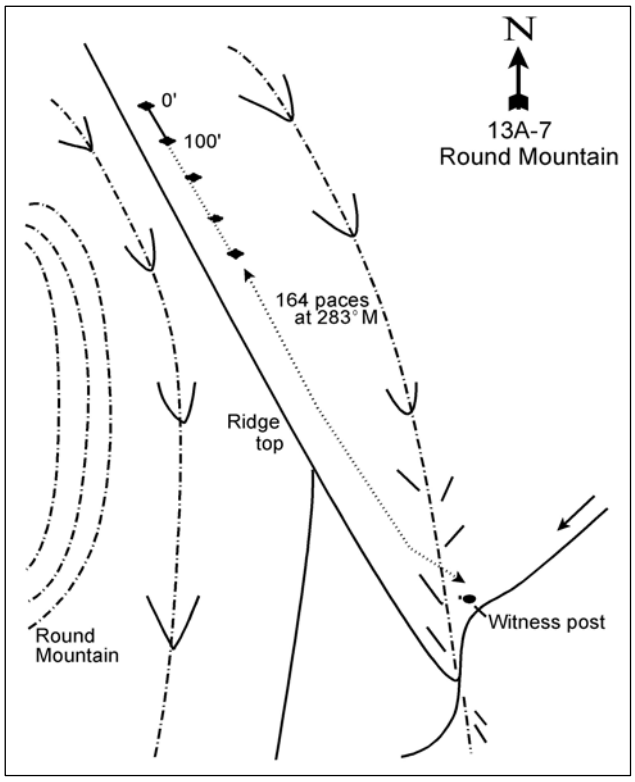
Vegetation Type: Blackbrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Semidesert Stony Loam (Blackbrush), R035XY243UT
Land Ownership: SITLA
Elevation: 5,400 ft (1,646 m)
Aspect: West
Slope: 4%-7%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
Travel 6.8 miles up the Castle Valley Road (La Sal Mountain Loop Road) from SR 128 along the Colorado River. Turn onto a rough dirt road heading south towards Round Mountain. Travel 0.55 miles to just before the road drops into a deep draw. There is a witness post (4' green fencepost) on the right side of the road. From here, walk 164 paces west northwest (approximately 283°M) down and across the draw to the top of a sage-blackbrush ridge. The 0-foot baseline stake is a short fencepost marked with a red browse tag #7837.

Map Name: Warner Lake



Diagrammatic Sketch:



Township: 25S, Range: 23E, Section: 22

GPS: NAD 83, UTM 12S 643242 E 4275370 N

ROUND MOUNTAIN - TREND STUDY NO. 13A-7

Site Information

Site Description: The study samples a blackbrush (*Coleogyne ramosissima*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community near the center of Castle Valley, just east of Round Mountain. The study is located on a small ridge within the rolling foothills below Round Mountain. The transect runs along the ridge top through a blackbrush community that transitions to a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) community on the lower belts. Drainage of the area is northwest through Castle Valley to the Colorado River. Much of the land in lower Castle Valley is managed by the Utah Division of State Lands and Forestry. Pellet group data has estimated heavy deer use with some minimal elk use on the site since 1999 (Table - Pellet Group Data). It was noted in 2009 that deer pellet groups were congregated in the blackbrush community and dropped markedly as you entered the pinyon-juniper.

Browse: The dominant browse species on the site is blackbrush, which grows primarily on the shallow-soiled ridge tops of Castle Valley. Blackbrush has had an average cover of 10% and an average density of around 3,800 plant/acre since 1994. Both decadence and vigor have been good in the population, but recruitment of young plants has been low over the course of the study. Utilization of blackbrush has been mostly light to moderate over the sample years (Table - Browse Characteristics).

The key browse species for deer is Wyoming big sagebrush. The cover and density of sagebrush has decreased drastically on the site since 1999. The sagebrush population has displayed poor vigor and high decadence since 1994. Recruitment of young sagebrush plants has been very low since 1994. Browse use of sagebrush has been moderate to very heavy over the sample years (Table - Browse Characteristics). The browse population is very susceptible to fire because of the amount of understory cheatgrass (*Bromus tectorum*) (Table - Herbaceous Trends).

Herbaceous Understory: Herbaceous vegetation (grasses and forbs) are not an important component of this community. The only grass species that contributes notably to cover is the annual grass cheatgrass. There are few perennial grasses on the site. Forbs have provided less than 1% cover since 1999. There was a large decline in perennial forb cover and nested frequency between the 1994 and 1999 sample years. Perennial forbs are now very rare on the site (Table -Herbaceous Trends).

Soil: The soil is very rocky, both on the surface and within the soil profile. The soil is a reddish sandy clay loam with an effective rooting depth of about 10 inches. It is mildly to moderately alkaline with a pH of 7.8 (Table - Soil Data Analysis). Pavement and rock cover are high on the site (Table - Basic Cover). The soil erosion condition classification was rated as stable in 2009.

Trend Assessments

Browse:

- **1987 to 1994 - down (-2):** Differences in density may be related to the larger sample area used in 1994; therefore, other parameters were used to determine trend. Decadence of the key browse species, Wyoming big sagebrush, increased from 22% to 64%. The proportion of sagebrush plants displaying poor vigor increased to 35%. Recruitment of young sagebrush plants fell markedly. Decadence of blackbrush also increased to 12%, but is still considered low.
- **1994 to 1999 - down (-2):** Density of sagebrush decreased by 20%, and cover decreased from 7% to 3%. Vigor, decadence, and recruitment of young plants all remained poor in the sagebrush population.
- **1999 to 2004 - down (-2):** Density of sagebrush decreased by a further 60% and cover decreased to 1%. Decadence increased to 85% and plants displaying poor vigor increased to 76% of the sagebrush population. There was no new recruitment of young sagebrush plants sampled.

- **2004 to 2009 - slightly down (-1):** Density of sagebrush decreased by 29%, but density is now so low at 480 plants/acre that even small changes in density show large percentage change. Decadence, vigor, and recruitment of young sagebrush plants remain poor.

Grass:

- **1987 to 1994 - stable (0):** Perennial grasses were sampled for the first time in 1994, though at very low frequency and cover.
- **1994 to 1999 - slightly down (-1):** Cheatgrass increased significantly in nested frequency and cover increased from 3% to over 6%. There was little change in perennial grasses.
- **1999 to 2004 - stable (0):** Cheatgrass decreased significant in nested frequency, but cover increased slightly. There was little change in perennial grasses
- **2004 to 2009 - slightly down (-1):** Cheatgrass increased significantly in nested frequency and cover increased to 9%. There was little change in perennial grasses.

Forb:

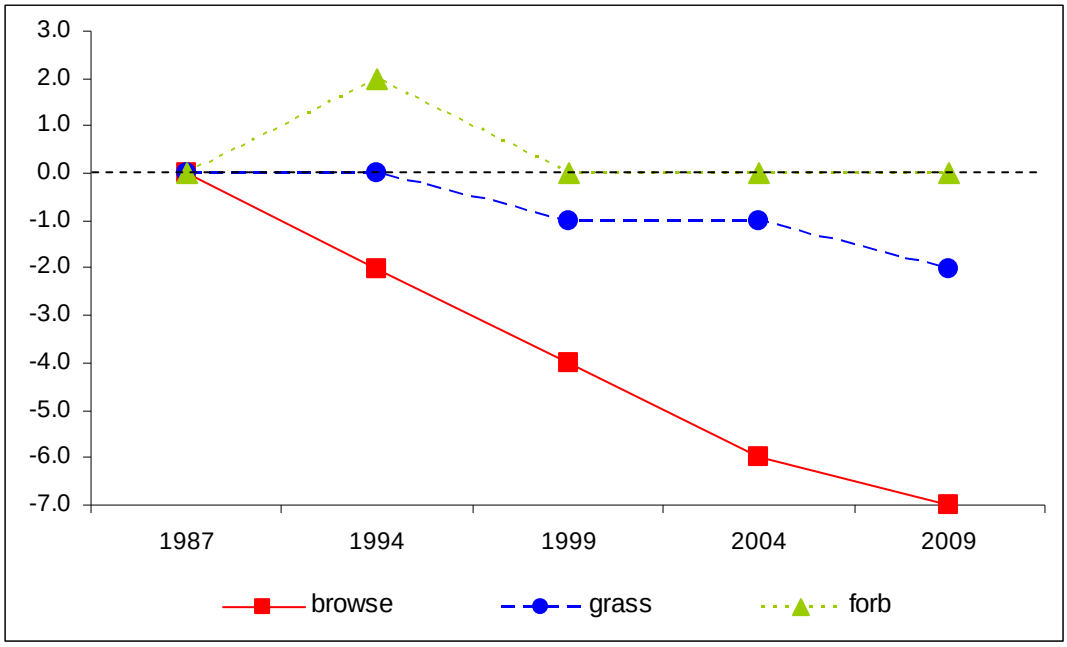
- **1987 to 1994 - up (+2):** There was a large increase in the sum of nested frequency of perennial forbs. The number of perennial species sampled increased from 4 species to 7 species.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased to below 1987 levels, and cover decreased to less than 0.1%.
- **1999 to 2004 - stable (0):** There were no perennial forbs sampled and all forbs remain rare on the site.
- **2004 to 2009 - stable (0):** Forbs remain very rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13A, study no: 7

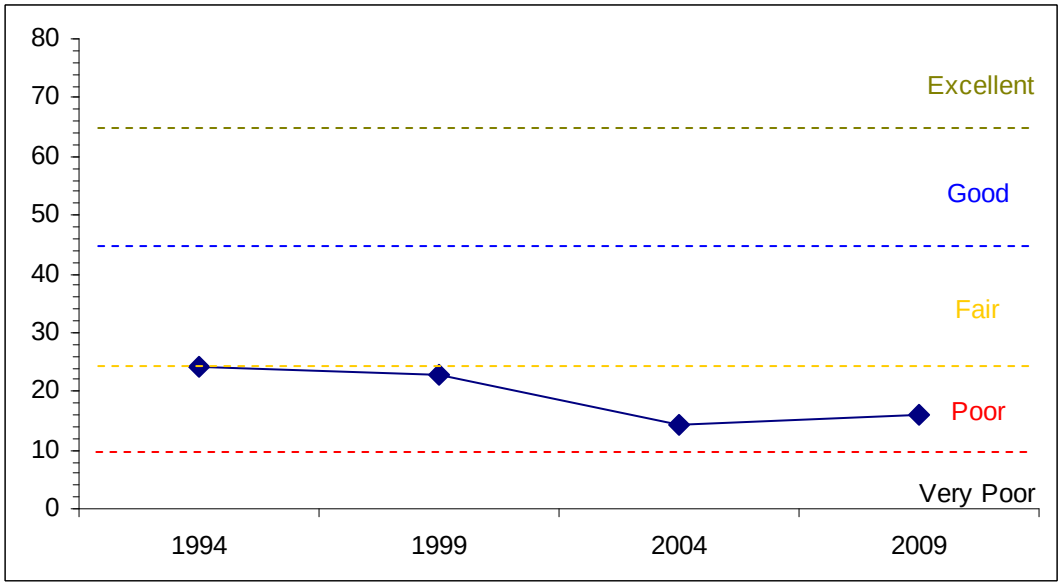
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	18	5	1	0	-2	3	0	**24**	Poor-Fair
99	16	11	1	0	-5	0	0	**23**	Poor
04	11	9	0	0	-6	0	0	**14**	Poor
09	10	12	1	1	-7	0	0	**16**	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 7



DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 13A, Study no: 7



HERBACEOUS TRENDS--
Management unit 13A, Study no: 7

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Bromus tectorum (a)	-	$_{a}$214	$_{c}$327	$_{a}$246	$_{b}$297	3.00	6.42	7.41	9.14
G	Poa secunda	$_{a}$-	$_{a}$3	$_{a}$4	$_{a}$3	$_{b}$17	.01	.04	.04	.25
G	Sitanion hystrix	-	4	-	-	-	.04	-	-	-
G	Vulpia octoflora (a)	-	$_{c}$145	$_{b}$75	$_{b}$51	$_{a}$2	.32	.22	.16	.15
Total for Annual Grasses		0	359	402	297	299	3.31	6.65	7.57	9.29
Total for Perennial Grasses		0	7	4	3	17	0.05	0.04	0.03	0.25
Total for Grasses		0	366	406	300	316	3.37	6.69	7.61	9.54
F	Arabis sp.	14	3	1	-	-	.01	.00	-	-
F	Astragalus moencopensis	-	1	-	-	-	.00	-	-	-
F	Astragalus sp.	$_{a}$6	$_{c}$71	$_{b}$10	$_{a}$-	$_{b}$10	.17	.03	-	.03
F	Castilleja chromosa	-	2	-	-	-	.01	-	-	-
F	Descurainia pinnata (a)	-	$_{b}$25	$_{a}$-	$_{a}$3	$_{a}$4	.05	-	.00	.16
F	Draba reptans (a)	-	$_{c}$190	$_{b}$10	$_{a}$-	$_{a}$-	.42	.02	-	-
F	Erigeron pumilus	1	-	-	-	-	-	-	-	-
F	Eriogonum cernuum (a)	-	2	-	-	-	.00	-	-	-
F	Gilia sp. (a)	-	$_{c}$106	$_{b}$10	$_{b}$13	$_{a}$-	.20	.05	.04	-
F	Holosteum umbellatum (a)	-	-	11	-	-	-	.02	-	-
F	Lappula occidentalis (a)	-	11	-	2	-	.02	-	.00	-
F	Penstemon pachyphyllus	3	-	-	-	-	-	-	-	-
F	Physaria sp.	-	4	-	-	-	.03	-	-	-
F	Plantago patagonica (a)	-	$_{b}$20	$_{b}$11	$_{b}$21	$_{a}$-	.04	.02	.08	-
F	Polygonum sp.	-	-	-	-	1	-	-	-	.00
F	Senecio multilobatus	$_{a}$-	$_{b}$20	$_{ab}$8	$_{a}$-	$_{a}$3	.67	.05	-	.00
F	Sisymbrium altissimum (a)	-	9	3	-	-	.02	.01	-	-
F	Streptanthus cordatus	$_{a}$-	$_{b}$15	$_{a}$-	$_{a}$-	$_{a}$-	.43	-	-	-
Total for Annual Forbs		0	363	45	39	4	0.77	0.12	0.12	0.15
Total for Perennial Forbs		24	116	19	0	14	1.34	0.08	0	0.03
Total for Forbs		24	479	64	39	18	2.11	0.21	0.12	0.19

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

BROWSE TRENDS--
Management unit 13A, Study no: 7

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	68	52	25	18	7.01	3.01	.98	.81
B	Coleogyne ramosissima	64	65	71	68	9.59	11.75	9.58	9.37
B	Ephedra viridis	2	1	1	3	.03	.15	.15	.63
B	Gutierrezia sarothrae	50	57	25	23	.95	1.16	.97	.57
B	Juniperus osteosperma	0	3	3	3	3.08	6.59	7.46	5.25
B	Opuntia sp.	0	1	2	2	-	.00	.00	.00
B	Pinus edulis	0	0	1	0	-	-	.00	-
Total for Browse		184	179	128	117	20.68	22.65	19.16	16.64

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 7

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata wyomingensis	-	1.00	1.00
Coleogyne ramosissima	-	13.69	14.83
Ephedra viridis	-	-	.50
Gutierrezia sarothrae	-	1.53	.53
Juniperus osteosperma	4.00	5.34	7.46
Opuntia sp.	-	-	.03

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 7

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.4	0.8
Coleogyne ramosissima	2.0	0.6

POINT-QUARTER TREE DATA--
Management unit 13A, Study no: 7

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	46	44	47
Pinus edulis	23	-	22

Average diameter (in)		
'99	'04	'09
2.8	4.8	3.4
3.3	-	2.8

BASIC COVER--
Management unit 13A, Study no: 7

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	8.25	22.44	29.63	27.61	26.22
Rock	32.00	30.60	23.46	24.36	22.06
Pavement	16.75	10.05	25.93	27.57	18.59
Litter	29.50	20.06	23.24	20.06	30.78
Cryptogams	.25	1.23	1.47	1.56	.41
Bare Ground	13.25	24.26	8.07	10.72	12.92

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 7, Study Name: Round Mountain

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
9.6	7.8	58.9	19.8	21.3	1.9	60.4	48	0.4

PELLET GROUP DATA--
Management unit 13A, Study no: 7

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	8	9	2	6
Elk	-	3	-	-
Deer	49	40	33	25

Days use per acre (ha)		
'99	'04	'09
-	-	-
2 (5)	-	1 (3)
78 (193)	106 (263)	52 (127)

BROWSE CHARACTERISTICS--
Management unit 13A, 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									
87	**4798**	44	33	22	266	33	64	3	16/27
94	**2140**	3	34	64	-	28	3	35	18/36
99	**1720**	1	48	51	-	38	52	23	18/29
04	**680**	0	15	85	-	12	85	76	16/27
09	**480**	4	33	63	-	38	13	63	15/23
Atriplex canescens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	27/43
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-

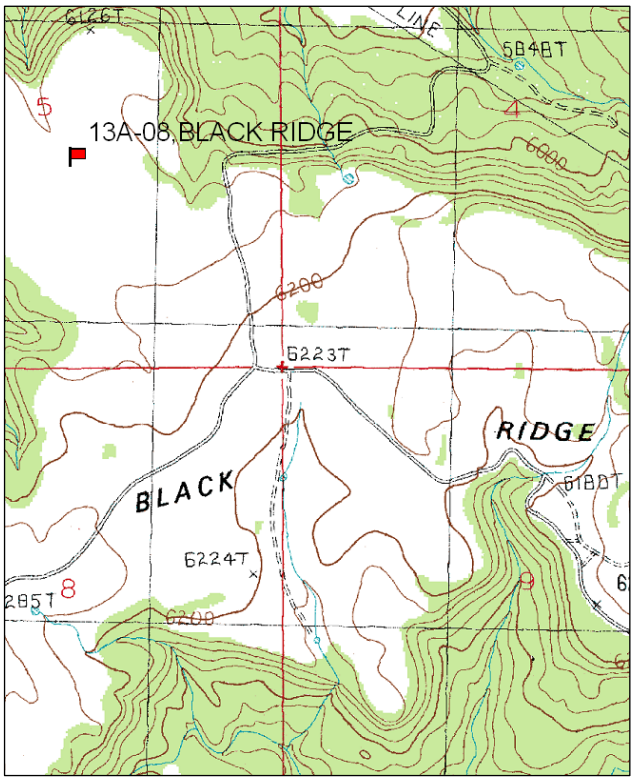
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Cercocarpus montanus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	20/32
09	**0**	0	0	-	-	0	0	0	-/-
Coleogyne ramosissima									
87	**1732**	42	58	0	66	19	54	0	12/16
94	**4120**	0	87	12	-	20	.48	10	13/26
99	**3500**	1	97	2	40	23	7	.57	16/30
04	**3720**	1	85	14	-	53	21	4	12/26
09	**3740**	1	92	7	40	34	.53	4	13/27
Ephedra viridis									
87	**66**	0	100	-	-	0	100	0	4/2
94	**40**	50	50	-	-	50	0	0	19/22
99	**80**	75	25	-	-	0	25	0	25/31
04	**20**	0	100	-	-	0	0	0	23/27
09	**100**	20	80	-	-	0	0	0	25/40
Gutierrezia sarothrae									
87	**4798**	46	51	3	399	6	10	3	8/6
94	**2220**	28	61	11	2880	.90	0	2	9/11
99	**3560**	24	73	3	160	0	0	2	7/10
04	**1840**	4	95	1	-	0	0	1	8/10
09	**1320**	30	24	45	80	0	0	44	6/9
Juniperus osteosperma									
87	**66**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	67	33	-	20	0	0	0	-/-
04	**60**	67	33	-	-	0	0	0	-/-
09	**80**	100	0	-	-	0	0	0	-/-
Opuntia sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	12/7
04	**40**	50	50	-	-	0	0	0	10/28
09	**40**	0	100	-	-	0	0	0	12/29
Pinus edulis									
87	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**0**	0	0	0	-	0	0	0	-/-
04	**20**	0	0	100	-	0	0	100	-/-
09	**0**	0	0	0	-	0	0	0	-/-

BLACK RIDGE - STUDY NO. 13A-8-09

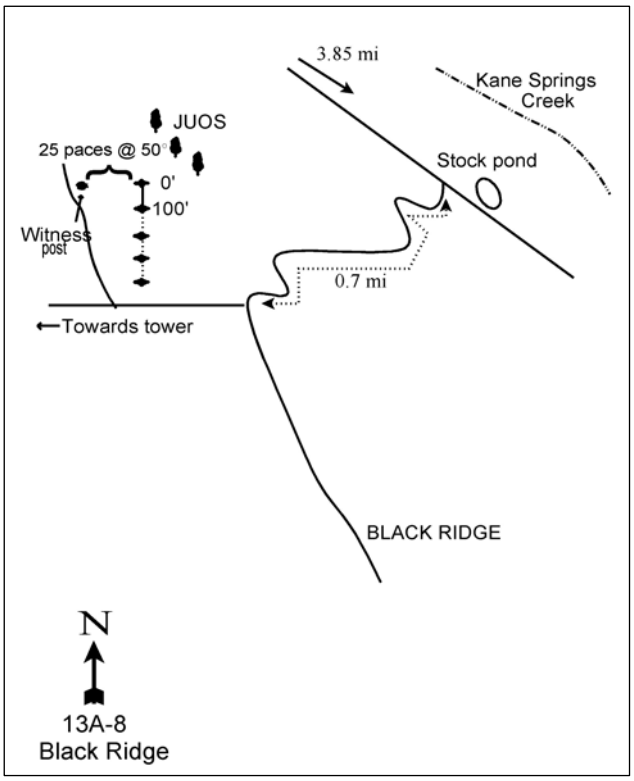
Vegetation Type: Chained, Seeded, P-J
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Loam (Basin Big Sagebrush), R035XY306UT
Land Ownership: BLM
Elevation: 6,100 ft (1,859 m)
Aspect: Flat
Slope: 0%-1%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
Travel south from Moab on SR 191 to just past mile marker 113, where a road turns off to Black Ridge and Yellow Circle Mine. Turn left and go 4.4 miles on the main road to the top of the ridge. Turn right onto a faint dirt road bearing west towards the relay tower. Go 0.15 miles to a faint fork. Bear right and continue 0.3 miles. Stop by a witness post on the right side of the road. The baseline starts 25 paces away from the witness post at 50°M. The 0-foot stake is tagged #7173.

Map Name: Kane Springs



Diagrammatic Sketch:



Township: 28S, Range: 23E, Section: 5

GPS: NAD 83, UTM 12S 638655 E 4250723 N

BLACK RIDGE - TREND STUDY NO. 13A-8

Site Information

Site Description: The study is on one of the lower elevation crucial deer winter ranges on the southwest side of the La Sal Mountains. This large mesa, managed by the BLM, was chained many years ago and must have been seeded mostly to crested wheatgrass (*Agropyron cristatum*) because that is the only non-native perennial grass species present. The site is located approximately a half mile south of the mesas edge, near the middle of the chained area. Deer use appears to be greatest along the north rim above Kane Springs Creek. Pellet group data has estimated deer use to have decreased since 1999. There has been minimal use by elk on the site since 1999. Cattle use has fluctuated between light to moderate use since 1999 (Table - Pellet Group Data). Cattle use the Black Ridge allotment during the spring, as they move up the mountain to the U.S. Forest Service administered lands.

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the dominant browse on this site. It provides all of the measured browse cover for the site, though there are other limited browse species present on the site. Cover of sagebrush has averaged 13% (Table - Browse Trends) and density of sagebrush has averaged 3,500 plants/acre since 1994. Vigor and decadence of the sagebrush population has been mostly good, though decadence has risen in recent years. Recruitment of young sagebrush plants has declined since the outset of the study and is very poor on the site. Browse use of sagebrush has been moderate to heavy on the site (Table -Browse Characteristics).

Herbaceous Understory: The dominant grass on the site is the seeded species crested wheatgrass, which has provided nearly all of the perennial grass cover over the duration of the study. Diversity is very low throughout this community. Other perennial grasses observed historically on the site include Indian ricegrass (*Oryzopsis hymenoides*), bottlebrush squirreltail (*Sitanion hystrix*), and three-awn (*Aristida longiseta*), though none of these species were sampled in 2009. Annual grasses, primarily cheatgrass (*Bromus tectorum*), provide the majority of the remaining grass cover on the site. Nested frequency and cover of annual species has fluctuated over the sample years (Table - Herbaceous Trends).

Forbs are almost nonexistent. The annual forb species burr buttercup (*Ranunculus testiculatus*) was the only forb sampled in 2009, providing negligible cover (Table - Herbaceous Trends).

Soil: The soil is classified as upland sandy clay loam with an effective rooting depth of almost 16 inches. The soil has a mildly alkaline pH (7.5). Phosphorus has limited availability for plant growth and development at 5.8 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The average bare ground cover is quite high on the site (Table - Basic Cover). Pedastaling around plants and soil movement are common problems on this site. The soil erosion condition classification was rated as slight in 2004 and stable in 2009.

Trend Assessments

Browse:

- **1987 to 1994 - slightly down (-1):** Differences in density may be related to the larger sample area used in 1994; therefore, other parameters were used to determine trend. Decadence of sagebrush increased from 3% to 24% and plants displaying poor vigor increased from 1% to 18%. Recruitment of young sagebrush plants decreased markedly.
- **1994 to 1999 - down (-2):** Density of sagebrush decreased by 21% to 3,300 plants/acre, and cover decreased from 15% to 12%. Decadence and vigor of sagebrush both improved slightly. Recruitment of young sagebrush plants decreased slightly.
- **1999 to 2004 - slightly down (-1):** Density of sagebrush decreased by another 13% to 2,880 plants/acre, though cover increased slightly. Recruitment of young sagebrush plants continued to decrease to only 1% of the population.

- **2004 to 2009 – slightly up (+1):** Density of sagebrush increased by 28% to 3,700 plants/acre, though cover fell slightly. Decadence also increased from 22% to 35%, but vigor remained good. Recruitment of young sagebrush was still very low.

Grass:

- **1987 to 1994 - stable (0):** There was little change in the nested frequency of perennial grasses.
- **1994 to 1999 - down (-2):** There was a 21% decrease in the sum of nested frequency of perennial grasses, and cover decreased from 6% to 3%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 17%, though cover increased slightly. Cheatgrass cover increased to the highest rate in any of the years it was sampled.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 15%, and cover increased slightly. There was a significant decrease in the sum of nested frequency of cheatgrass, and cheatgrass cover decreased to the lowest rate in any of the years it was sampled.

Forb:

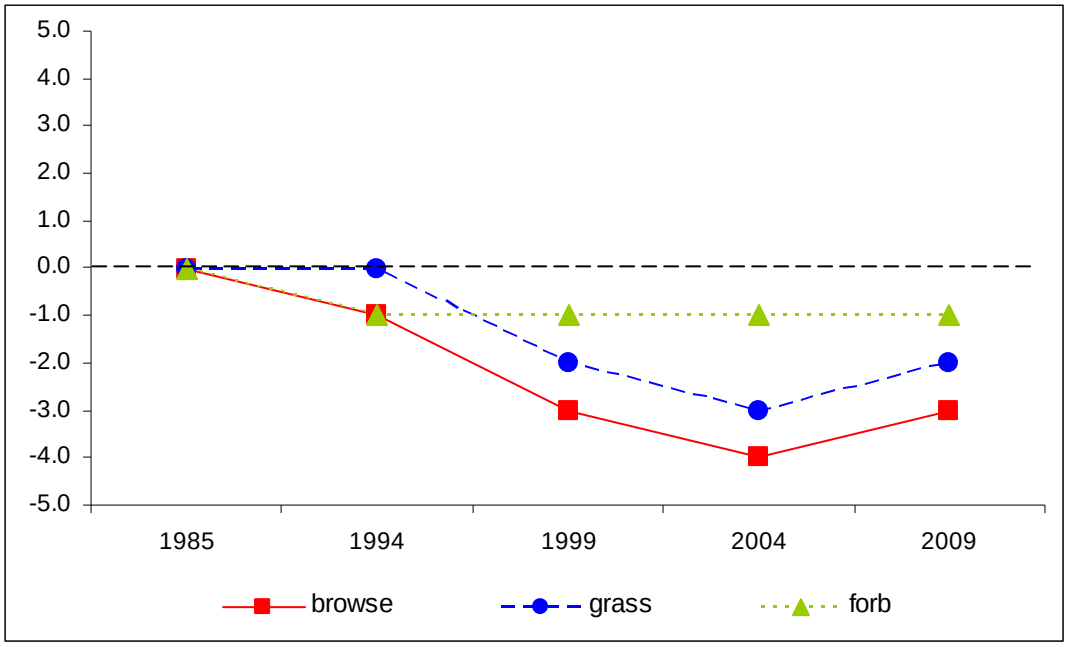
- **1987 to 1994 - slightly down (-1):** Forbs are very rare on this site. The sum of nested frequency of perennial forbs decreased on the site with only one perennial forb species being sampled.
- **1994 to 1999 - stable (0):** Forb cover and frequency are negligible on this site.
- **1999 to 2004 - stable (0):** Forb cover and frequency are negligible on this site.
- **2004 to 2009 - stable (0):** Forb cover and frequency are negligible on this site. Only one annual species was sampled on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13A, study no: 8

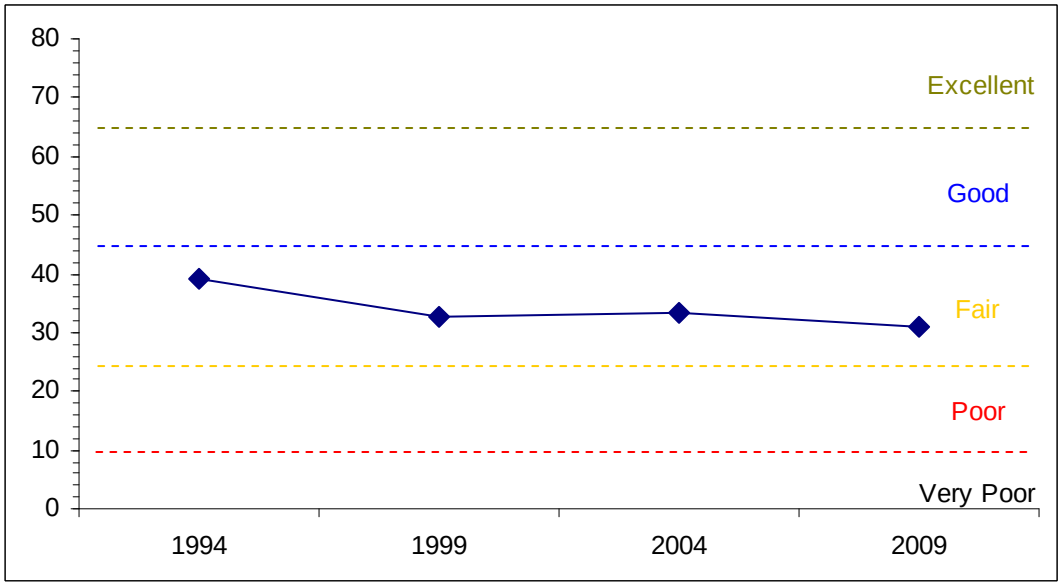
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	18	8	3	11	-1	0	0	**39**	Fair
99	15	11	2	6	-2	0	0	**33**	Fair
04	17	8	1	10	-2	0	0	**33**	Fair
09	15	5	1	11	0	0	0	**31**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A Study no: 8



DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 13A, Study no: 8



HERBACEOUS TRENDS--
Management unit 13A, Study no: 8

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{b}$169	$_{ab}$142	$_{ab}$145	$_{a}$126	$_{ab}$146	5.48	3.14	5.10	5.53
G	Aristida longiseta	-	8	4	-	-	.09	.03	-	-
G	Bromus tectorum (a)	-	$_{b}$192	$_{b}$197	$_{b}$192	$_{a}$79	1.47	2.03	3.22	.41
G	Sitanion hystrix	$_{b}$21	$_{b}$43	$_{a}$4	$_{a}$1	$_{a}$-	.11	.01	.00	-
G	Vulpia octoflora (a)	-	$_{b}$91	$_{a}$9	$_{a}$2	$_{a}$-	.23	.02	.01	-
Total for Annual Grasses		0	283	206	194	79	1.71	2.05	3.23	0.41
Total for Perennial Grasses		190	193	153	127	146	5.69	3.18	5.11	5.53
Total for Grasses		190	476	359	321	225	7.40	5.24	8.34	5.94
F	Astragalus amphioxys	1	-	-	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	3	-	1	-	.00	-	.01	-
F	Eriogonum cernuum (a)	-	$_{b}$47	$_{a}$-	$_{a}$12	$_{a}$-	.12	-	.07	-
F	Eriogonum ovalifolium	5	-	-	-	-	-	-	-	-
F	Lappula occidentalis (a)	-	5	-	2	-	.02	-	.00	-
F	Machaeranthera grindelioides	$_{b}$15	$_{ab}$4	$_{a}$1	$_{a}$3	$_{a}$-	.01	.00	.00	-
F	Ranunculus testiculatus (a)	-	-	-	-	2	-	-	-	.00
F	Salsola iberica (a)	-	-	-	2	-	-	-	.00	-
Total for Annual Forbs		0	55	0	17	2	0.15	0	0.09	0.00
Total for Perennial Forbs		21	4	1	3	0	0.01	0.00	0.00	0
Total for Forbs		21	59	1	20	2	0.16	0.00	0.10	0.00

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

BROWSE TRENDS--
Management unit 13A, Study no: 8

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	78	75	77	78	14.63	11.89	13.28	12.17
B	Gutierrezia sarothrae	0	0	1	3	-	-	.00	.00
B	Opuntia sp.	2	1	1	1	.38	.00	.00	.00
Total for Browse		80	76	79	82	15.01	11.89	13.28	12.17

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 8

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	18.51	13.98

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 8

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.2	0.9

BASIC COVER--
Management unit 13A, Study no: 8

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	7.00	20.77	16.72	23.32	17.06
Rock	0	.05	0	.01	.01
Pavement	0	.12	.28	.16	.16
Litter	40.50	29.28	15.99	25.09	23.64
Cryptogams	.75	.41	1.38	3.13	.89
Bare Ground	51.75	54.25	60.84	61.64	62.18

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 8, Study Name: Black Ridge

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.7	7.5	56.9	19.8	23.3	10.4	5.8	19.2	0.4

PELLET GROUP DATA--
Management unit 13A, Study no: 8

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	59	17	12	50
Elk	-	-	1	3
Deer	45	29	24	30
Cattle	-	-	-	8

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	3 (8)	3 (7)
94 (232)	63 (155)	23 (58)
20 (49)	1 (4)	21 (52)

BROWSE CHARACTERISTICS--
Management unit 13A, Study no: 8

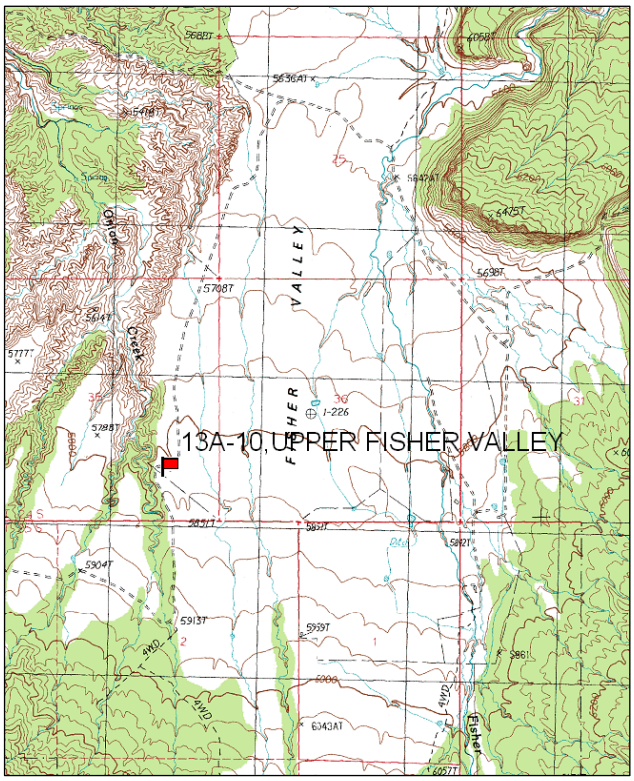
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis									
87	**7831**	71	25	3	2833	38	12	1	23/33
94	**4180**	6	70	24	1060	16	4	18	19/32
99	**3300**	4	83	13	-	55	42	4	19/30
04	**2880**	1	76	22	-	44	52	9	18/32
09	**3700**	1	64	35	-	34	55	9	18/33
Atriplex canescens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	16/24
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Ephedra viridis									
87	**33**	0	100	-	-	100	0	0	20/22
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	41/38
09	**0**	0	0	-	-	0	0	0	37/35
Gutierrezia sarothrae									
87	**66**	50	50	-	33	0	0	0	12/13
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	100	0	-	-	0	0	0	-/-
09	**60**	0	100	-	-	0	0	0	7/9
Opuntia sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**60**	0	100	-	-	0	0	0	5/25
99	**20**	0	100	-	-	0	0	0	5/5
04	**20**	0	100	-	-	0	0	0	4/6
09	**40**	0	100	-	-	0	0	0	6/10
Sclerocactus sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	2/3
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	2/3

UPPER FISHER VALLEY - TREND STUDY NO. 13A-10-09

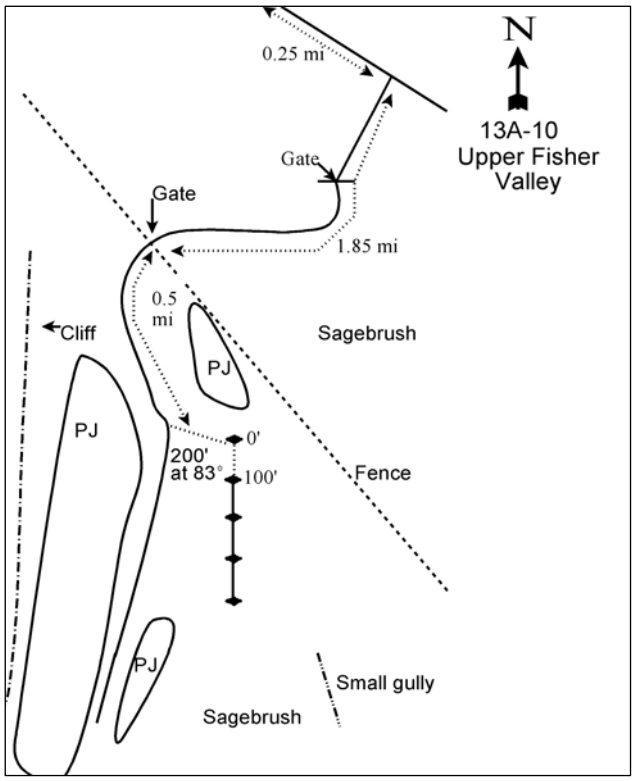
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Upland Loam (Basin Big Sagebrush), R035XY306UT
Land Ownership: BLM
Elevation: 5,800 ft (1,768 m)
Aspect: Flat
Slope: 0%-4%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
Leaving Moab on Route 128, drive northeast 0.1 miles past mile marker 20 (about 5 miles past the Castle Valley turnoff), and turn right onto the Fisher Valley Road. Go 8.7 miles up Onion Creek to a gate at the edge of the valley. Continue 0.25 miles to a dirt road that forks off to the right. Turn here and go 0.85 miles across an annual grass flat to a gate. Continue 1 mile to another fence. Go through the gate and 0.05 miles. The transect is located on the east side of the road about 200 feet out in the sagebrush. Study markers are l-foot tall green fence posts. The 0-foot baseline stake is tagged #7861.

Map Name: Fisher Valley



Diagrammatic Sketch:



Township: 24S, Range: 24E, Section: 35

GPS: NAD 83, UTM 12S 653290 E 4281537 N

UPPER FISHER VALLEY - TREND STUDY NO. 13A-10

Site Information

Site Description: The study is located along the rim of Onion Creek in Upper Fisher Valley. This area is managed by the BLM and is part of the Fisher Valley grazing allotment. Much of the pinyon-juniper woodlands and sagebrush communities in this valley have been historically treated and seeded. The particular area of this study was two-way chained in 1960 and seeded to crested wheatgrass (*Agropyron cristatum*). Pellet group data has estimated decreasing deer use on the site since 1999 with only minimal elk use measured in one year. Cattle use on the site has been estimated to be moderately heavy (Table - Pellet Group Data).

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the dominant browse species on the site. Sagebrush has provided an average of 14% cover since 1994, but has decreased in cover over the same period (Table - Browse Trends). Density of sagebrush has also declined steadily since the outset of the study in 1987. Decadence of sagebrush has increased over the span of the study, but is still considered to be good. Recruitment of young sagebrush has decreased since 1987, with no young plants sampled in 2009. Browse use has been mostly moderate with some heavy browsing occurring (Table - Browse Characteristics).

Broom snakeweed (*Gutierrezia sarothrae*) is present on the site with fluctuating cover and density over the sample years (Tables - Browse Trends and Browse Characterization). There are also a few large, mature Utah juniper (*Juniperus osteosperma*) trees established on the flat.

Herbaceous Understory: A fair stand of crested wheatgrass was established, but has diminished over the years. Most crested wheatgrass plants are found growing near or under sagebrush. Sandberg bluegrass (*Poa secunda*) is the dominant grass, providing the most cover. Other common grasses include galleta (*Hilaria jamesii*), bottlebrush squirreltail (*Sitanion hystrix*), and cheatgrass (*Bromus tectorum*). Forbs are an insignificant source of forage on this site. There are several small species present, none of which are very abundant or provide significant cover (Table - Herbaceous Trends).

Soil: The soil is a reddish-brown sandy clay loam with an effective rooting depth of almost 14 inches. Soil pH is neutral (6.8), and phosphorous has marginal availability for plant growth and development at 7.8 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The soil is not rocky, but appears to have a carbonate layer at approximately 8-10 inches below the surface. Bare ground cover is high on this site occurring mostly in the interspaces of shrubs. Litter cover is good, but found mainly under shrubs (Table - Basic Cover). There are two well-defined natural gullies east of the transect that are still active. Due to the levelness of the terrain, erosion is not a serious problem, although there is some pedestaling of the grasses and some soil movement in the large bare interspaces. The soil erosion condition classification was rated as slight in 2004 and stable in 2009.

Trend Assessments

Browse:

- **1987 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 decadence and vigor of the sagebrush population, though recruitment of young plants decreased markedly.
- **1994 to 1999 - down (-2):** Density of sagebrush decreased by 19% to 5,040 plants/acre, and cover decreased from 16% to 14%. Decadence and vigor of sagebrush improved slightly. Recruitment of young sagebrush plants continued to decrease.
- **1999 to 2004 - down (-2):** Density of sagebrush decreased again by 19% to 4,060 plants/acre, though cover remained similar. There was an increase in sagebrush decadence from 7% to 23%. There was no new recruitment of young sagebrush plants.
- **2004 to 2009 - slightly down (-1):** Density of sagebrush decreased by 12% to 3,560 plants/acre, and cover decreased to 12%. Recruitment of young sagebrush plants remained poor.

Grass:

- **1987 to 1994 - stable (0):** There was little change in grasses on this site.
- **1994 to 1999 - stable (0):** There was little change in grasses on this site.
- **1999 to 2004 - stable (0):** There has been a general decrease in the sum of nested frequency of perennial grasses since 1994, but cover has increased over the same period.
- **2004 to 2009 - stable (0):** There was little change in grasses on this site.

Forb:

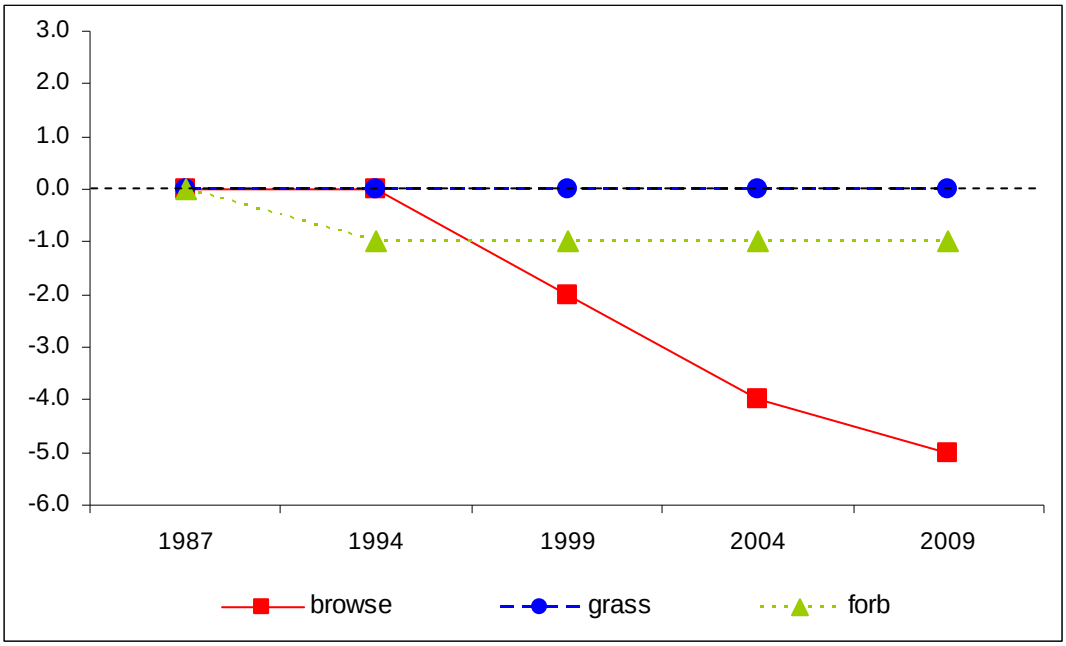
- **1987 to 1994 - slightly down (-1):** Forbs are very rare on this site. There was a decrease in the sum of nested frequency of perennial forbs.
- **1994 to 1999 - stable (0):** There was little change in forbs on this site.
- **1999 to 2004 - stable (0):** There was little change in forbs on this site.
- **2004 to 2009 - stable (0):** There was little change in forbs on this site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13A, study no: 10

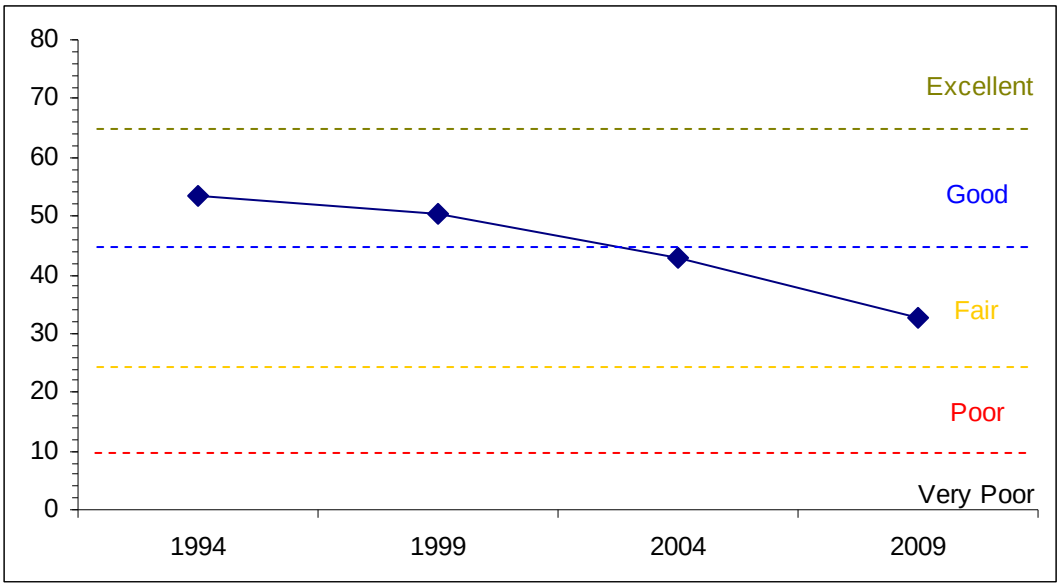
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	20	12	6	14	-1	2	0	**53**	Good
99	17	13	3	17	-1	2	0	**50**	Good
04	17	8	0	17	-1	1	0	**43**	Fair
09	15	7	0	16	-6	1	0	**33**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 10



DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 13A, Study no: 10



HERBACEOUS TRENDS--
Management unit 13A, Study no: 10

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	a63	b105	a72	ab75	ab94	2.48	.65	1.85	2.24
G	Agropyron intermedium	-	-	7	-	-	-	.04	-	-
G	Bouteloua gracilis	a-	a-	a7	b17	a2	-	.04	.18	.00
G	Bromus tectorum (a)	-	106	104	94	92	.88	.38	1.01	.56
G	Hilaria jamesii	b94	b93	ab79	ab75	a51	.96	.80	.98	.48
G	Poa secunda	ab224	bc246	c256	a174	ab229	3.77	6.50	4.48	5.03
G	Sitanion hystrix	ab24	a6	a7	b45	a12	.01	.21	1.02	.25
G	Sporobolus cryptandrus	-	-	-	3	-	-	-	.03	-
G	Stipa comata	7	-	-	-	5	-	-	-	.06
G	Vulpia octoflora (a)	-	b76	b61	a8	a-	.16	.55	.04	-
Total for Annual Grasses		0	182	165	102	92	1.03	0.94	1.06	0.56
Total for Perennial Grasses		412	450	428	389	393	7.23	8.25	8.55	8.07
Total for Grasses		412	632	593	491	485	8.27	9.19	9.61	8.64
F	Astragalus amphioxys	7	4	-	-	-	.01	-	-	-
F	Calochortus nuttallii	1	-	-	-	6	-	-	-	.01
F	Chenopodium fremontii (a)	-	-	-	3	-	-	-	.00	-
F	Cruciferae	1	-	-	-	-	-	-	-	-
F	Draba reptans (a)	-	b22	ab9	a-	a-	.04	.02	.00	-
F	Erigeron pumilus	6	10	12	1	6	.02	.05	.03	.06
F	Gilia sp. (a)	-	5	-	-	-	.01	-	-	-
F	Lesquerella sp.	-	-	1	-	-	-	.00	-	-
F	Leucelene ericoides	-	1	2	1	-	.00	.03	.03	-
F	Oenothera albicaulis (a)	1	-	-	-	-	-	-	-	-
F	Phlox austromontana	a21	ab21	b31	ab21	ab28	.81	.65	.27	.44

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
F	Phlox longifolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$18	$_{a}$4	-	-	.13	.03
F	Ranunculus testiculatus (a)	-	$_{b}$14	$_{a}$-	$_{a}$-	$_{a}$1	.05	-	-	.00
F	Sphaeralcea coccinea	$_{b}$62	$_{a}$22	$_{a}$5	$_{a}$6	$_{a}$7	.05	.01	.09	.02
F	Tragopogon dubius	4	-	-	-	-	-	-	-	-
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		1	41	9	3	1	0.10	0.01	0.00	0.00
Total for Perennial Forbs		103	58	51	47	51	0.90	0.75	0.56	0.56
Total for Forbs		104	99	60	50	52	1.01	0.77	0.57	0.57

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

BROWSE TRENDS--
Management unit 13A, Study no: 10

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	85	78	83	77	15.69	13.69	13.94	11.82
B	Atriplex canescens	0	1	0	0	-	.00	-	-
B	Gutierrezia sarothrae	78	86	95	74	.85	3.98	4.90	2.91
B	Juniperus osteosperma	0	1	2	2	.88	.66	1.85	1.23
B	Opuntia sp.	0	0	4	4	-	-	.00	.03
B	Pinus edulis	0	0	1	1	-	-	.00	.00
Total for Browse		163	166	185	158	17.43	18.34	20.69	16.00

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 10

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata wyomingensis	-	19.25	18.68
Gutierrezia sarothrae	-	5.06	2.29
Juniperus osteosperma	.40	1.04	1.60

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 10

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.3	0.7

BASIC COVER--
Management unit 13A, Study no: 10

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	8.00	23.64	25.24	34.15	28.52
Rock	0	.00	0	0	0
Pavement	0	.00	.00	.00	0
Litter	32.25	24.45	17.47	21.12	32.85
Cryptogams	1.00	1.28	10.75	5.93	1.01
Bare Ground	58.75	57.47	48.54	49.90	47.62

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 10, Study Name: Upper Fisher Valley

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.9	6.8	58.9	15.8	25.3	1.6	7.8	73.6	0.4

PELLET GROUP DATA--
Management unit 13A, Study no: 10

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	68	30	18	34
Elk	-	-	-	-
Deer	53	28	25	6
Cattle	1	11	5	10

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	7 (17)	-
40 (99)	23 (56)	13 (31)
26 (64)	26 (64)	38 (93)

BROWSE CHARACTERISTICS--
Management unit 13A, 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 tridentata wyomingensis									
87	**6331**	51	43	6	3133	40	1	2	21/25
94	**6220**	12	79	9	1360	7	0	11	17/27
99	**5040**	6	88	7	-	47	5	4	22/34
04	**4060**	0	77	23	-	60	12	9	19/30
09	**3560**	0	72	28	60	56	29	16	17/27
Atriplex canescens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	43/66
99	**100**	0	100	-	-	100	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	17/26

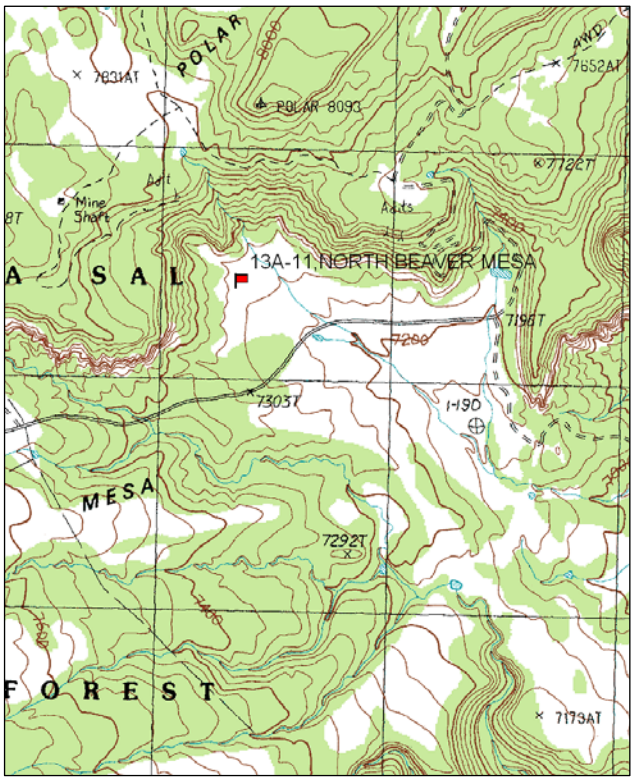
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
87	**13198**	40	57	4	2599	.50	1	2	11/9
94	**5720**	17	82	1	420	.34	0	.69	7/7
99	**13220**	29	68	2	60	0	0	1	10/10
04	**20340**	8	92	0	620	0	.19	.09	8/9
09	**4880**	2	59	39	20	0	0	28	7/7
Juniperus osteosperma									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	20	0	0	0	-/-
04	**60**	67	33	-	-	33	0	0	-/-
09	**80**	75	25	-	-	0	0	25	-/-
Opuntia sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	6/16
99	**0**	0	0	-	-	0	0	0	9/12
04	**80**	50	50	-	-	25	0	0	7/22
09	**80**	0	100	-	-	0	0	0	6/13
Pediocactus simpsonii									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	5/4
Pinus edulis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	20	0	0	0	-/-
04	**20**	100	0	-	-	0	0	0	-/-
09	**20**	100	0	-	-	0	0	0	-/-

NORTH BEAVER MESA - TREND STUDY NO. 13A-11-09

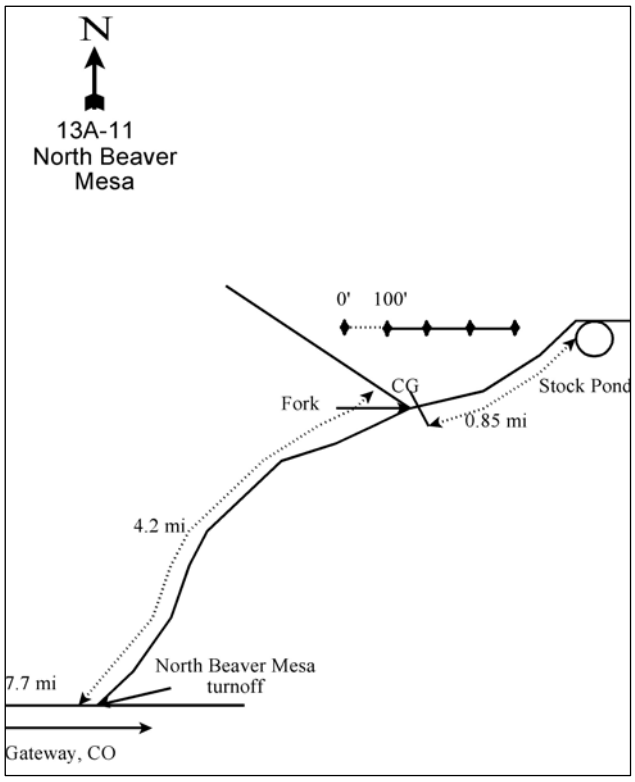
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Shallow Hardpan (Pinyon-Utah Juniper), R035XY316UT
Land Ownership: US Forest Service
Elevation: 7,300 ft (2,225 m)
Aspect: Southeast
Slope: 5%
Transect bearing: 133 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From the intersection of the La Sal Mountain Loop and Gateway roads, travel east towards Gateway, Colorado for 7.7 miles to the North Beaver Mesa turnoff. Turn left and go 4.2 miles to the Polar Mesa/Fisher Valley Road. Continue straight through this fork, over a cattleguard and 0.85 miles to a stockpond at the head of a large sagebrush valley. The transect is located to the west (300 yards away @ 284°M) towards an alcove. It is marked by l-foot tall fence posts. The 0-foot baseline stake is furthest away and is tagged #7842.

Map Name: Fisher Valley



Diagrammatic Sketch:



Township: 25S, Range: 25E, Section: 10

GPS: NAD 83, UTM 12S 661264 E 4279597 N

NORTH BEAVER MESA - TREND STUDY NO. 13A-11

Site Information

Site Description: The study is in an area on the northeast side of the La Sal Mountains that receives a considerable amount of winter elk use. In 1962, 1,000 acres within the allotment were chained or contour trenched and seeded. A roller-chopper was used to retreat other parts of the allotment in 1985 and 1987, but did not include the study site. The study is located in the upper part of a large sagebrush valley, where the only evidence of vegetative treatments is the partially filled-in contoured trenches and presence of seeded species. The area is administered by the BLM as part of the Beaver allotment with cattle grazing in the spring and fall. Pellet group data has estimated heavy to very heavy use by elk since 1999. Deer use has decreased from moderate use in 1999 to very light use in 2009. Cattle use has ranged from light to moderate on the site since 1999 (Table - Pellet Group Data).

Browse: The key browse on this site is Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) which has provided an average of 18% cover since 1994. However, cover of sagebrush has decreased since 1994 (Table - Browse Trends). Density of sagebrush has averaged about 6,700 plants/acre since 1994, and decadence and vigor have been good over that same period. Recruitment of young sagebrush plants has fluctuated over the sample years, but is currently good. Browse use has been mostly moderate on sagebrush (Table - Browse Characteristics).

Pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and Gambel oak (*Quercus gambelii*) dominate the surrounding slopes. Except for a few trees and clusters, they are not abundant in the sagebrush dominated valley bottoms. However, it appears that pinyon is increasing in density on the site (Table - Point-Quarter Tree Data). Other preferred browse that is found on and around the site in limited numbers include Utah serviceberry (*Amelanchier utahensis*), fourwing saltbush (*Atriplex canescens*), and slender bush eriogonum (*Eriogonum microthecum*).

Herbaceous Understory: Since this is elk range, the grass component is especially important. The dominant grass on the site is the seeded species crested wheatgrass (*Agropyron cristatum*), providing almost all of the grass cover on the site. Other perennial grasses are rare on the site. There is a small component of cheatgrass (*Bromus tectorum*) on the site (Table - Herbaceous Trends).

Forbs have good diversity, but provide limited cover on the site. Cover and frequency of perennial forbs has decreased steadily since 1994. The most common forb is hairy goldaster (*Heterotheca villosa*). There are also randomly scattered patches of alfalfa (*Medicago sativa*) which were seldom picked up in the sampling design (Table - Herbaceous Trends).

Soil: The soil is a reddish-brown, sandy loam with an effective rooting depth of 15 inches. The soil is neutral to slightly alkaline (7.4 pH). In contrast, to the east and west of the contour trenches, there are some natural gullies, especially further down in the valley. The trenches unquestionably help to slow down water and soil movement. These water and soil catchments also support the greatest grass cover. The soil erosion condition classification was rated as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1987 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 decadence or vigor of the sagebrush population. Recruitment of young sagebrush plants remained very good.
- **1994 to 1999 - slightly up (+1):** Density of sagebrush increased by 34% to 8,200 plants/acre, though cover decreased from 24% to 19%. Most of the change in density is from the recruitment of young

sagebrush plants which comprised 22% of the population. Many of these plants may not survive to maturity.

- **1999 to 2004 - slightly down (-1):** Density of sagebrush decreased by 28% to 5,900 plants/acre, and cover decreased to 15%. Most of the decrease in density came from the loss of young plants as the density of mature plants actually increased. Recruitment of young sagebrush plants comprised only 1% of the population.
- **2004 to 2009 - slightly up (+1):** Density of sagebrush increased by 10% to 6,480 plants/acre with little change in cover. Recruitment of young sagebrush plants increased to 12% of the population.

Grass:

- **1987 to 1994 - stable (0):** There was a slight change in the composition of grasses with a significant increase in nested frequency of intermediate wheatgrass (*Agropyron intermedium*) and a significant decrease in nested frequency of crested wheatgrass. There was little change in the sum of nested frequency of perennial grasses.
- **1994 to 1999 - slightly up (+1):** Sum of nested frequency of perennial grasses increased by 16%, and cover increased from 10% to 14%. The nested frequency of crested wheatgrass increased significantly.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 19%, and cover decreased slightly to 13%. There was a significant decrease in the nested frequency of intermediate wheatgrass.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 11%, and cover increased to 18%.

Forb:

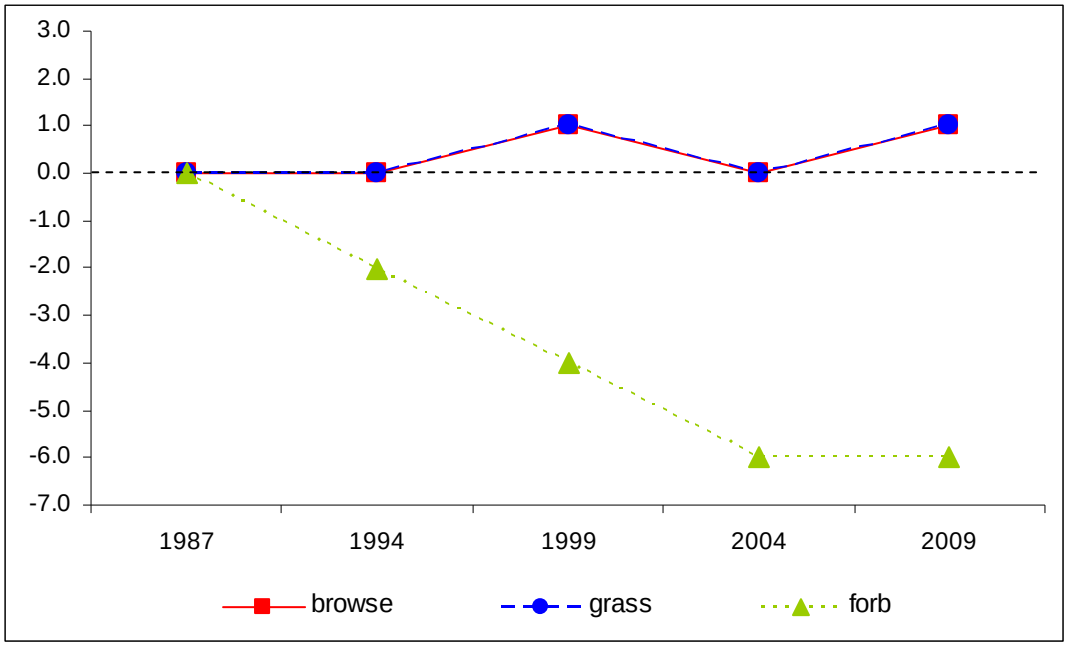
- **1987 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased by 33%. There was a significant decrease in the nested frequency of the dominant forb hairy goldaster.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 29% with a slight decrease in cover.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs continued to decrease by 44%, and cover decreased from 4% to 3%. There was a significant decrease in the nested frequency of the dominant forb hairy goldaster.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover decreased slightly.

DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13A, study no: 11

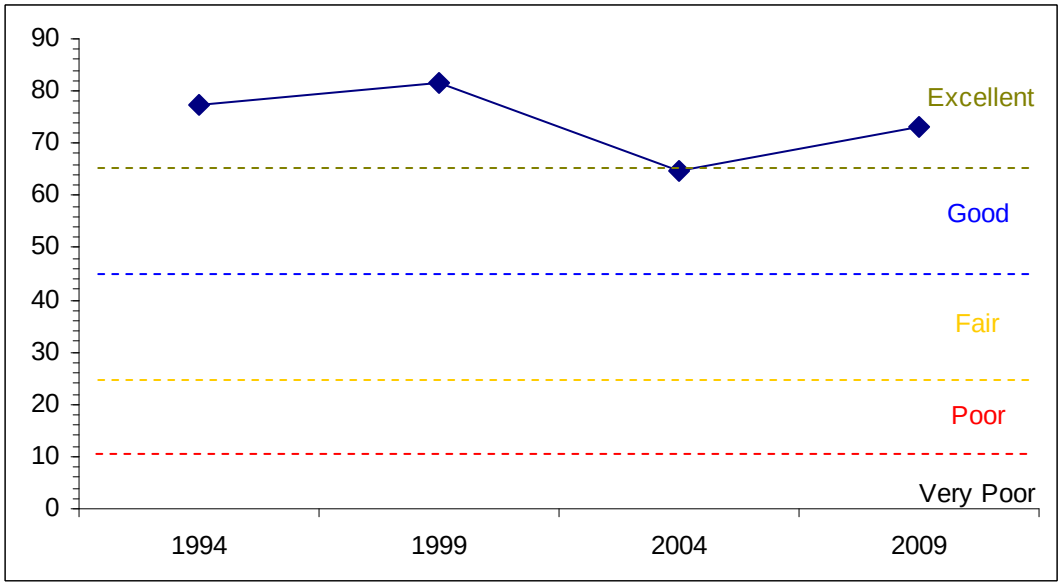
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	30	12	9	19	-1	9	0	**77**	Excellent
99	26	10	11	28	0	8	0	**82**	Excellent
04	20	11	2	26	0	6	0	**65**	Good
09	20	12	6	30	0	4	0	**73**	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 11



DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 13A, Study no: 11



HERBACEOUS TRENDS--
Management unit 13A, Study no: 11

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{b}$258	$_{a}$232	$_{b}$291	$_{b}$259	$_{b}$283	7.13	12.09	11.28	16.77
G	Agropyron intermedium	$_{a}$41	$_{b}$67	$_{b}$70	$_{a}$34	$_{a}$31	1.58	1.15	1.12	.68
G	Bouteloua gracilis	5	8	5	3	6	.33	.30	.15	.06
G	Bromus inermis	24	13	14	16	22	.36	.24	.25	.46
G	Bromus tectorum (a)	-	42	36	37	24	1.66	.52	.26	.13
G	Sporobolus cryptandrus	$_{a}$-	$_{b}$10	$_{a}$4	$_{a}$-	$_{a}$4	.08	.01	-	.03
G	Stipa comata	-	6	4	4	4	.01	.18	.18	.15
G	Vulpia octoflora (a)	-	2	-	-	-	.00	-	-	-
Total for Annual Grasses		0	44	36	37	24	1.66	0.52	0.26	0.13
Total for Perennial Grasses		328	336	388	316	350	9.50	13.98	13.00	18.17
Total for Grasses		328	380	424	353	374	11.16	14.51	13.26	18.31
F	Alyssum sp. (a)	-	3	-	-	-	.00	-	-	-
F	Arabis sp.	-	1	-	-	3	.00	-	-	.00
F	Artemisia ludoviciana	-	9	3	-	-	.18	.03	-	-
F	Aster sp.	-	-	5	-	3	-	.01	-	.00
F	Astragalus convallarius	8	16	12	22	24	.36	.07	.88	.31
F	Astragalus sp.	8	7	6	10	1	.02	.01	.08	.00
F	Calochortus nuttallii	1	-	-	-	-	-	-	-	-
F	Castilleja linariaefolia	-	-	2	-	-	-	.00	-	-
F	Chenopodium album (a)	-	-	-	3	3	-	-	.01	.06
F	Cruciferae	$_{b}$28	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
F	Delphinium nuttallianum	1	-	-	-	-	-	-	-	-
F	Draba reptans (a)	-	4	1	2	-	.01	.00	.03	-
F	Erigeron pumilus	$_{b}$25	$_{ab}$14	$_{b}$18	$_{a}$-	$_{a}$1	.06	.19	.03	.03
F	Eriogonum cernuum (a)	-	2	-	-	-	.00	-	-	-
F	Eriogonum racemosum	27	47	39	34	29	.30	.69	.66	.30
F	Euphorbia sp.	1	-	-	-	-	-	-	-	-
F	Fritillaria atropurpurea	$_{a}$-	$_{b}$10	$_{a}$-	$_{a}$-	$_{a}$-	.02	-	-	-
F	Gayophytum ramosissimum(a)	-	3	-	-	-	.01	-	-	-
F	Heterotheca villosa	$_{c}$214	$_{b}$102	$_{b}$78	$_{a}$26	$_{a}$28	2.76	2.44	.28	.92
F	Lactuca serriola	4	-	-	-	-	-	-	-	-
F	Lepidium densiflorum (a)	-	3	-	-	-	.00	-	-	-
F	Lesquerella ludoviciana	3	2	3	1	-	.01	.00	.00	-
F	Lithospermum ruderale	$_{a}$-	$_{b}$14	$_{a}$-	$_{a}$-	$_{a}$-	.20	-	-	-
F	Machaeranthera canescens	$_{ab}$15	$_{b}$26	$_{ab}$16	$_{ab}$5	$_{a}$4	.05	.31	.04	.06
F	Medicago sativa	-	10	4	10	8	.42	.18	.69	.23
F	Microsteris gracilis (a)	-	$_{ab}$29	$_{a}$17	$_{b}$50	$_{ab}$36	.06	.03	.27	.14
F	Oenothera coronopifolia	$_{c}$39	$_{b}$11	$_{a}$-	$_{a}$-	$_{a}$-	.03	-	-	-
F	Oxybaphus linearis	-	1	-	-	-	.00	-	-	-
F	Petradoria pumila	1	-	-	-	-	-	-	-	-
F	Phlox longifolia	9	4	6	2	8	.01	.03	.01	.04
F	Polygonum douglasii (a)	-	$_{a}$1	$_{a}$8	$_{b}$31	$_{a}$6	.00	.01	.15	.02
F	Ranunculus testiculatus (a)	-	$_{a}$-	$_{a}$-	$_{a}$4	$_{b}$14	-	-	.01	.10

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
F	Senecio multilobatus	3	-	-	-	-	-	-	-	-
F	Sphaeralcea coccinea	11	12	13	5	6	.05	.14	.18	.18
F	Stellaria jamesiana	-	-	-	-	3	-	-	-	.03
F	Tragopogon dubius	$_{b}$17	$_{a}$4	$_{a}$-	$_{a}$-	$_{a}$1	.01	-	-	.03
F	Trifolium sp.	4	-	-	-	-	-	-	-	-
F	Unknown forb-perennial	$_{b}$11	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
Total for Annual Forbs		0	45	26	90	59	0.11	0.05	0.47	0.32
Total for Perennial Forbs		430	290	205	115	119	4.54	4.13	2.87	2.16
Total for Forbs		430	335	231	205	178	4.65	4.19	3.34	2.49

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

BROWSE TRENDS--
Management unit 13A, Study no: 11

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	5	3	0	1	.15	.03	-	.00
B	Artemisia frigida	2	4	1	1	.00	.00	.00	.00
B	Artemisia tridentata wyomingensis	77	96	93	94	23.59	19.26	14.63	15.20
B	Atriplex canescens	2	2	2	1	.00	.15	.15	.03
B	Ceratoides lanata	0	0	1	0	-	-	.00	-
B	Chrysothamnus nauseosus	8	6	3	4	.49	.24	.18	.68
B	Eriogonum microthecum	11	14	13	11	.21	.25	.36	.28
B	Gutierrezia sarothrae	30	14	26	28	1.81	.57	2.15	.64
B	Juniperus osteosperma	0	0	0	0	-	-	-	.03
B	Opuntia sp.	8	6	14	18	.11	.09	.21	.49
B	Pinus edulis	0	4	5	4	.53	2.07	1.85	.98
B	Quercus gambelii	0	0	1	1	.85	-	.85	.85
B	Symphoricarpos oreophilus	0	0	2	0	-	-	.00	-
Total for Browse		143	149	161	163	27.76	22.68	20.40	19.19

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 11

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	-	.25
Artemisia tridentata wyomingensis	-	20.91	23.98
Atriplex canescens	-	-	.30
Chrysothamnus nauseosus	-	.61	.60
Eriogonum microthecum	-	.28	.26
Gutierrezia sarothrae	-	2.11	1.14
Juniperus osteosperma	-	-	.06
Opuntia sp.	-	.50	.08
Pinus edulis	.80	2.73	1.63
Quercus gambelii	.40	.60	.56

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 11

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.8	1.0
Ceratoides lanata	3.5	-

POINT-QUARTER TREE DATA--
Management unit 13A, Study no: 11

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	23	26	24
Pinus edulis	42	53	72

Average diameter (in)		
'99	'04	'09
6.8	3.2	4.3
1.3	2.1	2.0

BASIC COVER--
Management unit 13A, Study no: 11

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	15.75	40.55	40.91	38.89	39.02
Rock	0	.15	.15	.15	.15
Pavement	0	.42	.11	.02	.03
Litter	43.50	41.52	40.15	43.83	54.77
Cryptogams	3.50	1.58	3.35	2.40	2.57
Bare Ground	37.25	30.21	29.78	30.00	23.43

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 11, Study Name: North Beaver Mesa

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.1	7.4	70.9	11.8	17.3	1.6	8.9	92.8	0.4

PELLET GROUP DATA--
Management unit 13A, Study no: 11

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	19	5	17	13
Horse	-	1	-	-
Elk	55	52	51	30
Deer	26	20	12	6
Cattle	-	5	-	6

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (2)	-	-
155 (383)	102 (251)	77 (190)
46 (114)	3 (7)	1 (3)
17 (42)	7 (18)	27 (66)

BROWSE CHARACTERISTICS--
Management unit 13A, Study no: 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)
Amelanchier utahensis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**100**	60	40	-	-	0	20	0	15/11
99	**60**	100	0	-	-	0	0	0	36/34
04	**0**	0	0	-	-	0	0	0	17/15
09	**20**	0	100	-	-	100	0	0	28/24
Artemisia frigida									
87	**599**	100	0	-	66	0	11	0	-/-
94	**100**	0	100	-	-	0	0	0	8/9
99	**100**	0	100	-	-	0	0	0	10/5
04	**20**	0	100	-	-	0	0	0	14/10
09	**20**	0	100	-	-	0	0	0	13/13
Artemisia tridentata wyomingensis									
87	**10332**	49	32	19	733	38	4	2	19/22
94	**6140**	18	70	12	2340	31	4	11	16/28
99	**8200**	22	59	19	460	52	10	5	24/36
04	**5900**	1	87	12	-	45	19	6	18/26
09	**6480**	12	78	9	40	30	10	4	20/29
Atriplex canescens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**60**	33	67	-	-	67	0	0	16/19
99	**80**	75	25	-	-	25	0	0	20/15
04	**40**	0	100	-	-	0	100	0	20/14
09	**60**	0	100	-	-	0	0	0	18/19
Ceratoides lanata									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	100	0	14/4
09	**0**	0	0	-	-	0	0	0	7/4

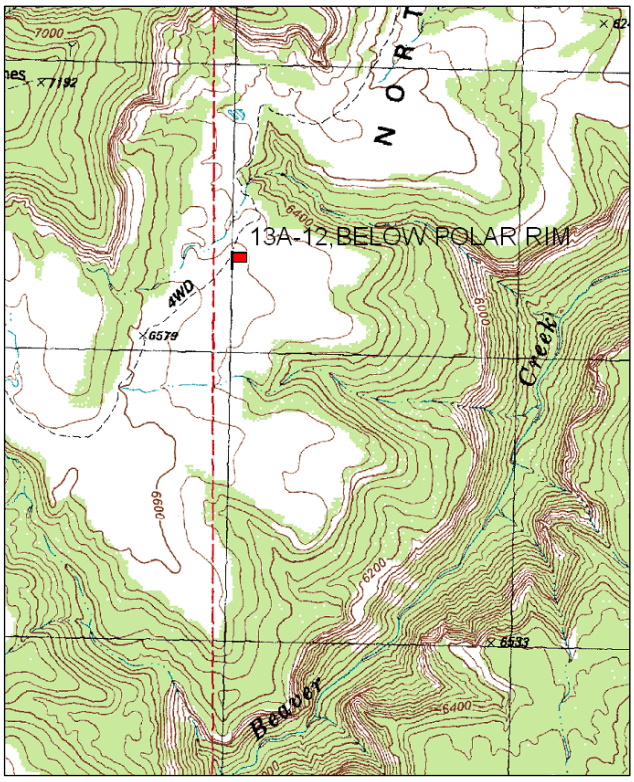
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus									
87	**331**	20	60	20	-	20	20	40	34/25
94	**240**	25	67	8	20	0	0	17	29/26
99	**200**	40	40	20	-	0	0	0	20/32
04	**100**	0	80	20	-	0	0	0	20/20
09	**100**	0	80	20	-	0	0	20	28/33
Eriogonum microthecum									
87	**599**	100	0	0	-	0	0	0	-/-
94	**620**	23	77	0	60	13	0	0	11/8
99	**540**	15	78	7	-	7	19	0	7/6
04	**380**	0	95	5	-	11	37	5	10/8
09	**440**	14	86	0	20	0	0	0	12/10
Gutierrezia sarothrae									
87	**665**	90	10	0	-	0	0	0	6/5
94	**1820**	8	91	1	400	0	0	1	10/11
99	**1200**	13	87	0	-	50	0	0	8/8
04	**1540**	0	100	0	-	0	0	0	10/12
09	**2220**	4	95	2	-	0	0	2	7/10
Opuntia sp.									
87	**266**	0	100	0	66	0	0	50	4/14
94	**280**	0	100	0	-	0	0	0	4/9
99	**160**	38	63	0	-	0	0	0	5/13
04	**460**	0	100	0	-	0	0	0	5/15
09	**560**	7	89	4	20	0	0	11	4/10
Pinus edulis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**80**	75	25	-	20	0	0	0	-/-
04	**100**	80	20	-	-	0	0	0	-/-
09	**80**	75	25	-	20	0	0	0	-/-
Quercus gambelii									
87	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**0**	0	0	0	-	0	0	0	-/-
04	**180**	56	22	22	-	22	0	22	29/28
09	**100**	20	80	0	-	0	0	0	-/-
Symphoricarpos oreophilus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**40**	50	50	-	-	0	0	0	13/17
09	**0**	0	0	-	-	0	0	0	-/-

BELOW POLAR RIM - TREND STUDY NO. 13A-12-09

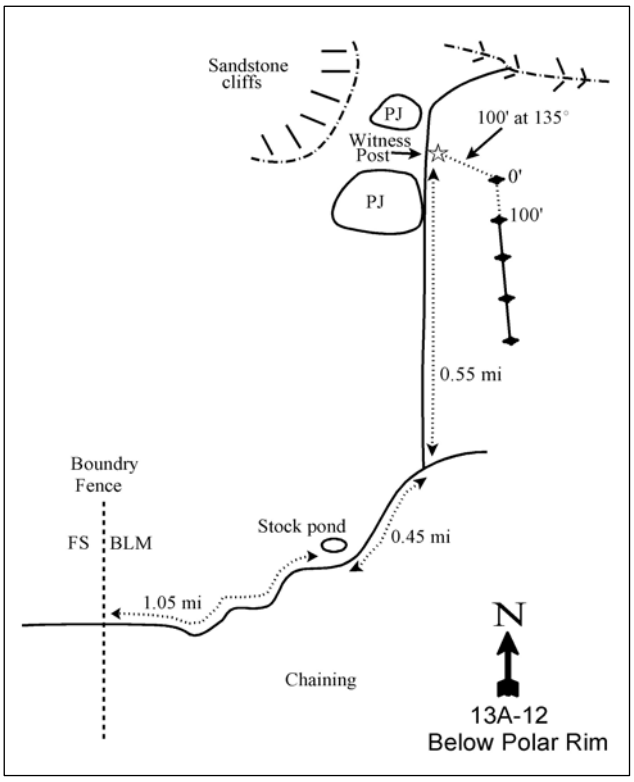
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 6,500 ft (1,981 m)
Aspect: Southeast
Slope: 5%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From the intersection of La Sal Mountain Loop and Gateway roads, travel east towards Gateway, Colorado for 7.7 miles to the North Beaver Mesa turnoff. Turn left and go 4.2 miles to the Polar Mesa/Fisher Valley road. Continue straight through this fork, over a cattleguard and 0.85 miles to a stockpond and study 13A-12-87. Continue 0.45 miles to a fork by another stockpond. Turn right, go 0.35 miles to an intersection. Turn left and proceed 0.6 miles to a boundary fence. Continue on the road 1.05 miles, winding through the large chaining, to a stock pond. Cross the pond and continue 0.45 miles to a fork. Keep left on the main road and continue 0.55 miles to a fence post on the right side of the road. The 0-foot baseline stake, tagged #7857, is 100 feet away at 85°M.

Map Name: Dolores Point North



Diagrammatic Sketch:



Township: 25S, Range: 25E, Section: 1

GPS: NAD 83, UTM 12S 664940 E 4280500 N

Site Information

Site Description: The study is on a 1,540 acre treatment on lower Beaver Mesa that was two-way-chained and seeded in 1969. This BLM land is part of the Taylor allotment and is grazed by cattle from winter to spring. Pellet group data shows estimated elk use to have declined from high use in 1999 to light to moderate use in 2009. Estimated deer use has been light to moderate since 1999. Estimated cattle use on the site has also decreased from high use in 1999 to more light to moderate use in 2009 (Table - Pellet Group Data).

Browse: The key browse species on this chaining is Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) providing an average cover of 12% since 1994. Cover of big sagebrush has increased in that same time span (Table - Browse Trends). The density of big sagebrush was very high early in the study, but it appears the population went through a period of self thinning. Decadence and vigor of sagebrush have been good over the duration of the study. Recruitment of young sagebrush plants has fluctuated over sample years, but has been mostly good. Utilization of sagebrush is mostly moderate with some heavy use (Table - Browse Characterization).

There are a few scattered pinyon pine (*Pinus edulis*) trees on the site at low densities. Though point-quarter estimates do not show a decrease in density of pinyon between 2004 and 2009, there was a decrease in the average basal diameter of pinyon (Table - Point-Quarter Tree Data). The photo transect shows a die-off of some of the large pinyon trees on the site over these sample years. There are also a few scattered fourwing saltbush (*Atriplex canescens*) and green ephedra (*Ephedra veridis*) plants on the site.

Herbaceous Understory: The dominant grass on the site is the native warm season grass blue grama (*Bouteloua gracilis*). Sandberg bluegrass (*Poa secunda*) and the seeded species, crested wheatgrass (*Agropyron cristatum*), are the next most common grasses, and these three species provide the majority of grass cover on the site. Other fairly common grasses include needle-and-thread (*Stipa comata*) and cheatgrass (*Bromus tectorum*). Cover and frequency of perennial grasses has fluctuated over the sample years (Table - Herbaceous Trends).

Forbs were fairly diverse and abundant at the outset of the study, however, frequency and cover of forbs has declined drastically over the sample years. The most common forb is scarlet globemallow (*Sphlaeralcea coccinea*) (Table - Herbaceous Trends).

Soil: The soil is a sandy clay loam with a neutral reaction (pH 6.7) and an effective rooting depth is 15 inches. Percent organic matter is quite low (1.6 %) and amount of phosphorous in the soil has marginal availability to plant growth and development at 6.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover has stayed fairly consistent at an average of 41% since the outset of the study. The herbaceous species and litter provide some protective cover from erosion (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **198 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. Sagebrush decadence and vigor remained good in the population. Recruitment of young sagebrush plants decreased.
- **1994 to 1999 - slightly down (-1):** There may have been some identification problems between young and mature form classes on this site, with large fluctuations in density of both classes. The sagebrush population also appears to be maturing and going through a period of self thinning. Density of sagebrush decreased by 21% to 10,900 plants/acre, but cover increased from 10% to 12%. The

average height/crown of sagebrush also increased. Recruitment of young sagebrush plants increased markedly, and comprised 40% of the population.

- **1999 to 2004 - stable (0):** Though there was a large decrease in the total density of sagebrush plants, the density of mature sagebrush plants remained similar. Cover of sagebrush increased slightly to 13% with vigor and decadence remaining good in the population. Recruitment of young sagebrush plants was less than 1% of the population.
- **2004 to 2009 - slightly up (+1):** Density of sagebrush increased 16% to 7,640 plants/acre, and cover remained similar. Sagebrush decadence and vigor have remained good in the population, and recruitment of young sagebrush plants increased to 7% of the population.

Grass:

- **1987 to 1994 - 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 bottlebrush squirreltail (*Sitanion hystrix*).
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 19%, though cover increased slightly. There was a significant decrease in the nested frequency of needle-and-thread grass.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 23% and cover decreased from 17% to 10%. There was a significant decrease in the nested frequency of crested wheatgrass and needle-and-thread grass. Annual grass species frequency and cover have also decreased on the site.
- **2004 to 2009 - up (+2):** The sum of nested frequency and cover of perennial grasses increased to 1999 levels. Most of the increase came from the significant increase in nested frequency of Sandberg bluegrass.

Forb:

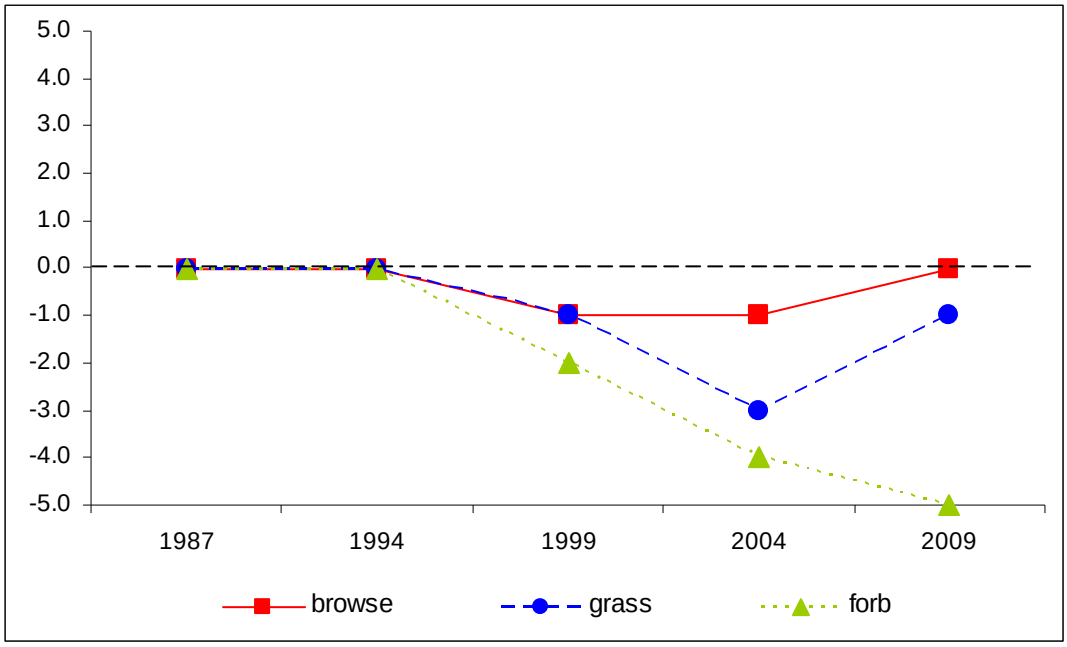
- **1987 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial forbs.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 37%, though cover increased slightly.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 47%, and cover decreased to 1%. There was a significant decrease in the nested frequency of scarlet globemallow.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 11% and cover decreased to less than 1%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13A, study no: 12

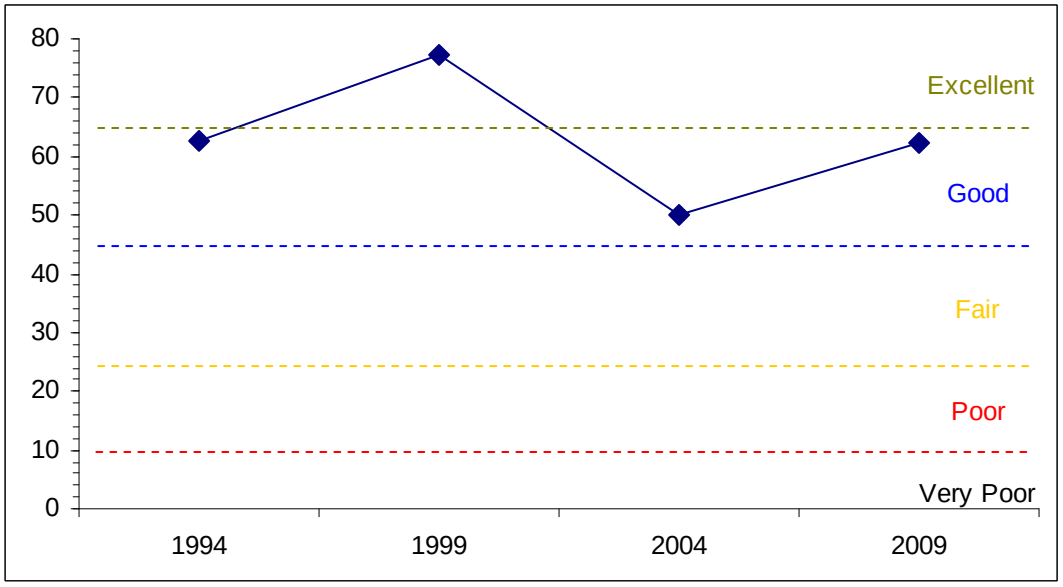
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	13.8	14.2	0.9	29.7	-0.6	4.7	0.0	**62.7**	Good
99	15.1	12.3	15.0	30.0	-1.4	6.1	0.0	**77.2**	Excellent
04	16.7	11.4	0.0	19.6	-0.1	2.5	0.0	**50.1**	Good
09	16.9	11.4	3.5	30.0	-0.4	0.9	0.0	**62.4**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 12



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 13A, Study no: 12



HERBACEOUS TRENDS--
Management unit 13A, Study no: 12

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{b}$139	$_{b}$145	$_{b}$126	$_{a}$56	$_{a}$77	3.17	3.07	.69	2.50
G	Bouteloua gracilis	212	177	201	202	222	6.89	9.97	6.67	8.28
G	Bromus tectorum (a)	-	53	40	22	26	.32	.50	.08	.33
G	Hilaria jamesii	$_{c}$22	$_{bc}$22	$_{abc}$13	$_{a}$-	$_{ab}$2	.09	.13	.00	.00
G	Poa secunda	$_{a}$104	$_{a}$112	$_{a}$92	$_{a}$125	$_{b}$213	.97	2.25	1.71	4.98
G	Sitanion hystrix	$_{b}$35	$_{a}$17	$_{a}$15	$_{a}$-	$_{a}$3	.08	.13	-	.03
G	Sporobolus cryptandrus	-	6	4	4	5	.18	.18	.04	.06
G	Stipa comata	$_{c}$183	$_{c}$201	$_{b}$101	$_{a}$38	$_{a}$39	3.44	1.04	.67	.53
G	Vulpia octoflora (a)	-	$_{c}$168	$_{b}$80	$_{a}$8	$_{a}$3	.44	1.30	.02	.15
Total for Annual Grasses		0	221	120	30	29	0.75	1.80	0.10	0.47
Total for Perennial Grasses		695	680	552	425	561	14.84	16.78	9.80	16.40
Total for Grasses		695	901	672	455	590	15.60	18.59	9.90	16.88
F	Astragalus cicer	$_{abc}$39	$_{c}$52	$_{bc}$43	$_{ab}$18	$_{a}$14	.24	.21	.18	.02
F	Astragalus convallarius	-	5	2	3	7	.01	.03	.00	.02
F	Calochortus nuttallii	$_{b}$46	$_{a}$4	$_{a}$-	$_{a}$3	$_{a}$-	.01	-	.01	-
F	Castilleja sp.	$_{a}$-	$_{b}$25	$_{a}$-	$_{a}$-	$_{a}$-	.10	-	-	-
F	Draba reptans (a)	-	$_{b}$139	$_{a}$-	$_{a}$1	$_{a}$-	.30	-	.00	-
F	Erigeron pumilus	$_{c}$67	$_{b}$38	$_{bc}$58	$_{a}$-	$_{a}$3	.22	.92	-	.01
F	Gilia sp. (a)	-	$_{c}$85	$_{a}$-	$_{b}$18	$_{a}$-	.20	-	.03	-
F	Lappula occidentalis (a)	-	-	-	4	-	-	-	.01	-
F	Lomatium sp.	3	-	-	-	-	-	-	-	-
F	Medicago sativa	6	4	2	-	-	.18	.21	-	-
F	Microsteris gracilis (a)	-	$_{b}$49	$_{a}$4	$_{a}$17	$_{a}$-	.10	.00	.04	-
F	Oenothera albicaulis (a)	5	-	-	-	-	-	-	-	-
F	Phlox longifolia	$_{b}$76	$_{b}$71	$_{a}$22	$_{a}$17	$_{a}$27	.18	.09	.07	.11
F	Plantago patagonica (a)	-	$_{bc}$96	$_{b}$73	$_{c}$120	$_{a}$-	.20	.53	.40	-
F	Potentilla gracilis	$_{a}$-	$_{b}$38	$_{a}$-	$_{a}$-	$_{a}$-	.26	-	-	-
F	Sphaeralcea coccinea	$_{b}$135	$_{b}$131	$_{b}$110	$_{a}$75	$_{a}$61	1.12	1.60	.92	.30
F	Tragopogon dubius	$_{b}$10	$_{a}$9	$_{a}$-	$_{b}$10	$_{a}$-	.01	-	.05	-
Total for Annual Forbs		5	369	77	160	0	0.81	0.53	0.49	0
Total for Perennial Forbs		382	377	237	126	112	2.37	3.07	1.24	0.46
Total for Forbs		387	746	314	286	112	3.18	3.61	1.73	0.46

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

BROWSE TRENDS--
Management unit 13A, Study no: 12

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	92	88	84	89	9.97	12.05	13.34	13.38
B	Atriplex canescens	1	2	1	1	1.00	.03	.00	.15
B	Eriogonum microthecum	7	4	7	3	.07	.03	.03	.00
B	Gutierrezia sarothrae	5	4	9	1	.15	.00	.36	.00
B	Opuntia sp.	20	20	21	22	.29	.05	.25	.37
B	Pediocactus simpsonii	0	0	8	2	-	-	.05	.01
B	Pinus edulis	0	4	6	3	1.27	5.05	3.89	3.22
B	Sclerocactus whipplei	0	8	0	3	-	.03	-	.00
Total for Browse		125	130	136	124	12.77	17.25	17.93	17.13

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 12

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata wyomingensis	-	18.63	21.23
Eriogonum microthecum	-	.28	.11
Gutierrezia sarothrae	-	.35	-
Opuntia sp.	-	.30	.21
Pediocactus simpsonii	-	-	.03
Pinus edulis	3.40	5.50	5.01
Sclerocactus whipplei	-	-	.03

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 12

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.1	0.7

POINT-QUARTER TREE DATA--
Management unit 13A, Study no: 12

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	20	<20	<20
Pinus edulis	71	47	47

Average diameter (in)		
'99	'04	'09
1.0	-	-
3.3	4.4	2.3

BASIC COVER--
Management unit 13A, Study no: 12

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	12.25	34.09	36.44	29.85	35.18
Rock	0	.00	0	0	0
Pavement	0	0	.01	.00	0
Litter	42.25	30.93	31.25	34.56	32.34
Cryptogams	5.00	1.81	4.96	4.73	4.15
Bare Ground	40.50	38.21	38.89	44.86	42.11

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 12, Study Name: Below Polar Rim

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.1	6.7	58.9	19.8	21.3	1.6	6.5	60.8	0.3

PELLET GROUP DATA--
Management unit 13A, Study no: 12

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	30	22	30	25
Horse	-	2	-	-
Elk	39	37	18	28
Deer	8	18	8	5
Cattle	-	6	7	5

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	1 (2)	-
94 (232)	33 (83)	17 (43)
13 (32)	19 (46)	9 (23)
52 (128)	31 (75)	17 (43)

BROWSE CHARACTERISTICS--
Management unit 13A, 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 tridentata wyomingensis									
87	**7732**	71	25	4	533	21	7	.86	20/31
94	**13800**	2	95	3	-	2	0	10	15/21
99	**10900**	40	51	9	380	47	14	.91	18/31
04	**6580**	0	88	12	160	58	10	4	18/27
09	**7640**	7	81	12	40	67	16	3	17/28
Atriplex canescens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**40**	0	100	-	20	100	0	0	20/24
99	**80**	0	100	-	-	0	0	0	21/13
04	**20**	0	100	-	-	0	100	0	17/14
09	**20**	0	100	-	-	100	0	0	11/16

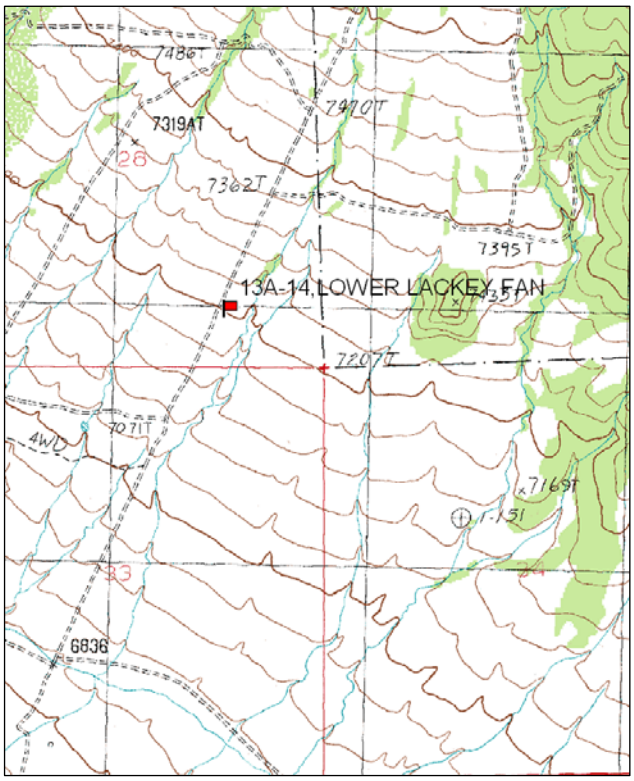
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Eriogonum microthecum									
87	**0**	0	0	0	-	0	0	0	-/-
94	**360**	0	100	0	-	0	0	0	4/10
99	**120**	50	50	0	-	0	0	0	11/8
04	**200**	0	100	0	-	10	70	0	8/7
09	**220**	0	91	9	-	0	0	0	7/6
Gutierrezia sarothrae									
87	**0**	0	0	0	-	0	0	0	-/-
94	**100**	0	80	20	-	0	0	0	8/9
99	**140**	43	57	0	-	0	0	0	8/12
04	**340**	6	94	0	-	0	0	0	8/10
09	**40**	0	0	100	-	0	0	100	6/9
Opuntia sp.									
87	**1265**	32	58	11	199	0	0	21	3/13
94	**620**	0	97	3	20	10	0	0	3/9
99	**560**	32	57	11	20	0	0	11	4/9
04	**600**	10	87	3	-	0	0	3	5/12
09	**960**	4	92	4	-	0	0	8	4/12
Pediocactus simpsonii									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**200**	10	90	-	-	0	0	0	1/3
09	**40**	0	100	-	40	0	0	0	1/2
Pinus edulis									
87	**0**	0	0	-	133	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**100**	20	80	-	-	0	0	0	-/-
04	**120**	33	67	-	-	0	0	17	-/-
09	**60**	0	100	-	20	0	0	0	-/-
Sclerocactus whipplei									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	1/4
99	**200**	70	30	-	40	0	0	0	1/2
04	**0**	0	0	-	-	0	0	0	-/-
09	**60**	0	100	-	-	0	0	0	2/2

LOWER LACKEY FAN - STUDY NO. 13A-14-09

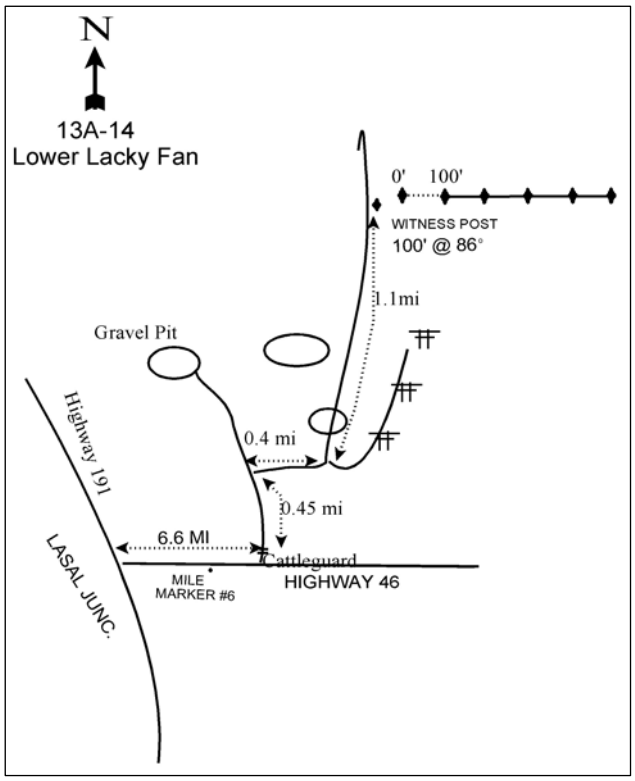
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R035XY318UT
Land Ownership: BLM
Elevation: 7,200 ft (2,195 m)
Aspect: South
Slope: 2%-4%
Transect bearing: 86 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5(95 ft)

Directions:
From La Sal Junction travel east on Highway 46 to mile marker #6. Continue 0.60 miles from mile marker #6 and turn left (north) onto a dirt road. Go 0.45 miles to where the road forks and turn right. Go 0.4 miles to another fork. Turn left and go 1.1 miles to witness post. The 0-foot stake is found 100 feet away at a bearing of 86°M. Browse tag #200 marks the start of the baseline.

Map Name: LaSal West



Diagrammatic Sketch:



Township: 28S, Range: 24E, Section: 27

GPS: NAD 83, UTM 12S 650375 E 4244165 N

LOWER LACKEY FAN - TREND STUDY NO. 13A-14

Site Information

Site Description: The study is located on the lower southwest slopes of the La Sal Mountains on a fairly flat ridge with scattered pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). There is a moderately dense stand of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) on the site that in the past was sprayed and seeded with crested wheatgrass (*Agropyron cristatum*). This area is managed by the BLM and is part of the Hatch Point grazing allotment. Pellet group data has estimated elk use as fluctuating from heavy to light between sample years. Estimated deer use has increased from light use in 1999 to more moderate use in 2009. Estimated cattle use has been light since 1999 (Table - Pellet Group Data).

Browse: The key browse species on the site is Wyoming big sagebrush, which has provided an average of 10% cover since 1994 (Table - Browse Trends). Density of sagebrush has remained relatively similar over the study, but there has been a steady decline in the recruitment of young sagebrush plants since 1994. The sagebrush population was fairly healthy from 1994 to 2003, but decadence and plants displaying poor vigor both increased markedly in 2009. Utilization of sagebrush has been mostly moderate to heavy since 1999 (Table - Browse Characteristics).

The undesirable species, broom snakeweed (*Gutierrezia sarothrae*), is prevalent on the site. Snakeweed has had fluctuating cover and density on the site since 1994, and is found mostly in clumped patches. There is also a very small, heavily used population of antelope bitterbrush (*Purshia tridentata*) scattered throughout the community (Table - Browse Trends, Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is dominated by the seeded perennial grass, crested wheatgrass. Cheatgrass (*Bromus tectorum*) is the only other grass species sampled with any notable frequency and it has declined in both frequency and cover since 1999. Perennial forbs are rare on the site and are not a major component of this community (Table - Herbaceous Trends).

Soil: The soil is a reddish-brown, sandy clay loam that has a moderately shallow rooting depth with a neutral pH (Table - Soil Analysis Data). There is abundant rock within the profile (Figure - Stoniness Index) and on the surface. Bare ground cover is not as high as some other sagebrush/grass sites with a scattered population of pinyon and juniper (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 and 2009, due to pedestaling of plants, flow patterns, and gullies.

Trend Assessments

Browse:

- **1994 to 1999 - down (-2):** Sagebrush density decreased by 21% to 3,880 plants/acre, and cover decreased from 12% to 10%. Recruitment of young sagebrush plants decreased from 36% to 19% of the population.
- **1999 to 2004 - stable (0):** Sagebrush density and cover remained similar. Recruitment of young sagebrush plants decreased to 6%.
- **2004 to 2009 - stable (0):** Sagebrush density increased slightly and cover remained similar. Recruitment of young sagebrush plants decreased to 4% of the population. Sagebrush decadence and plants displaying poor vigor both increased.

Grass:

- **1994 to 1999 - up (+2):** There was a significant increase in nested frequency of the dominant grass, crested wheatgrass, and cover increased from 8% to 10%.
- **1999 to 2004 - slightly up (+1):** The nested frequency of crested wheatgrass decreased slightly, but cover increased to 16%. There was a significant decrease in the nested frequency of cheatgrass and cover decreased from 3% to 1%.

- **2004 to 2009 - stable (0):** There was little change in the nested frequency of crested wheatgrass, though cover decreased slightly.

Forb:

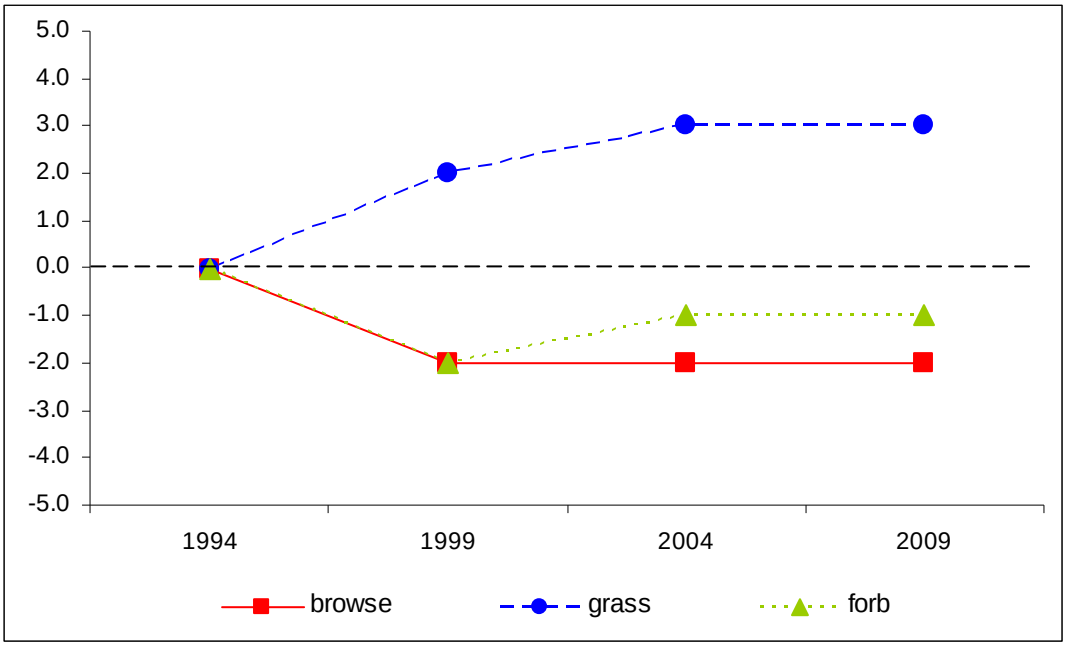
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased substantially, and the number of perennial forb species sampled decreased from 12 species to 3 species.
- **1999 to 2004 - slightly up (+1):** The sum of nested frequency and cover of perennial forbs increased slightly, but forbs remain rare on this site.
- **2004 to 2009 - stable (0):** There was little change in perennial forbs on this site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 13A, study no: 14

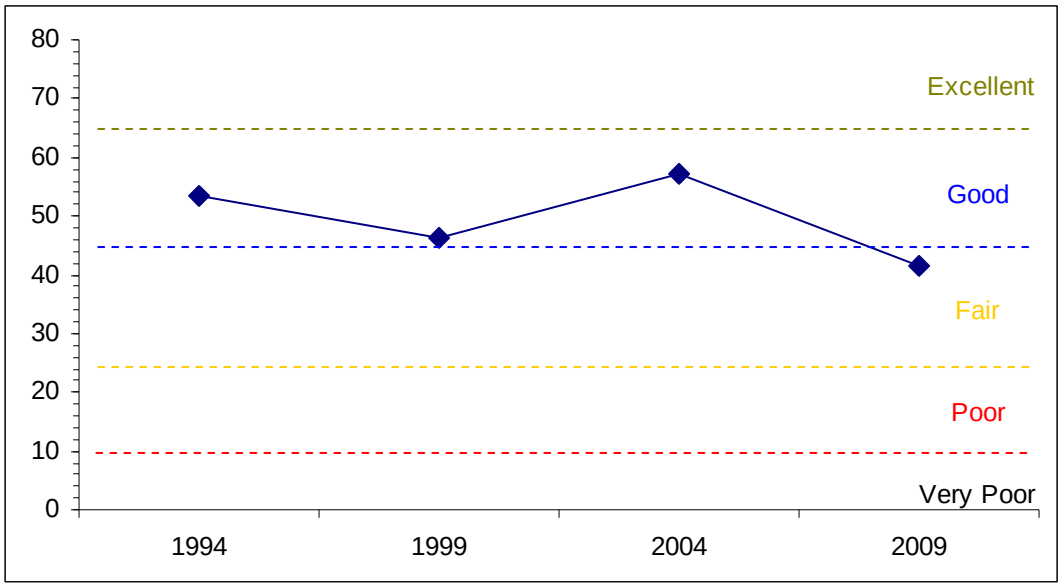
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	15.3	8.8	15.0	15.1	-2.4	1.7	0.0	**53.5**	Good
99	12.7	6.6	9.2	20.3	-2.6	0.1	0.0	**46.2**	Fair-Good
04	12.8	10.7	3.2	30.0	-0.9	1.3	0.0	**57.1**	Good
09	11.8	2.4	2.0	25.1	-0.3	0.4	0.0	**41.4**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 14



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 13A, Study no: 14



HERBACEOUS TRENDS--
Management unit 13A, Study no: 14

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	a225	b309	ab285	b302	7.54	10.15	16.17	12.55
G	Bromus tectorum (a)	b175	b206	a80	a77	3.18	3.51	1.23	.43
G	Vulpia octoflora (a)	-	8	5	-	-	.02	.01	-
Total for Annual Grasses		175	214	85	77	3.18	3.53	1.24	0.43
Total for Perennial Grasses		225	309	285	302	7.54	10.15	16.17	12.55
Total for Grasses		400	523	370	379	10.73	13.69	17.41	12.99
F	Astragalus convallarius	c29	a3	bc19	a3	.14	.01	.61	.02
F	Astragalus sp.	-	-	-	4	-	-	-	.03
F	Chenopodium sp. (a)	b11	a-	a-	a-	.02	-	-	-
F	Collinsia parviflora (a)	b26	a4	a-	a3	.09	.00	-	.00
F	Comandra pallida	b24	a-	a-	a-	.06	-	-	-
F	Cryptantha nevadensis	b39	a-	a-	a-	.06	-	-	-
F	Cryptantha sp.	b20	a-	a-	a6	.04	-	-	.04
F	Dalea searlsiae	2	-	-	-	.00	-	-	-
F	Descurainia pinnata (a)	14	-	4	-	.02	-	.15	-
F	Draba nemorosa (a)	b42	a-	a-	a-	.08	-	-	-
F	Erigeron pumilus	-	-	-	-	-	.00	-	-
F	Gayophytum ramosissimum(a)	b22	a-	a-	a-	.04	-	-	-
F	Gilia sp. (a)	b18	a-	a-	a-	.04	-	-	-
F	Heterotheca villosa	-	4	-	7	-	.03	-	.06
F	Ipomopsis aggregata	2	1	1	-	.00	.00	.00	-
F	Machaeranthera spp	1	-	-	-	.00	-	-	-
F	Microsteris gracilis (a)	b60	a6	a-	b80	.32	.01	-	.25
F	Oxybaphus linearis	2	-	-	-	.01	-	-	-

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
F	Phlox longifolia	3	-	5	4	.01	-	.01	.03
F	Ranunculus testiculatus (a)	$_{c}$158	$_{a}$-	$_{a}$-	$_{b}$45	.73	-	-	.14
F	Salsola iberica (a)	3	-	-	-	.01	-	-	-
F	Schoencrambe linifolia	$_{b}$27	$_{a}$-	$_{a}$-	$_{a}$-	.07	-	-	-
F	Sisymbrium altissimum (a)	-	-	-	-	.00	-	-	-
F	Sphaeralcea coccinea	5	-	-	3	.38	-	-	.00
F	Tragopogon dubius	5	-	-	-	.01	-	-	-
F	Trifolium sp.	3	-	2	5	.03	-	.03	.01
Total for Annual Forbs		354	10	4	128	1.37	0.01	0.15	0.40
Total for Perennial Forbs		162	8	27	32	0.84	0.05	0.65	0.20
Total for Forbs		516	18	31	160	2.22	0.07	0.81	0.60

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

BROWSE TRENDS--
Management unit 13A, Study no: 14

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	86	73	73	74	12.07	9.84	9.71	9.39
B	Chrysothamnus depressus	0	1	7	3	-	.00	.01	.01
B	Eriogonum microthecum	1	0	1	4	.00	-	.00	.03
B	Gutierrezia sarothrae	37	73	65	65	.82	8.06	2.04	2.36
B	Juniperus osteosperma	0	1	1	1	-	.00	.00	.15
B	Pediocactus simpsonii	0	0	1	2	-	-	.00	.01
B	Pinus edulis	0	1	1	2	-	3.75	5.94	2.01
B	Purshia tridentata	1	4	4	3	.15	.15	.15	.00
B	Quercus gambelii	0	0	0	0	-	.15	.38	-
B	Yucca sp.	6	7	9	12	1.60	1.31	1.80	1.97
Total for Browse		131	160	162	166	14.64	23.26	20.05	15.95

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 14

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata wyomingensis	-	10.71	11.14
Chrysothamnus depressus	-	.01	-
Gutierrezia sarothrae	-	2.48	1.73
Juniperus osteosperma	-	.05	.15
Pinus edulis	5.19	6.26	5.38
Purshia tridentata	-	.21	.08
Quercus gambelii	4.00	3.59	8.03
Yucca sp.	-	2.65	2.59

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 14

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.9	1.0

POINT-QUARTER TREE DATA--
Management unit 13A, Study no: 14

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	6	<18	<18
Pinus edulis	6	<18	<18

Average diameter (in)		
'99	'04	'09
5.8	-	-
4.0	-	-

BASIC COVER--
Management unit 13A, Study no: 14

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	27.73	34.18	36.42	30.71
Rock	12.83	15.93	16.14	12.76
Pavement	1.11	3.06	4.60	1.60
Litter	31.20	36.69	30.13	35.79
Cryptogams	.06	1.40	.37	.20
Bare Ground	28.67	23.90	30.02	26.80

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 14, Study Name: Lower Lackey Fan

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10.7	7.2	52.9	25.8	21.3	2.1	8.1	76.8	0.5

PELLET GROUP DATA--
Management unit 13A, Study no: 14

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	17	21	7	19
Elk	30	21	26	3
Deer	1	16	8	29
Cattle	-	8	1	2

Days use per acre (ha)		
'99	'04	'09
-	-	-
34 (84)	52 (129)	14 (35)
20 (49)	7 (18)	36 (89)
12 (30)	7 (16)	15 (36)

BROWSE CHARACTERISTICS--
Management unit 13A, 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									
94	**4920**	36	43	21	4240	9	2	13	25/36
99	**3880**	19	52	29	560	52	13	6	20/28
04	**3860**	6	79	15	-	54	30	11	18/29
09	**4020**	4	54	42	20	24	45	30	18/25
Chrysothamnus depressus									
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	3/6
04	**240**	17	83	-	-	50	0	0	6/10
09	**60**	67	33	-	-	0	33	33	-/-
Ephedra viridis									
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	43/63
09	**0**	0	0	-	-	0	0	0	26/22
Eriogonum microthecum									
94	**40**	0	100	-	-	0	0	0	9/11
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	10/14
09	**100**	0	100	-	-	0	0	0	6/5
Gutierrezia sarothrae									
94	**1800**	29	68	3	1720	0	0	1	10/10
99	**20060**	29	70	2	880	.69	0	.59	11/11
04	**15100**	16	83	2	200	0	0	.92	7/7
09	**6800**	4	90	6	-	0	0	4	9/8
Juniperus osteosperma									
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	100	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-
Leptodactylon pungens									
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	9/7
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	6/13
09	**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)
Pediocactus simpsonii									
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	1/3
09	**40**	50	50	-	-	0	0	0	2/5
Pinus edulis									
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**40**	50	50	-	20	0	0	0	-/-
Purshia tridentata									
94	**20**	0	100	0	-	0	0	0	13/27
99	**80**	0	100	0	-	0	75	0	17/35
04	**80**	50	50	0	-	50	50	0	27/61
09	**80**	25	50	25	-	0	100	25	22/36
Yucca sp.									
94	**360**	0	100	0	-	0	0	0	24/38
99	**440**	9	91	0	-	0	0	0	18/29
04	**600**	30	67	3	-	0	0	3	22/30
09	**500**	0	92	8	-	0	8	20	22/27

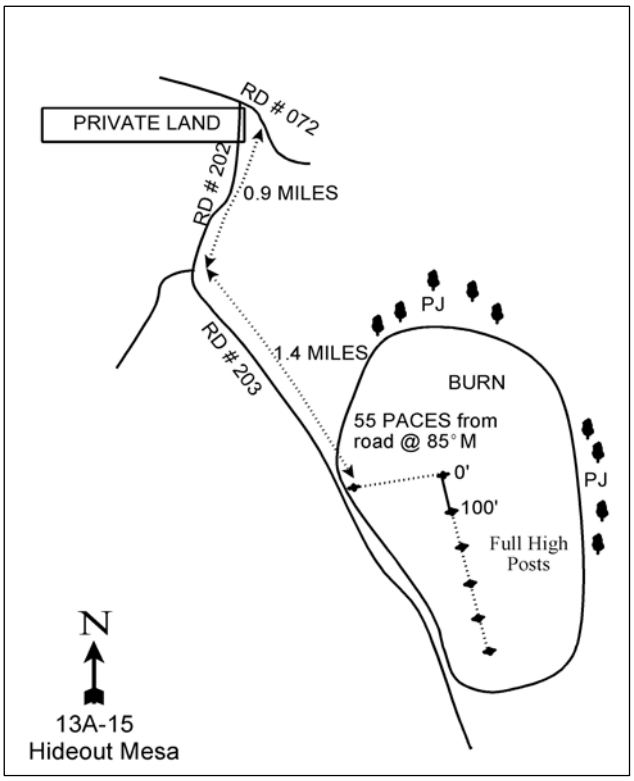
HIDEOUT MESA - TREND STUDY NO. 13A-15-09

Vegetation Type: Sagebrush-Grass Burn
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Mountain Loam (Oak), R048AY415UT
Land Ownership: US Forest Service
Elevation: 7,100 ft (2,164 m)
Aspect: Southeast
Slope: 3%
Transect bearing: 155 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5(95 ft)

Directions:
From LaSal Junction take Highway 46 east to mile marker #16. From mile marker #16 travel east 0.10 miles and turn left (north). Proceed 1.2 miles to Forest Service Road #072 and turn right (fork heads toward Buckeye Reservoir). Continue 5.2 miles to a cattle guard. Continue 1.9 miles and turn right (south) on F. S. Road #202. Continue 0.90 miles and take on F. S. Road #203. Proceed 1.4 miles to a burn on the left side of the road. The baseline can be found by walking east several hundred feet out into the burn. The 0 foot stake is marked by browse tag #25.

Map Name: Ray Mesa

Diagrammatic Sketch:



Township: 28S, Range: 26E, Section: 20

GPS: NAD 83, UTM 12S 668249 E 4247055 N

HIDEOUT MESA - TREND STUDY NO. 13A-15

Site Information

Site Description: The study is located within the southeast lower benches of the La Sal Mountains, just west of the Colorado-Utah state line. The site is in the bottom of one of the many shallow canyons in the area which are surrounded by rugged flat-topped mesas. This study is inside a shallow canyon bottom of sagebrush and grass, within a moderately large opening of thick pinyon-juniper woodland in association with scattered Ponderosa pine. The area burned around 1994 and in 2002 a fire came within one-third of mile to the study site. This area is managed by the Forest Service and is part of the South Paradox grazing allotment. Pellet group data shows decreases in estimated elk use on the site since 1999. Estimated deer use has been light since 1999. Estimated cattle use has been moderate to heavy on the site since 1999. There are two well worn livestock trails that run through the site.

Browse: The key browse species on the site is mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), which has been increasing in cover since 1994 (Table - Browse Trends). Mountain big sagebrush vigor and decadence had been good over the life of the study. Recruitment of young mountain big sagebrush plants has fluctuated over the sample year, but has been mostly good. Utilization of mountain big sagebrush has been mostly light since 1994 (Table Browse Characteristics).

Other common browse species on this site are fringed sagebrush (*Artemisia frigida*), stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), and broom snakeweed (*Gutierrezia sarothrae*). There were several large mats of what appeared to be rhizomatous fringed sagebrush sampled in 2009. It is possible that fringed sagebrush may be hybridizing with Louisiana sagebrush (*Artemisia ludoviciana*) on this site. There are also a few scattered of Utah serviceberry (*Amelanchier utahensis*), fourwing saltbush (*Atriplex canescens*), and rubber rabbitbrush (*Chrysothamnus nauseosus*) on the site.

Herbaceous Understory: The herbaceous understory is diverse, though it has diminished since the outset of the study. There is a medley of perennial grasses on the site, with the dominant perennial species being needle-and-thread (*Stipa comata*). The dominant species on the site is the annual species, cheatgrass (*Bromus tectorum*). Perennial grass species decreased substantially and cheatgrass increased substantially between 1999 and 2004, allowing cheatgrass to gain dominance on the site. Cheatgrass decreased in frequency and cover in 2009, but maintained dominance on the site. The herbaceous understory has many perennial forb species, but only scarlet globemallow (*Sphaeralcea coccinea*) is sampled more than rarely and provides notable cover. Annual forb species on the site have steadily decreased in frequency and cover since 1994 (Table - Herbaceous Trends).

Soil: The shallow and narrow canyon bottom has a sandy clay loam soil with a moderately shallow rooting depth and a neutral pH (Table - Soil Analysis Data). Past erosion problems are evident due to a large gully nearby that has been active historically. The site has a fairly good vegetation and litter cover, with moderate bare ground cover since 1994 (Table - Basic Cover). The soil erosion condition was classified as slight in 2004, due primarily to surface litter movement, pedestaling of plants, flow patterns, and gullies. Much of the erosion was attributed to a high intensity storm a few weeks prior to sampling. The soil erosion condition was classified as stable in 2009.

Trend Assessments

Browse:

- **1994 to 1999 - up (+2):** Density of the primary browse, mountain big sagebrush, increased 41% to 6,500 plants/acre, mostly due to a large increase in the recruitment of young plants which comprised 54% of the population. Mountain big sagebrush vigor and decadence remained good.

- **1999 to 2004 - slightly down (-1):** Density of mountain big sagebrush decreased by 23% to 5,000 plants/acre, primarily due to a large decrease in young sagebrush plants. Density of mature mountain big sagebrush plants increased. Cover of mountain big sagebrush increased from 10% to 13%.
- **2004 to 2009 - up (+2):** Mountain big sagebrush density increased 49% to 7,460 plants/acre, and cover increased to over 16%. Density of both mature and young mountain big sagebrush plants increased, and decadence and poor vigor remained low in the population. Cover and density of fringed sagebrush also increased markedly, but this species may be hybridizing with the forb species, Louisiana sagebrush.

Grass:

- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses. There was a significant increase in the nested frequency of cheatgrass and Sandberg bluegrass (*Poa secunda*). There was a significant decrease in nested frequency of prairie junegrass (*Koeleria cristata*).
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 51% and cover decreased from 13% to 5%. There was a significant decrease in the nested frequency of western wheatgrass (*Agropyron smithii*), prairie junegrass, mutton bluegrass (*Poa fendleriana*), and Sandberg bluegrass. There was a significant increase in the nested frequency of cheatgrass, and cover increased from 3% to 12%.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by a further 15%, though cover increased slightly. There was a significant decrease in the nested frequency of cheatgrass and western wheatgrass. Cover of cheatgrass decreased to 4%.

Forb:

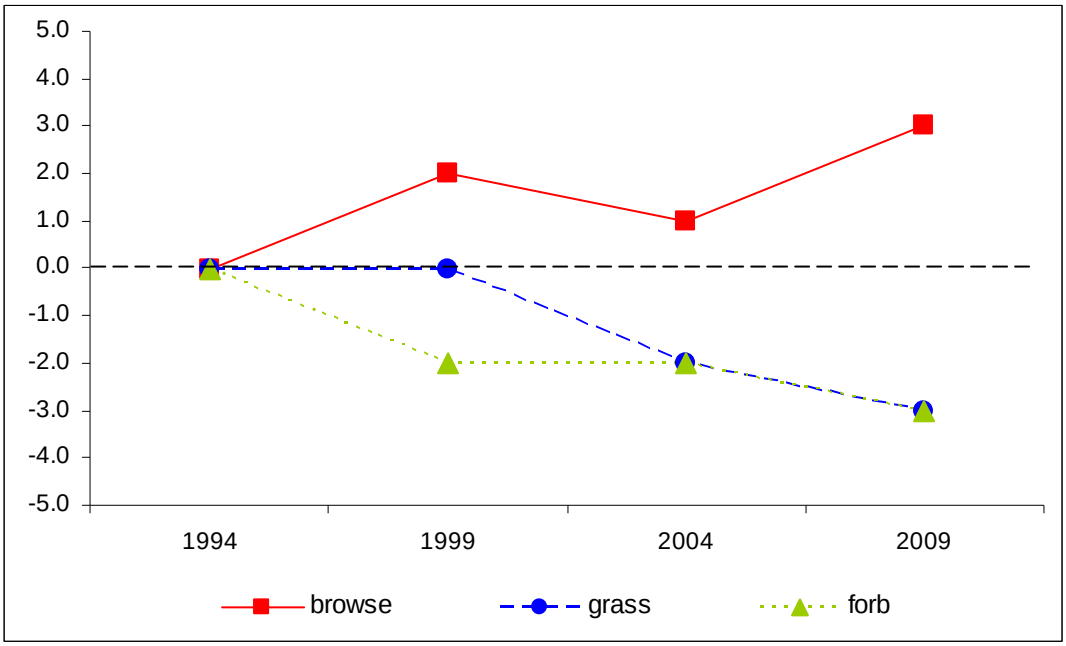
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 48%, and cover decreased from 5% to 4%. There was a significant decrease in nested frequency of bastard toadflax (*Comandra pallida*), low fleabane (*Erigeron pumilus*), hoary aster (*Macaeranthera canescens*), mat penstemon (*Penstemon caespitosus*), and longleaf phlox (*Phlox longifolia*).
- **1999 to 2004 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs. There was a significant increase in the nested frequency of mat penstemon.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 17%, though cover increased to 5%. There was a significant decrease in the nested frequency of low fleabane and mat penstemon.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 13A, study no: 15

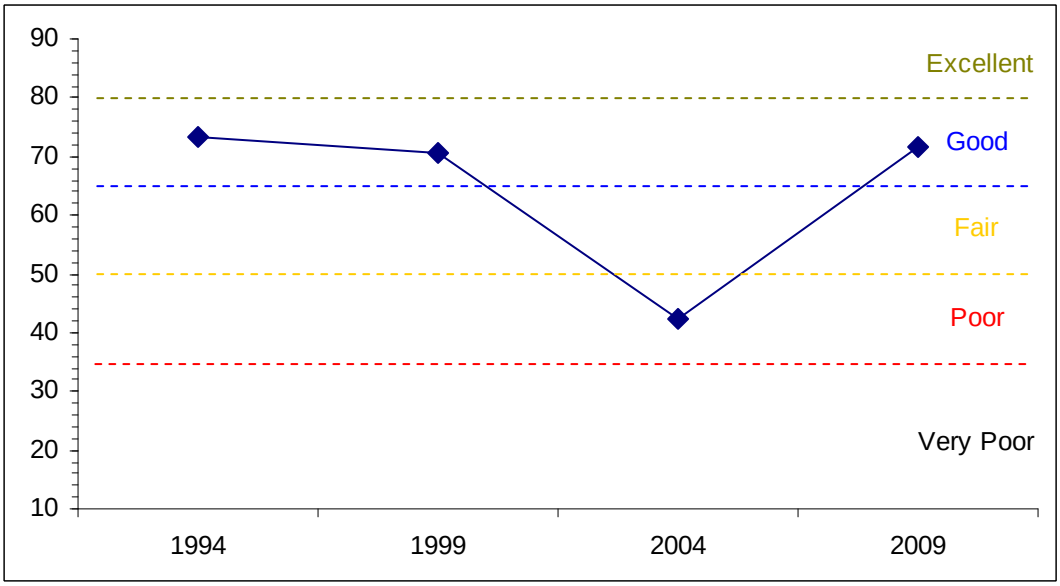
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	15.1	10.8	12.0	25.4	0.0	10.0	0.0	**73.2**	Good
99	13.7	11.4	15.0	25.0	-2.1	7.7	0.0	**70.7**	Good
04	18.7	11.6	4.1	9.2	-9.2	7.9	0.0	**42.3**	Poor
09	26.8	12.3	13.4	12.2	-3.2	10.0	0.0	**71.5**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 13A, Study no: 15



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 13A, Study no: 15



HERBACEOUS TRENDS--
Management unit 13A, Study no: 15

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron intermedium	a-	a-	b20	a9	-	-	.10	.03
G	Agropyron smithii	c276	c252	b75	a22	4.98	3.68	.52	.17
G	Bouteloua gracilis	58	50	52	37	1.16	.72	.85	.31
G	Bromus inermis	-	-	-	5	-	-	-	.15
G	Bromus tectorum (a)	a26	b127	c269	b121	.04	2.81	12.30	4.21
G	Carex sp.	1	5	10	4	.00	.02	.05	.03
G	Hilaria jamesii	6	4	5	-	.19	.03	.01	-
G	Koeleria cristata	c216	b169	a35	a24	3.82	4.17	.35	.42
G	Oryzopsis hymenoides	3	9	11	-	.18	.09	.01	-
G	Poa fendleriana	ab29	b45	a3	ab26	.12	.46	.00	.66
G	Poa pratensis	5	-	-	-	.01	-	-	-
G	Poa secunda	a-	c56	b19	b23	-	.59	.31	.23
G	Sitanion hystrix	c54	bc25	ab16	a4	.95	.19	.25	.06
G	Sporobolus cryptandrus	-	9	1	1	-	.04	.00	.03
G	Stipa comata	a51	ab86	b102	b143	1.24	2.47	2.12	3.98
G	Vulpia octoflora (a)	3	4	3	-	.00	.03	.01	-
Total for Annual Grasses		29	131	272	121	0.04	2.85	12.31	4.21
Total for Perennial Grasses		699	710	349	298	12.69	12.50	4.61	6.10
Total for Grasses		728	841	621	419	12.74	15.35	16.92	10.32
F	Agoseris glauca	-	2	1	-	-	.00	.01	-
F	Alyssum alyssoides (a)	4	-	1	-	.01	-	.00	-
F	Androsace septentrionalis (a)	a-	b45	a2	a-	-	.10	.00	-
F	Artemisia ludoviciana	29	23	13	25	.53	.57	.39	1.08
F	Astragalus miser	9	3	-	-	.39	.03	-	-
F	Calochortus nuttallii	-	-	3	1	-	-	.01	.03
F	Castilleja linariaefolia	6	-	-	1	.06	-	-	.15
F	Chenopodium fremontii (a)	a-	a-	b21	a-	-	-	.04	-
F	Chenopodium leptophyllum(a)	-	-	3	-	-	-	.01	-
F	Cirsium undulatum	4	1	1	-	.03	.00	.03	-
F	Collinsia parviflora (a)	b39	a1	a2	a1	.07	.00	.00	.00
F	Comandra pallida	b94	a-	a-	a-	.69	-	-	-
F	Crepis acuminata	-	1	5	1	-	.03	.09	.00
F	Cryptantha sp.	6	-	13	6	.02	-	.07	.06
F	Cymopterus sp.	4	-	-	-	.00	-	.00	-
F	Descurainia pinnata (a)	3	-	1	-	.01	-	.00	-
F	Draba nemorosa (a)	b75	ab11	a7	a-	.16	.03	.01	-
F	Erigeron divergens	-	-	8	7	-	-	.06	.07
F	Erigeron flagellaris	-	-	1	3	-	-	.03	.06
F	Erigeron pumilus	c42	b14	b17	a-	.09	.08	.11	-
F	Erigeron sp.	8	-	-	-	.02	-	-	-
F	Eriogonum racemosum	11	6	2	3	.17	.05	.01	.06
F	Gayophytum ramosissimum(a)	4	-	5	-	.00	-	.01	-
F	Gilia sp. (a)	b148	a1	a5	a-	.32	.00	.01	-

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
F	Grindelia squarrosa	$_{b}$41	$_{a}$-	$_{a}$-	$_{a}$-	.15	-	-	-
F	Heterotheca villosa	12	11	5	13	.08	.36	.38	.15
F	Ipomopsis aggregata	10	-	-	-	.02	-	-	-
F	Lactuca serriola	-	-	-	1	-	-	-	.03
F	Lappula occidentalis (a)	$_{a}$13	$_{a}$12	$_{b}$61	$_{a}$10	.04	.03	.32	.20
F	Linum lewisii	4	7	4	11	.01	.06	.03	.10
F	Lupinus sp.	4	1	5	-	.01	.03	.01	-
F	Machaeranthera canescens	$_{b}$27	$_{a}$6	$_{a}$2	$_{a}$2	.06	.01	.00	.03
F	Microsteris gracilis (a)	$_{a}$38	$_{b}$114	$_{a}$10	$_{a}$13	.09	.36	.01	.03
F	Oenothera pallida	5	7	1	-	.03	.03	.00	-
F	Orthocarpus sp. (a)	-	4	-	-	-	.00	-	-
F	Penstemon caespitosus	$_{b}$14	$_{a}$-	$_{b}$18	$_{a}$5	.70	-	.60	.00
F	Penstemon comarrhenus	2	5	7	5	.00	.01	.28	.76
F	Penstemon sp.	$_{b}$20	$_{b}$29	$_{a}$-	$_{a}$-	.07	1.27	-	-
F	Phlox longifolia	$_{b}$36	$_{a}$19	$_{a}$10	$_{a}$3	.08	.03	.02	.00
F	Plantago patagonica (a)	$_{c}$77	$_{b}$50	$_{ab}$29	$_{a}$4	.32	.10	.16	.01
F	Polygonum douglasii (a)	$_{ab}$28	$_{b}$38	$_{a}$3	$_{a}$6	.05	.09	.01	.01
F	Ranunculus testiculatus (a)	$_{a}$2	$_{a}$-	$_{a}$3	$_{b}$15	.01	-	.00	.03
F	Sphaeralcea coccinea	129	132	125	115	1.72	1.23	1.68	2.36
F	Tragopogon dubius	-	-	3	8	-	-	.04	.07
F	Trifolium sp.	11	2	4	-	.02	.00	.01	-
F	Zigadenus paniculatus	6	8	12	7	.01	.02	.02	.07
Total for Annual Forbs		431	276	153	49	1.09	0.74	0.63	0.29
Total for Perennial Forbs		534	277	260	217	5.02	3.86	3.93	5.12
Total for Forbs		965	553	413	266	6.12	4.60	4.56	5.42

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

BROWSE TRENDS--
Management unit 13A, Study no: 15

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	1	1	1	1	.00	.03	.15	.15
B	Artemisia frigida	54	49	49	62	2.47	.89	1.78	5.35
B	Artemisia nova	0	0	0	0	-	-	-	.15
B	Artemisia tridentata tridentata	0	0	0	1	-	-	-	.00
B	Artemisia tridentata vaseyana	62	70	70	78	9.93	10.20	13.13	16.44
B	Atriplex canescens	4	7	5	2	.15	.02	.18	.18
B	Chrysothamnus depressus	0	1	3	3	-	.03	.00	.15
B	Chrysothamnus nauseosus	2	1	2	2	.00	.00	.15	.03
B	Chrysothamnus viscidiflorus viscidiflorus	24	27	33	32	.69	.96	1.93	1.70
B	Coryphantha vivipara arizonica	0	3	2	1	-	.00	.00	.03
B	Eriogonum microthecum	3	5	5	3	.00	.00	.04	.03
B	Gutierrezia sarothrae	14	15	14	10	.59	.25	.37	.51
B	Opuntia sp.	7	7	5	2	.00	.15	.00	.00
B	Pinus edulis	0	1	1	1	-	.00	.00	.15
B	Unknown browse	0	0	0	6	-	-	-	.15
Total for Browse		171	187	190	204	13.87	12.53	17.76	25.04

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 15

Species	Percent Cover	
	'04	'09
Amelanchier utahensis	.21	.21
Artemisia frigida	2.34	5.11
Artemisia tridentata tridentata	-	.45
Artemisia tridentata vaseyana	15.91	17.61
Atriplex canescens	.48	.21
Chrysothamnus depressus	.03	.11
Chrysothamnus nauseosus	.13	.23
Chrysothamnus viscidiflorus viscidiflorus	2.23	1.73
Eriogonum microthecum	.05	.23
Gutierrezia sarothrae	.56	.41
Opuntia sp.	.11	.06
Pinus edulis	.46	.70
Unknown browse	-	.16

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 13A, Study no: 15

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	1.7	1.5

BASIC COVER--
Management unit 13A, Study no: 15

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	29.71	35.97	37.65	40.79
Rock	.06	.89	.03	.06
Pavement	.04	.13	.06	0
Litter	43.97	32.96	43.00	47.83
Cryptogams	1.32	9.93	1.82	1.71
Bare Ground	32.34	32.75	33.37	25.22

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 15, Study Name: Hideout Mesa

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10	7.2	50.9	28.6	20.6	2.2	18.6	227.2	0.5

PELLET GROUP DATA--
Management unit 13A, Study no: 15

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	42	11	2	16
Elk	17	20	1	5
Deer	6	17	2	-
Cattle	-	5	4	14

Days use per acre (ha)		
'99	'04	'09
-	-	-
36 (89)	11 (27)	6 (15)
11 (27)	-	3 (8)
50 (124)	22 (54)	38 (93)

BROWSE CHARACTERISTICS--
Management unit 13A, 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	**20**	0	100	-	-	0	0	0	20/24
99	**20**	0	100	-	-	0	100	0	30/28
04	**20**	0	100	-	-	0	100	0	28/26
09	**40**	0	100	-	-	0	100	0	33/33
Artemisia frigida									
94	**3660**	13	84	3	40	0	0	0	8/11
99	**5040**	24	74	2	160	8	.79	1	6/6
04	**3260**	4	96	1	1300	5	14	1	12/10
09	**7000**	11	87	1	6240	.28	0	3	12/13
Artemisia tridentata tridentata									
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	70/76

		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	**4600**	27	55	17	9000	4	0	19	20/24
99	**6500**	54	34	13	200	16	2	2	24/31
04	**5000**	9	78	13	13440	17	.40	4	19/26
09	**7460**	33	55	12	20	15	13	11	20/29
Atriplex canescens									
94	**80**	0	100	-	-	0	0	0	21/16
99	**140**	29	71	-	60	29	29	0	22/20
04	**100**	0	100	-	-	60	40	0	27/24
09	**40**	0	100	-	-	0	0	0	26/24
Chrysothamnus depressus									
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	0	100	-	-	0	0	0	4/12
04	**200**	0	100	-	-	0	0	0	4/7
09	**60**	0	100	-	-	0	0	0	6/10
Chrysothamnus nauseosus									
94	**40**	0	100	0	-	0	0	0	29/32
99	**20**	0	100	0	-	0	0	0	27/32
04	**60**	0	100	0	-	0	0	0	22/25
09	**40**	0	50	50	-	0	0	0	34/50
Chrysothamnus viscidiflorus viscidiflorus									
94	**1180**	12	88	0	180	0	0	3	7/15
99	**1600**	14	86	0	-	4	0	0	6/10
04	**1920**	1	99	0	-	1	0	0	8/11
09	**1840**	0	96	4	100	0	4	14	8/14
Coryphantha vivipara arizonica									
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	0	100	-	-	0	0	0	3/4
04	**40**	0	100	-	-	0	0	0	3/4
09	**60**	0	100	-	20	0	0	0	3/6
Eriogonum microthecum									
94	**120**	0	100	-	-	0	0	0	9/11
99	**300**	33	67	-	-	27	0	0	7/6
04	**200**	0	100	-	-	0	0	0	7/8
09	**100**	0	100	-	-	0	0	0	12/7
Gutierrezia sarothrae									
94	**840**	5	86	10	120	0	0	5	7/11
99	**720**	14	81	6	-	0	0	0	6/6
04	**580**	7	93	0	-	0	0	0	7/9
09	**420**	5	95	0	-	0	0	0	9/10

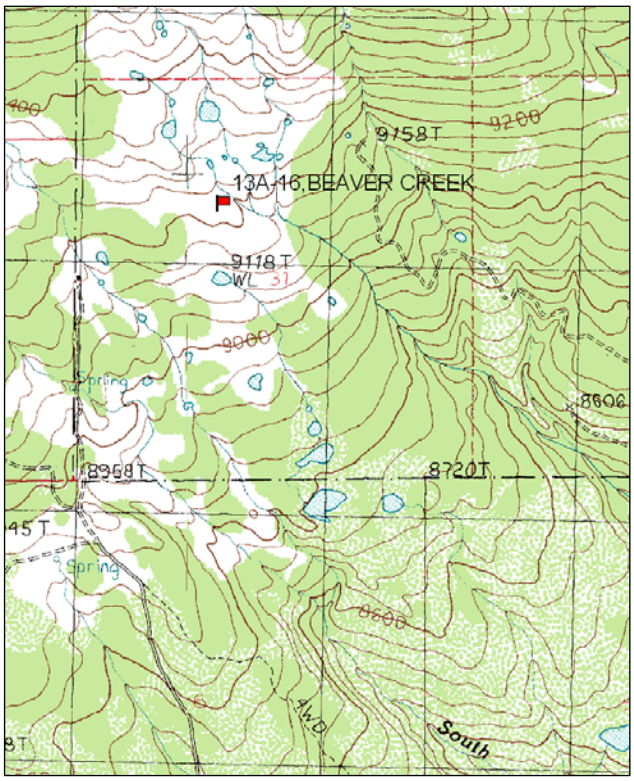
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
94	**160**	38	63	-	-	13	0	0	3/9
99	**140**	14	86	-	20	0	0	0	4/10
04	**160**	13	88	-	-	0	0	0	4/7
09	**60**	0	100	-	-	0	0	67	4/13
Pinus edulis									
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-
Symphoricarpos oreophilus									
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	30/59
Unknown browse									
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**120**	0	100	-	-	0	0	0	26/21

BEAVER CREEK - TREND STUDY NO. 13A-16-09

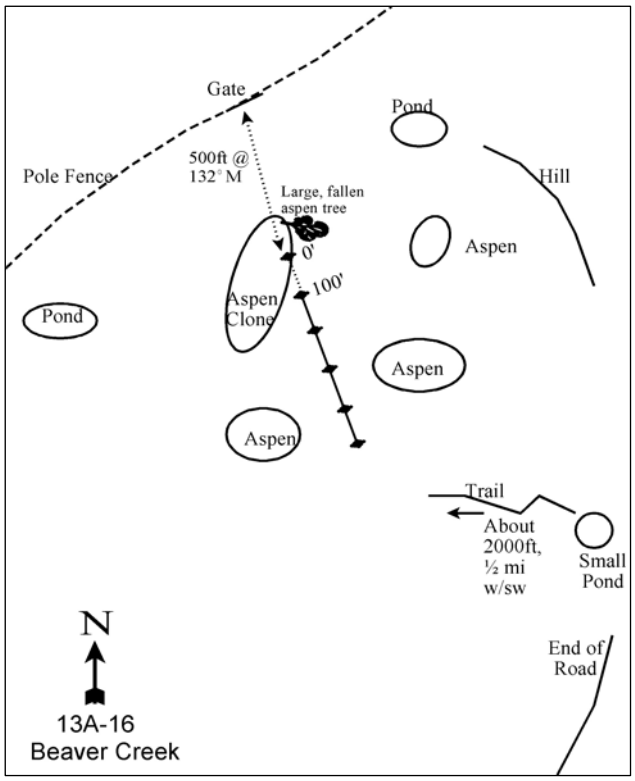
Vegetation Type: Aspen Meadow
Range Type: Crucial Deer Summer (Fawning), Crucial Elk Summer (Calving)
NRCS Ecological Site Description: High Mountain Loam (Aspen), R048AY506UT
Land Ownership: SITLA
Elevation: 9,000 ft (2,743 m)
Aspect: South
Slope: 10%-12%
Transect bearing: 122 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5(95 ft)

Directions:
On SR 46, travel northeast past La Sal to mile marker 12. Continue 0.75 miles to the La Sal Pass road. Turn left and go 1.9 miles to a fork just beyond the Forest Service boundary cattleguard. Bear left and go 0.05 miles to a canal. Continue 0.7 miles to a fork by the canal. Stay right, go 0.1 miles to a fork. Stay left and proceed 0.4 miles to another fork. Stay right on main road and continue 0.8 miles to the La Sal Creek crossing. Continue 1.0 mile to a cattleguard. Continue 0.8 miles to a fork. Stay right and continue 0.11 more miles to another fork. Go right and drive to the end of the road. Then follow the trail to an open area and walk west up the hill to the site. Use a GPS unit to navigate. The 0-foot stake is marked by browse tag #161.

Map Name: Mount Peale



Diagrammatic Sketch:



Township: 27S, Range: 25E, Section: 31

GPS: NAD 83, UTM 12S 656489 E 4253417 N

BEAVER CREEK - TREND STUDY NO. 13A-16

Site Information

Site Description: The study is located just southeast of Mount Peale on state land. It samples an aspen meadow that receives high elk and livestock use in the spring/summer. Pellet group data estimated elk use to be moderately heavy with elk observed near the site in 2004, but there was minimal elk sign noted in 2009. Estimated deer use has been minimal. Cattle use has been heavy to very heavy on the site (Table - Pellet Group Data).

Browse: Due to the elevation of this site, it is considered to be summer range and browse is therefore not a critical component for wildlife. Snowberry (*Symphoricarpos oreophilus*) is the dominant shrub on this open site and provides the only notable browse cover (Table - Browse Trends). The snowberry plants are vigorous and healthy with mostly light use. Other browse species found on the site include: aspen (*Populus tremuloides*), gambel oak (*Quercus gambelii*), gooseberry currant (*Ribes montigenum*), and Wood's rose (*Rosa woodsii*) (Table - Browse Characteristics). Most of the aspen are large and old, with very little recruitment of young trees.

Herbaceous Understory: Herbaceous vegetation forms a diverse and dense understory. Kentucky bluegrass (*Poa pratensis*), an increaser with moderate to heavy grazing, is the dominant species on the site and provides most of the vegetation cover. Other common grass species include mountain brome (*Bromus carinatus*), slender wheatgrass (*Agropyron trachycaulum*), and subalpine needlegrass (*Stipa columbiana*). Forbs are also abundant on the site. The most common forb species include: Pacific aster (*Aster chilensis*), western yarrow (*Achillea millefolium*), Silky lupine (*Lupinus argenteus*), and common dandelion (*Taraxacum officinale*). These species provide valuable summer forage for wildlife. The majority of the herbaceous species, especially the forbs, on this site are increasers with heavy grazing.

Soil: The soil is a loam with a moderately deep rooting depth a moderately acidic pH (Table - Soil Analysis Data). The site has good vegetation and litter cover with minimal bare ground cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **2004 to 2009 - slightly up (+1):** There was an increase in density and cover of the dominant browse species, snowberry, as well as gooseberry currant and Wood's rose. Because this is summer range, increases in browse species is not necessarily desirable.

Grass:

- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 19% and cover increased from 23% to 55%. There was a significant increase in the nested frequency of mountain brome and a significant decrease in the nested frequency of slender wheatgrass. The large increase in cover of grasses is attributed to a substantial increase in the cover of Kentucky bluegrass.

Forb:

- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 14% and cover decreased from 22% to 16%.

Trend Summary

HERBACEOUS TRENDS--
Management unit 13A, Study no: 16

Type	Species	Nested Frequency '04	Nested Frequency '09	Average Cover % '04	Average Cover % '09
G	Agropyron trachycaulum	$_{b}$70	$_{a}$49	1.64	1.42
G	Bouteloua gracilis	-	1	-	.15
G	Bromus anomalus	13	7	.36	.78
G	Bromus carinatus	$_{a}$64	$_{b}$128	1.17	8.07
G	Carex sp.	21	17	.53	.83
G	Dactylis glomerata	6	4	.03	.00
G	Poa pratensis	320	388	17.14	40.12
G	Stipa columbiana	59	69	2.28	3.13
G	Stipa lettermani	5	2	.06	.00
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		558	665	23.26	54.53
Total for Grasses		558	665	23.26	54.53
F	Achillea millefolium	167	147	4.25	3.29
F	Agoseris glauca	2	-	.00	-
F	Androsace septentrionalis (a)	3	3	.01	.03
F	Arabis sp.	-	1	-	.00
F	Aster chilensis	184	165	6.17	5.15
F	Chenopodium fremontii (a)	$_{b}$53	$_{a}$12	.44	.05
F	Cirsium sp.	17	12	.64	.13
F	Crepis acuminata	5	1	.01	.03
F	Cymopterus sp.	13	21	1.49	.36
F	Descurainia pinnata (a)	$_{b}$58	$_{a}$-	1.50	-
F	Draba sp. (a)	$_{b}$15	$_{a}$-	.10	-
F	Erigeron flagellaris	1	-	.00	-
F	Geranium sp.	12	18	.10	.08
F	Helenium hoopesii	-	15	-	.51
F	Labiatae	3	-	.04	-
F	Lappula occidentalis (a)	7	-	.16	-
F	Lathyrus brachycalyx	53	48	1.30	1.60
F	Lepidium sp. (a)	10	-	.07	-
F	Lupinus argenteus	48	29	4.59	2.00
F	Phacelia hastata	-	10	-	.07
F	Polygonum douglasii (a)	$_{a}$-	$_{b}$13	-	.34
F	Potentilla sp.	25	13	.71	.37
F	Stellaria jamesiana	$_{b}$23	$_{a}$10	.28	.05
F	Swertia perennis	2	2	.63	.38
F	Taraxacum officinale	143	108	2.11	1.47
F	Tragopogon dubius	5	4	.03	.01
Total for Annual Forbs		146	28	2.29	0.42
Total for Perennial Forbs		703	604	22.40	15.55
Total for Forbs		849	632	24.70	15.97

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

BROWSE TRENDS--
Management unit 13A, Study no: 16

Type	Species	Strip Frequency '04	Strip Frequency '09	Average Cover % '04	Average Cover % '09
B	Juniperus osteosperma	0	0	1.99	-
B	Populus tremuloides	8	9	.53	.39
B	Quercus gambelii	1	1	.41	.53
B	Ribes montigenum	1	4	.30	.45
B	Rosa woodsii	7	6	.36	.60
B	Symphoricarpos oreophilus	48	53	11.50	15.38
Total for Browse		65	73	15.10	17.35

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 16

Species	Percent Cover '04	Percent Cover '09
Populus tremuloides	24.23	20.66
Quercus gambelii	.60	.91
Ribes montigenum	1.45	1.51
Rosa woodsii	.58	.10
Symphoricarpos oreophilus	24.36	22.04

BASIC COVER--
Management unit 13A, Study no: 16

Cover Type	Average Cover % '04	Average Cover % '09
Vegetation	60.12	79.40
Rock	.33	.10
Pavement	0	.01
Litter	46.62	47.34
Bare Ground	7.81	4.36

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 16, Study Name: Beaver Creek

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.6	5.6	46.3	34.4	19.3	6.3	28.1	515.2	0.6

PELLET GROUP DATA--
Management unit 13A, Study no: 16

Type	Quadrat Frequency '04	Quadrat Frequency '09	Days use per acre (ha) '04	Days use per acre (ha) '09
Rabbit	-	1	-	-
Elk	2	1	42 (104)	8 (20)
Deer	-	-	5 (13)	-
Cattle	18	39	66 (163)	102 (251)

BROWSE CHARACTERISTICS--
Management unit 13A, Study no: 16

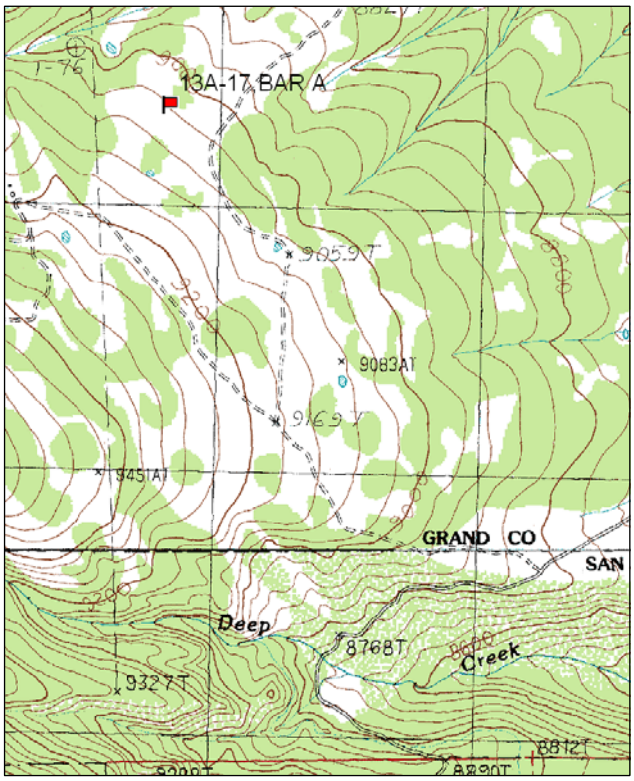
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Populus tremuloides									
04	**200**	70	30	-	-	10	30	0	-/-
09	**200**	70	30	-	40	30	20	0	-/-
Quercus gambelii									
04	**480**	100	0	-	-	0	0	0	13/7
09	**240**	0	100	-	-	0	100	0	-/-
Ribes montigenum									
04	**20**	0	100	-	-	0	0	0	34/86
09	**260**	0	100	-	-	0	0	0	21/32
Rosa woodsii									
04	**800**	0	100	-	-	0	0	0	13/10
09	**880**	0	100	-	-	0	0	0	12/9
Symphoricarpos oreophilus									
04	**2080**	7	92	1	40	0	0	0	30/47
09	**3060**	5	94	1	20	14	13	0	27/42

BAR-A - TREND STUDY NO. 13A-17-09

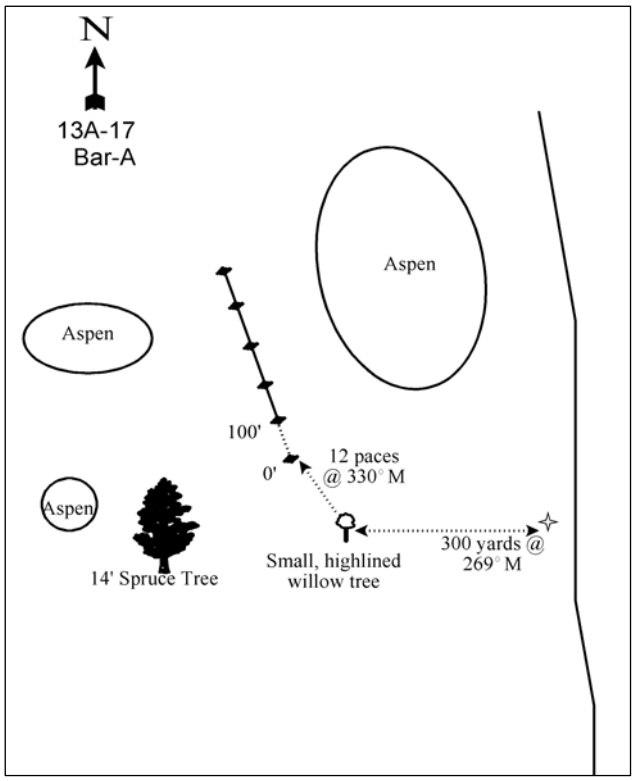
Vegetation Type: Aspen Meadow
Range Type: Crucial Deer Summer (Fawning), Crucial Elk Summer (Calving)
NRCS Ecological Site Description: High Mountain Loam (Aspen), R048AY506UT
Land Ownership: SITLA
Elevation: 9,050 ft (2,758 m)
Aspect: North
Slope: 5%-8%
Transect bearing: 345 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5(95 ft)

Directions:
From the intersection of State Road 128 and the La Sal Mountain Loop Road drive 10.9 miles to Gateway Road. From the intersection of the La Sal Mountain Loop Road and the Gateway Road at the upper end of Castle Valley, travel 12.7 miles towards Gateway, Colorado to the Sally Hollow turnoff. Turn right and stay on the main road for 6.7 miles. Take another right and drive 0.7 miles to a fork. Bear right and drive 0.8 miles to a witness post on the left side of the road. From the witness post walk 300 yards at 269°M to a small highlined willow tree. From the willow tree walk 12 paces at 330°M to the beginning of the frequency baseline. The 0-foot stake is marked with a browse tag # 144.

Map Name: Mount Waas



Diagrammatic Sketch:



Township: 26S, Range: 25E, Section: unsurveyed

GPS: NAD 83, UTM 12S 660729 E 4264552 N

BAR-A - TREND STUDY NO. 13A-17

Site Information

Site Description: The study is located on state land just northeast of Mount Tomasaki. This site is used heavily by elk and livestock in the spring/summer. The area samples a meadow surrounded by aspen (*Populus tremuloides*) trees. Pellet group data estimated moderate elk use and light deer use since 2004. Estimated cattle use has been moderate to moderately heavy since 2004 (Table - Pellet Group Data).

Browse: Browse species are minimal on this summer range and are not critical to this site. Silver sagebrush (*Artemisia cana*) is found in patches on the site and has shown light to moderate use since 2004. Other browse species scattered over the site in small numbers include bush cinquefoil (*Potentilla fruticosa*), Wood's rose (*Rosa woodsii*), snowberry (*Symphoricarpos oreophilus*), and aspen, which surrounds the meadow.

Herbaceous Understory: Herbaceous vegetation forms a diverse and dense understory. Grasses and forbs are abundant with them providing almost all of the vegetation cover. Kentucky bluegrass (*Poa pratensis*), an increaser under moderate to heavy grazing, is the dominant species on the site and provides the majority of the vegetation cover. Other common grass species include smooth brome (*Bromus inermis*), a *Carex sp.*, and Letterman needlegrass (*Stipa lettermani*).

Forbs are more abundant than grasses in frequency and cover on this site. The most common forb species include Rocky Mountain iris (*Iris missouriensis*), western yarrow (*Achillea millefolium*), an *Aster sp.*, thickleaf peavine (*Lathyrus lanszwertii*) and orange sneezeweed (*Helenium hoopesii*). Rocky Mountain iris and orange sneezeweed are both increasers with grazing. They are also poor in forage value for wildlife and livestock, with orange sneezeweed also being poisonous for livestock. Many of the herbaceous species on this site are increasers with heavy grazing.

Soil: The soil is a loam with a deep effective rooting depth and a slightly acidic pH. Phosphorous has a low availability for plant growth and development at 4.9 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The site has good vegetation and litter cover that comes from herbaceous species, with minimal exposed bare ground cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **2004 to 2009 - stable (0):** There is minimal browse on this site.

Grass:

- **2004 to 2009 - stable (0):** The sum of nested frequency of perennial grasses increased slightly and cover increased from 31% to 42%.

Forb:

- **2004 to 2009 - stable (0):** The sum of nested frequency of perennial forbs increased slightly and cover increased from 46% to 64%. There was a significant increase in the nested frequency of the increaser species Rocky Mountain Iris, and a significant decrease in the nested frequency of the increaser species orange sneezeweed.

Trend Summary

HERBACEOUS TRENDS--
Management unit 13A, Study no: 17

Type	Species	Nested Frequency '04	Nested Frequency '09	Average Cover % '04	Average Cover % '09
G	Agropyron trachycaulum	b90	a11	1.20	.36
G	Bromus anomalus	18	26	.16	.72
G	Bromus carinatus	a-	b15	-	.89
G	Bromus inermis	a15	b112	.15	4.95
G	Carex sp.	a21	b81	.38	2.17
G	Festuca ovina	1	-	.03	-
G	Festuca thurberi	b35	a-	2.58	-
G	Koeleria cristata	8	7	.06	.06
G	Muhlenbergia sp.	3	-	.06	-
G	Poa bulbosa	5	-	.15	-
G	Poa pratensis	412	389	23.08	27.53
G	Stipa columbiana	b38	a2	1.57	.03
G	Stipa comata	14	30	.18	.87
G	Stipa lettermani	40	66	1.11	4.02
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		700	739	30.73	41.63
Total for Grasses		700	739	30.73	41.63
F	Achillea millefolium	a284	b354	9.53	17.17
F	Agoseris glauca	27	36	.29	.97
F	Androsace septentrionalis (a)	b25	a-	.13	-
F	Antennaria rosea	25	27	.97	.54
F	Arabis sp.	2	1	.01	.00
F	Arenaria sp.	49	58	.85	1.16
F	Aster sp.	b226	a92	4.76	2.43
F	Calochortus gunnisoni	4	17	.01	.09
F	Carduus nutans (a)	2	-	.03	-
F	Cirsium sp.	30	31	1.26	.57
F	Collomia linearis (a)	8	-	.01	-
F	Crepis acuminata	-	2	-	.03
F	Cymopterus sp.	14	10	.10	.07
F	Erigeron flagellaris	a9	b42	.16	.97
F	Erigeron sp.	a-	b22	-	.51
F	Eriogonum ovalifolium	4	12	.00	.10
F	Geranium richardsonii	a5	b30	.33	.38
F	Helenium hoopesii	b74	a21	4.26	.28
F	Iris missouriensis	a209	b271	13.61	21.02
F	Lathyrus lanszwertii	a144	b236	2.91	10.02
F	Lupinus argenteus	15	21	.34	.83
F	Lupinus sp.	a-	b18	-	.66
F	Mentha sp.	-	6	-	.09
F	Orthocarpus sp. (a)	-	2	-	.00
F	Phlox sp.	b217	a93	3.34	1.56

Type	Species	Nested Frequency '04	Nested Frequency '09	Average Cover % '04	Average Cover % '09
F	Polygonum douglasii (a)	$_{b}$35	$_{a}$-	.18	-
F	Potentilla gracilis	28	26	.53	.49
F	Senecio integerrimus	$_{b}$36	$_{a}$2	.64	.03
F	Stellaria jamesiana	$_{a}$11	$_{b}$55	.10	1.54
F	Taraxacum officinale	119	118	1.88	2.26
F	Thlaspi sp.	-	5	-	.00
F	Tragopogon dubius	5	12	.03	.13
Total for Annual Forbs		70	2	0.35	0.00
Total for Perennial Forbs		1537	1618	46.01	64.00
Total for Forbs		1607	1620	46.36	64.00

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

BROWSE TRENDS--
Management unit 13A, Study no: 17

Type	Species	Strip Frequency '04	Strip Frequency '09	Average Cover % '04	Average Cover % '09
B	Artemisia cana	3	10	.18	.73
B	Potentilla fruticosa	1	0	.15	-
Total for Browse		4	10	0.32	0.73

CANOPY COVER, LINE INTERCEPT--
Management unit 13A, Study no: 17

Species	Percent Cover '04	Percent Cover '09
Artemisia cana	.20	.48
Potentilla fruticosa	.20	-

BASIC COVER--
Management unit 13A, Study no: 17

Cover Type	Average Cover % '04	Average Cover % '09
Vegetation	71.99	81.12
Rock	.87	.09
Pavement	.97	0
Litter	30.81	56.09
Bare Ground	12.83	2.61

SOIL ANALYSIS DATA --
Management unit 13A, Study no: 17, Study Name: Bar-A

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.4	6.1	49	33.5	17.5	6	4.9	192	0.6

PELLET GROUP DATA--
Management unit 13A, Study no: 17

Type	Quadrat Frequency '04	'09	Days use per acre (ha) '04	'09
Rabbit	1	-	-	-
Elk	5	1	21 (51)	21 (53)
Deer	-	-	7 (17)	1 (2)
Cattle	14	2	44 (109)	20 (50)

BROWSE CHARACTERISTICS--
Management unit 13A, 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 cana									
04	**100**	0	100	-	-	80	0	0	19/27
09	**320**	31	69	-	-	0	0	25	18/21
Potentilla fruticosa									
04	**20**	0	100	-	-	0	0	0	17/33
09	**0**	0	0	-	-	0	0	0	16/35
Rosa woodsii									
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	18/18
Symphoricarpos oreophilus									
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	31/27

SUMMARY
WILDLIFE MANAGEMENT UNIT 13A - LA SAL MOUNTAINS

Community Types

There were fourteen Range Trend studies sampled in WMU 13A during the summer of 2009. Six of the studies [Two Mile Chaining (13A-1), Buck Hollow (13A-3), Slaughter Flat (13A-4), Amasas Back (13A-5), Black Ridge (13A-8) and Below Polar Rim (13A-12)] sampled areas that had been chained and seeded in the past to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). All six of the studies that sample chained pinyon and juniper communities are considered to be crucial winter elk habitat. Four of the chained pinyon and juniper sites (13A-3, 13A-4, 13A-8, and 13A-12) are considered to be crucial deer winter habitat, one site (13A-1) is considered crucial deer spring/fall habitat and one site (13A-5) is considered crucial spring/fall/summer deer habitat. Three study sites [Upper Fisher Valley (13A-10), North Beaver Mesa (13A-11) and Lower Lackey Fan (13A-14)] sample Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities. All three studies are considered crucial winter deer habitat, and the 13A-11 and 13A-14 studies are also considered crucial winter elk habitat. One study site [Round Mountain (13A-7)] samples a blackbrush (*Coleogyne ramosissima*) community, which is considered crucial winter deer habitat. One study [Hideout Mesa (13A-15)] samples a burned mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass community that is crucial winter deer and elk habitat. One study [Bald Mesa (13A-6)] samples a mixed mountain brush community that is crucial summer deer and elk habitat. The final two studies [Beaver Creek (13A-16) and Bar-A (13A-17)] sample two high elevation aspen (*Populus tremuloides*) meadows that are considered crucial summer deer and elk habitat for fawning and calving.

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation data from this herd unit were compiled from the La Sal 2 SE, Moab, and Castle Valley Inst. weather stations (Figures 1 and 2). The units 27 year annual mean was 11.24 inches, the 28 year spring (March to May) mean was 2.75 inches, and the 27 year fall (Sept. to Nov.) mean was 3.55 inches. The unit annual precipitation was below 75% of the normal annual mean (drought conditions) in 1989, 1994, 2002, and 2008 (Figure 1). Spring precipitation was below 75% of normal in 1982, 1989, 1991, 2002, 2006, and 2008 (Figure 2). Fall precipitation was below 75% of normal in 1988, 1989, 1992, 1994, 1995, 1999, 2000, 2001 and 2008 (Figure 2) (Utah Climate Summary 2009).

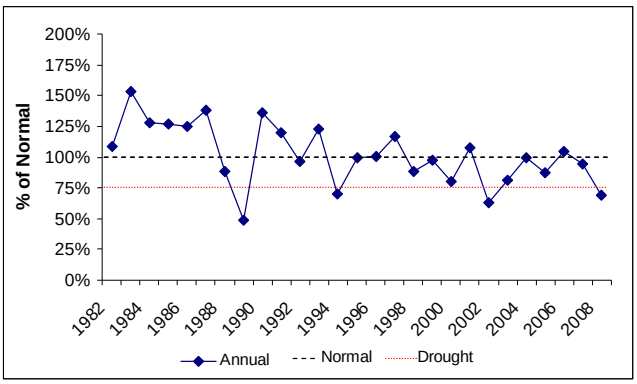


Figure 1. Percent annual precipitation based on the 27 year mean precipitation for WMU 13A, La Sal Mountains. Precipitation data were collected at the La Sal 2 SE, Moab, and Castle Valley Inst. weather stations (Utah Climate Summary 2009).

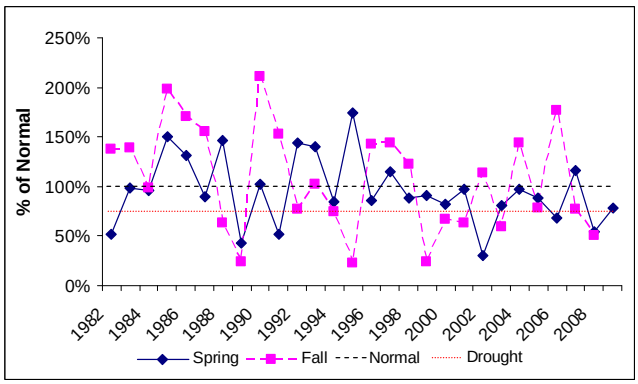


Figure 2. Percent annual precipitation based on the 27 year mean for spring (March-May) and fall (Sept.-Nov.) precipitation for WMU 13A, La Sal Mountains. Precipitation data were collected at the La Sal 2 SE, Moab, and Castle Valley Inst. weather stations (Utah Climate Summary 2009).

Browse

The median browse trend decreased slightly from 1994 to 1999, and again in 2004 (Figure 5). Three sagebrush species were sampled in the unit; Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*), and black sagebrush (*A. nova*). Wyoming big sagebrush was the most common species sampled and was sampled at eight study sites: 13A-4, 13A-5, 13A-7, 13A-8, 13A-8, 13A-11, 13A-12 and 13A-14. The average density of Wyoming big sagebrush decreased significantly between 1999 and 2004 (Figure 3a). Average cover of Wyoming big sagebrush decreased significantly from 1994 to 1999 and then remained similar from 1999 to 2009 (Figure 3b). The average Wyoming big sagebrush population decadence increased significantly from 1999 to 2004 (Figure 3c), corresponding with the decrease in density. Mountain big sagebrush was sampled on three sites in the unit: 13A-1, 13A-6 and 13A-15. The average density of mountain big sagebrush remained similar from 1994 to 2004, with a significant increase in 2009 (Figure 3a). Much of the increase in 2009 is due to a large increase in the recruitment of young plants on the Hideout Mesa study. The average mountain big sagebrush cover decreased significantly from 1994 to 1999, but then increased again in 2004 (Figure 3b). The average population decadence of mountain big sagebrush was relatively high in 1994 at 30%, but steadily decreased through 2004 to 14% and remained low at 13% in 2009 (Figure 3c). Black sagebrush was sampled on only one study, Amasas Back (13A-5) and is therefore not included in this summary discussion. For a summary of the black sagebrush trend, refer to the Amasas Back study discussion.

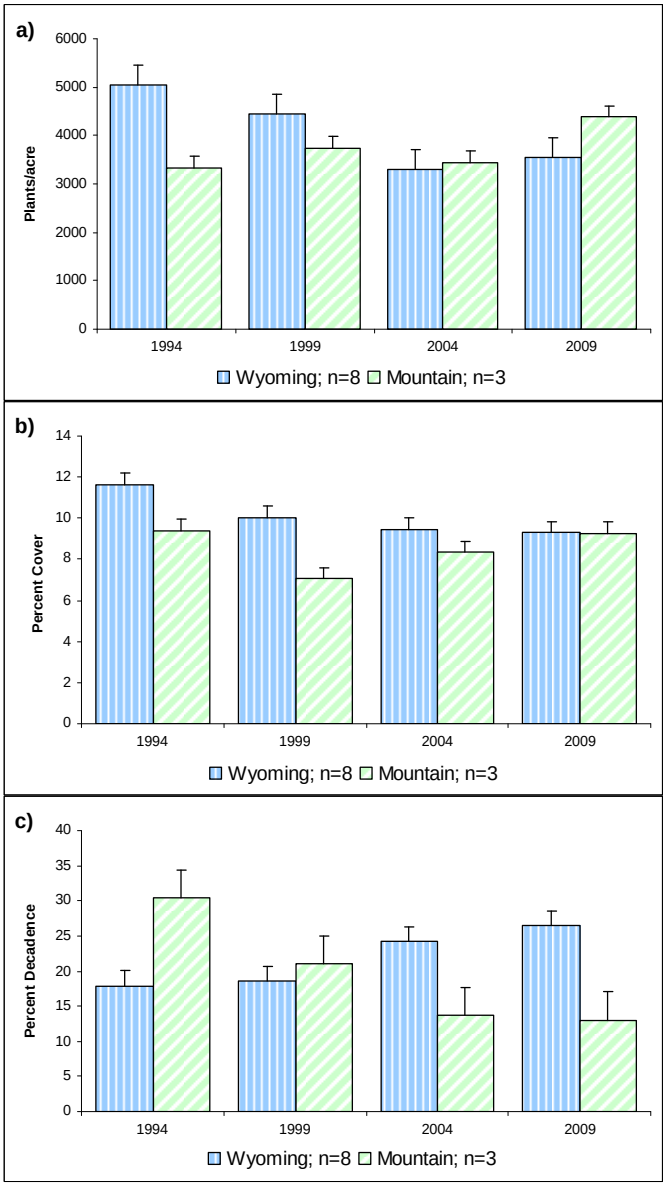


Figure 3. a) Mean density of sagebrush (*Artemisia spp.*) by year for WMU 13A, La Sal Mountains. **b)** Mean cover of sagebrush by year for WMU 13A. **c)** Mean population decadence of sagebrush by year for WMU 13A.

Herbaceous Understory

The median grass trend decreased slightly from 1999 to 2004 (Figure 5). The average perennial grass sum of nested frequency was similar in 1994, 1999 and 2009, but was significantly lower in 2004 than all other sample years (Figure 4a). However, the average cover of perennial grass has steadily increased from 2004 to 2009 (Figure 4b). Cheatgrass (*Bromus tectorum*) has had a relatively low presence on the unit, and has remained relatively similar in nested frequency and cover in all sample years (Figure 4a and 4b). Bulbous bluegrass (*Poa bulbosa*) was sampled on only one site on the unit, Two Mile Chaining (13A-1). For a summary of the bulbous bluegrass trend, refer to the Two Mile Chaining study discussion.

The median forb trend had a large decrease from 1994 to 1999 with slight decreases from 1987 to 1994 and from 1999 to 2004 (Figure 5). The average perennial forb sum of nested frequency was similar in 1994, 2004 and 2009, but was significantly lower in 1999 (Figure 4a). The average cover of perennial forbs was similar

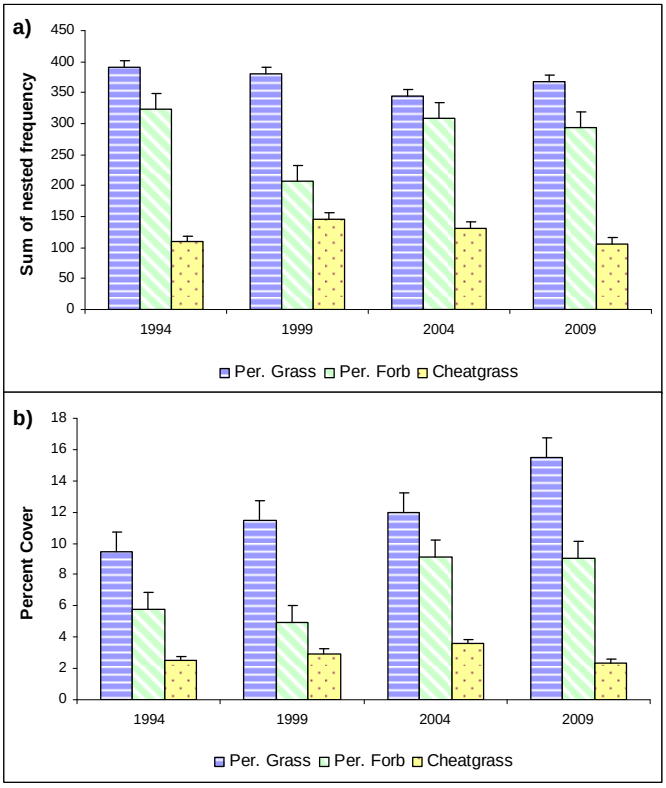


Figure 4. a) Mean perennial grass, perennial forb and cheatgrass sum of nested frequency by year for WMU 13A, La Sal Mountains. **b)** Mean perennial grass, perennial forb and cheatgrass cover by year for WMU 13A.

from 1994 to 1999, then increased significantly from 1999 to 2004 and remained similar in 2009 (Figure 4b). No noxious weeds were sampled on the studies in this herd unit.

Desirable Components Index

Eight studies in this herd unit sampled in 2009 are considered within the low potential scale for the deer Desirable Components Index (DCI), 13A-4, 13A-5, 13A-7, 13A-8, 13A-10, 13A-11, 13A-12 and 13A-14. The average DCI ranking for these studies has decreased slowly, but steadily, from good in 1994 to fair in 2009 (Figure 6 and Table 1). The decrease in DCI scores is due to a slight decrease in both the browse cover scores and the perennial forb cover scores (Table 1). The three remaining deer winter range studies, 13A-1, 13A-3 and 13A-15, are within the mid-level potential scale. The average DCI ranking for these studies has remained relatively steady at fair since 1994, with a slight decrease to poor-fair in 2004 (Figure 6 and Table 2). There were no studies that were considered to be within the high potential scale on this unit.

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	17.8	10.5	5.6	16.3	-2.7	4.4	0.0	**52.0**	Good
99	15.6	10.3	6.7	17.5	-3.0	3.3	0.0	**50.4**	Good
04	14.8	9.7	0.9	18.1	-2.6	2.7	0.0	**43.8**	Fair-Good
09	14.5	8.4	1.7	18.1	-2.7	1.7	0.0	**41.7**	Fair

Table 1. Low potential scale mean deer DCI scores (n=8) by year for WMU 13A, La Sal Mountains. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

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	13.5	5.1	5.2	26.1	0.0	8.7	0.0	**58.6**	Fair
99	11.2	7.1	7.5	27.6	-0.7	7.3	0.0	**60.0**	Fair
04	15.3	7.0	3.6	20.6	-3.1	7.7	0.0	**51.2**	Poor-Fair
09	15.6	7.5	7.5	18.9	-1.1	7.2	0.0	**55.7**	Fair

Table 2. Mid-level potential scale mean deer DCI scores (n=3) by year for WMU 13A, La Sal Mountains. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

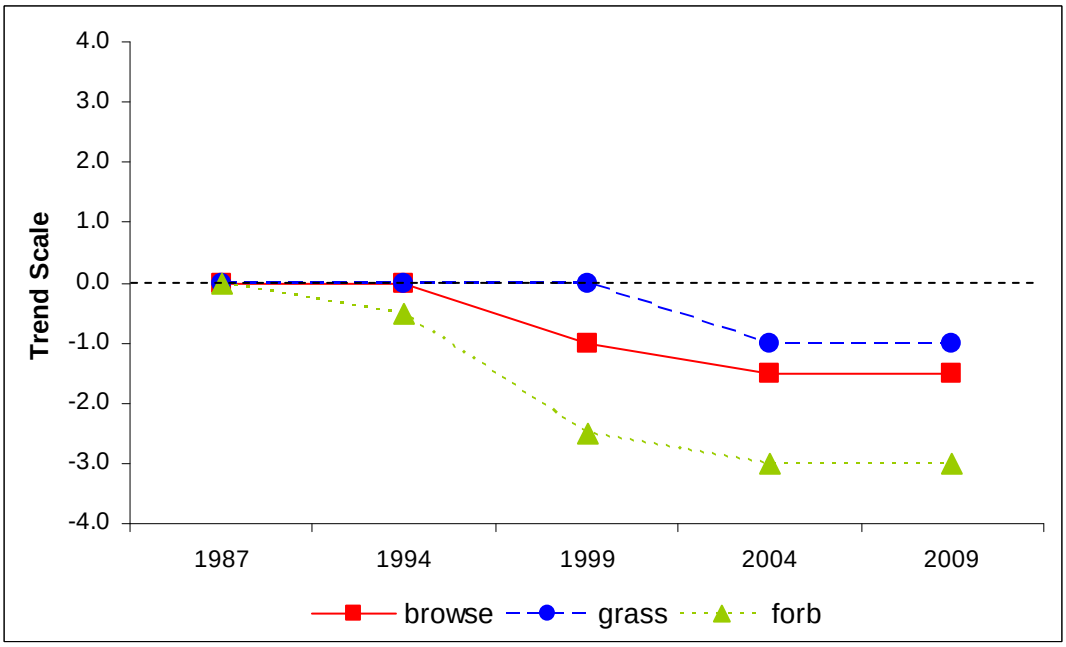


Figure 5. Cumulative median browse, grass and forb trends by year for WMU 13A, La Sal Mountains.

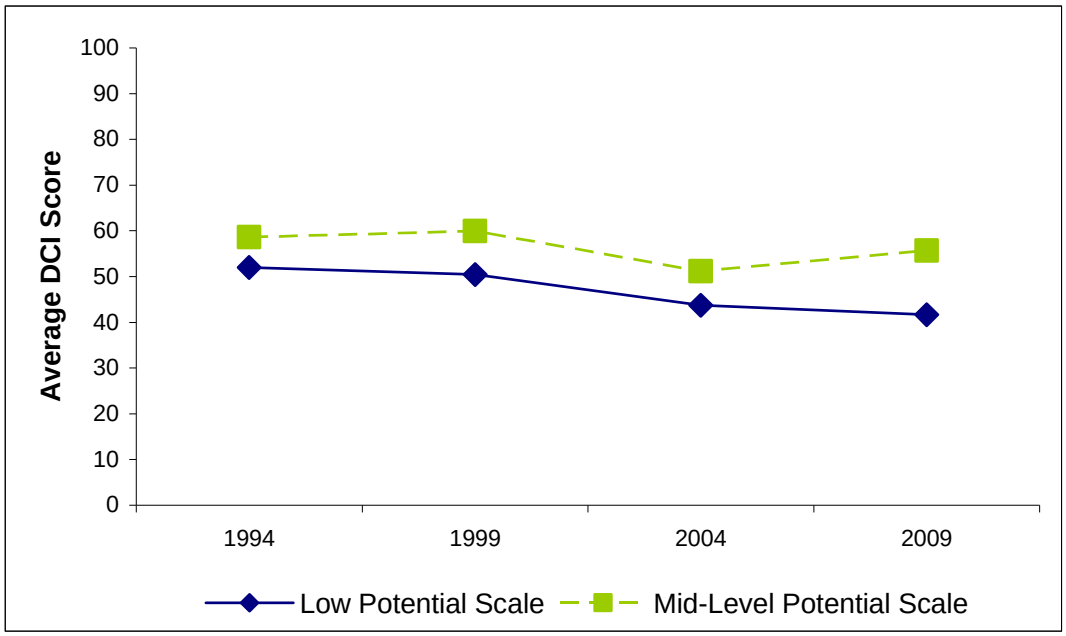
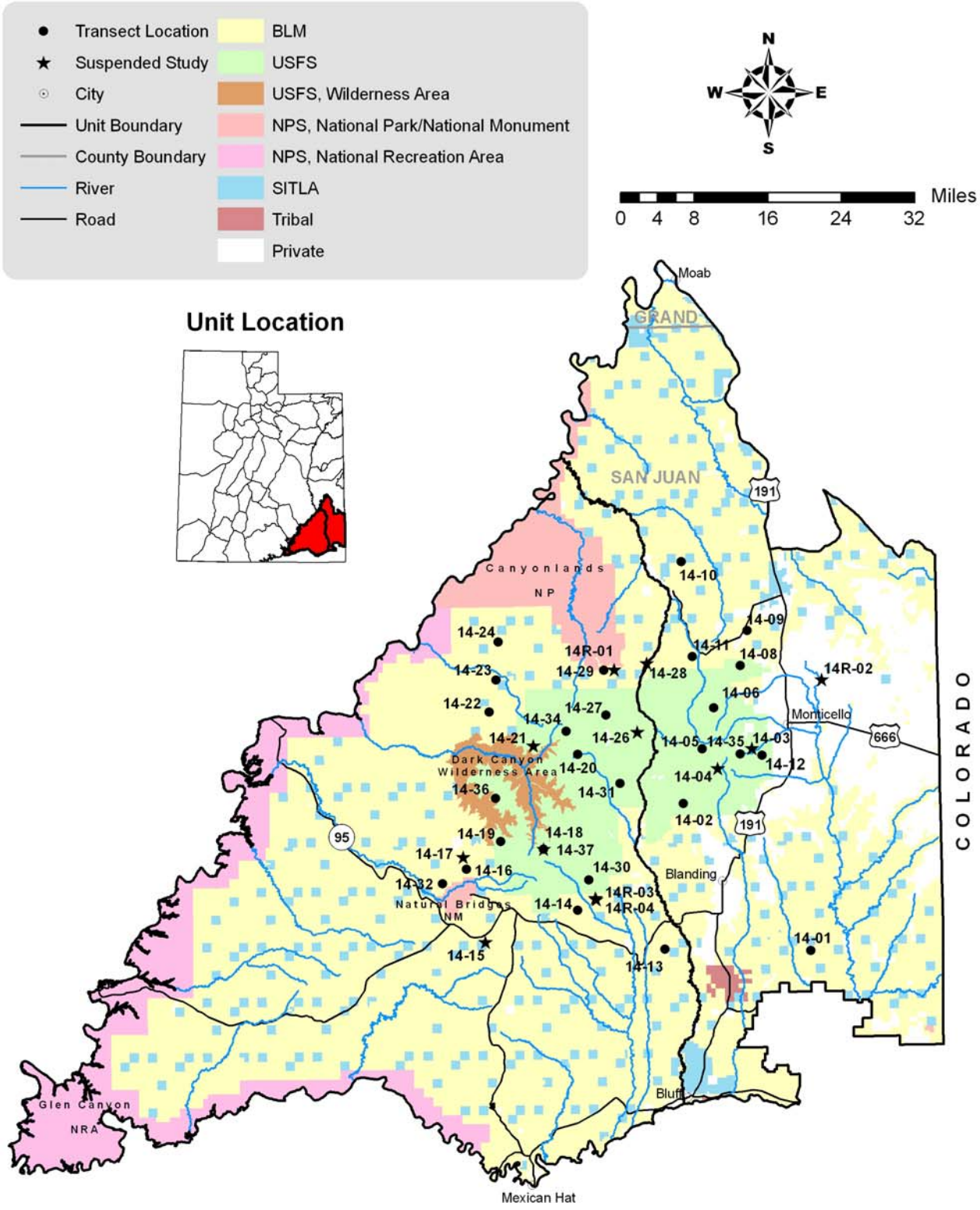


Figure 6. Mean low (n=8) and mid-level (n=3) potential scale deer DCI scores by year for WMU 13A, La Sal Mountains. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

Management Unit 14



WILDLIFE MANAGEMENT UNIT 14 - SAN JUAN

Boundary Description

Grand and San Juan Counties - Boundary begins in Moab at the Junction of the Colorado River and Highway US-191; then south on US-191 to the Big Indian Road; east on this road to the Lisbon Valley Road; east on this road to the Island Mesa Road; east on this road to the Colorado State Line; south on this state line to the Navajo Indian Reservation Boundary; west on this boundary to Lake Powell; north along the east shore of this lake to the Colorado River; north on this river to Moab and beginning point.

Management Unit Description

Management unit 14 is a combination of old deer herd units 35 (Abajo Mountains) and 36 (Elk Ridge). It is a very large unit with summer and winter ranges covering over 2 million acres. The U.S. Forest Service administers 80% of the summer range and the BLM 19%. Fifty-six percent of the winter range on unit 14 is on BLM land with another 17% on Forest Service lands. Private land occupies 18% of the winter range and National Parks 3%.

Abajo Mountains

The San Juan-Blue Mountain portion of unit 14 covers a large portion of the eastern side of San Juan County in southeastern Utah. It is a climatically and topographically diverse area. Elevation ranges from 4,500 feet near Bluff to 11,445 feet on Abajo Peak. The Abajo Mountains, found in the west-central part of the unit, contain the unit's summer range. These mountains typically have steep slopes and rugged canyons which have well developed vegetation communities except for the rocky peaks above timberline. The highest meadow slopes have been terraced to slow destructive erosion caused by historic overgrazing. From the base of the mountain, gentle slopes extend out into the flat mesas and rough desert canyon lands which constitute the majority of the unit's land area. Major drainages are Indian Creek and Hatch Wash which flow north to the Colorado River and Cottonwood, Johnson, Recapture, Verdure, and Montezuma Creeks which flow east and south to the San Juan River. Municipalities include Monticello, Blanding, Bluff, and Montezuma Creek.

The normal winter range is found on various sized and shaped mesas at middle elevations. The upper elevation limit of most deer use during normal winters is approximately 7,000 feet. During mild winters, however, the range may remain open up to 8,000 feet. The desert shrub type is found at low elevations along the northern boundary. This type is used by deer only in the most severe winters. The sagebrush-grass and pinyon-juniper types are found side by side on the mesa tops of the normal winter range which are very important to wintering deer. The sagebrush-grass type provides quality forage while the pinyon-juniper type, though relatively unproductive, provides important thermal cover. The pinyon-juniper-mountain brush type is the most productive, but is usually excluded from use by deep snow during the more harsh winters. The pinyon-juniper-sagebrush type is scattered throughout larger tracts of pinyon-juniper and is also important during severe winters.

The summer range is centered on and extending down the peaks of Blue Mountain to about 8,000 feet. The lower limit on the north and east sides of the mountain are closer to 7,600 feet (Giunta and Musclow 1983). Oakbrush is the dominant vegetation type at the lower reaches of the summer range. There is a mixed interspersion of oakbrush, sagebrush-grass, and forest types that provides the essential cover and forage requirements for fawning and calving. The slopes of the middle elevation summer range are dominated by mixed mountain brush. Subalpine forest, aspen, and grass-shrub lands are prevalent at higher elevations.

Heavy livestock use beginning in the late 1800's caused deterioration of much of the range. According to 1940's records, over 4,000 cattle and 72,000 sheep were using the winter range each year (Mann and Wallace 1983). Range use is much more controlled and conditions have improved since then. Extensive areas of pinyon-juniper were chained and seeded in the 1960's. Although wildlife cover requirements were not considered at the time (chained areas were large and usually square with no regard for cover or edge effect),

they still provided many benefits to the big game populations. Alkali Flat and Harts Draw are the most critical deer wintering areas. Other areas of concentration are Shay Mesa, Indian Creek, Deerneck Mesa through Step Hill, Cedar Point, Montezuma Canyon, and Recapture Wash.

Major land uses on the unit are grazing, farming, timber, mining (mainly uranium and gold), and gas exploration and production. In recent years with falling uranium prices, mining activities have decreased while oil and gas exploration have increased. There has been some more recent development and increased activity on the crucially important Harts Point winter range.

Elk Ridge

The Elk Ridge unit was previously referred to as Unit 31B but was changed to Unit 36 in the spring of 1992. It was then combined with Unit 35 and renamed Wildlife Management Unit 14 - San Juan in 1998. The Elk Ridge portion of unit 14 is located in the western half of San Juan County. Elk Ridge, a long, flat, sedimentary plateau located along the central portion of the east boundary bordering the Abajo Mountains, is the dominant topographic feature. Horse Mountain, found at the north end of Elk Ridge, is the highest point at approximately 9,200 feet. Elk Ridge itself is relatively level and ranges from 8,600 feet at the north end to 8,400 feet at the south end. Surrounding the steep slopes below Elk Ridge are numerous flats which provide most of the winter range on the unit. These flats are at elevations of 5,000 to 6,000 feet and dissected by numerous deep slickrock canyons which end at the San Juan and Colorado Rivers at about 4,000 feet. The most prominent drainages are South Cottonwood Wash, Butler Wash, and Comb Wash which drain into the San Juan River; and Beef Basin Wash, Dark Canyon, White Canyon, and North Cottonwood Wash which drain into the Colorado River. Two small communities, Bluff and Mexican Hat, are located along the unit's southern boundary. The unit boundaries encompass Natural Bridges National Monument and part of Canyonlands National Park.

The primary winter range is found between 5,000 and 7,000 feet on the slopes and throughout the large flats surrounding Elk Ridge. Beef Basin, Salt Creek Mesa, Dark Canyon Plateau, and Black Mesa are the most prominent winter concentration areas. Coles and Pederson (1968) identified seven vegetation types in their survey of the winter range.

The sagebrush-grass type, dominated by *Artemisia* shrubs, blue grama and needle-and-thread grass, are found in Beef Basin and on Black Mesa, two important crucial winter ranges. The mountain brush-grass type occupies the upper 1% of the winter range and has the highest rate of production. However, this type is inaccessible during severe winters. The pinyon-juniper type is most prominent and occupies the majority of the winter range. This type is relatively unproductive but provides good thermal and escape cover for deer that use the adjacent, more productive types. Pinyon-juniper with mountain brush, like the mountain brush type, is found in the upper elevations of the winter range. It provides quality deer forage in normal winters but can be inaccessible to deer in severe winters. The pinyon-juniper-sagebrush type is fairly open and interspersed throughout larger tracts of pinyon-juniper woodland and is important to wintering deer in both normal and severe winters. Chaining projects done mostly in the 1960's to improve range for livestock have also benefitted big-game, and are located throughout the unit. Most of the treated and seeded areas are within pinyon-juniper communities. With trends on most overused sagebrush communities going down, herbicide and seeding treatments have been done on several areas to open up the sagebrush and make them more productive and increase their vigor.

Livestock grazing is the primary land use for the herd unit. Pioneers began grazing livestock in the 1880's. By the 1940's, records indicate that over 10,000 cattle and 12,000 sheep were authorized to graze on the winter range. Plummeting sheep and wool prices in the 1950's caused ranchers to convert to cattle operations. Since the 1960's, approximately 4,500 cattle have been authorized to graze on the winter range. In addition, 2,127 cattle and 49 horses are permitted to graze on six allotments on the summer range. Other important land uses are logging, oil and gas exploration, mining, wood cutting, and recreation. Extensive areas of Elk Ridge are covered by ponderosa pine that provides large amounts of quality saw timber. Most of the area has been logged once and selective cuts are scheduled for the future. Oil and gas exploration has increased in recent

years while mining operations are suspended due to low uranium prices. Activities associated with these land uses need to be closely monitored and steps taken to minimize and mitigate negative impacts on the water quality and on the range and associated wildlife populations.

Early Indian pictographs and petroglyphs found in the area indicate the presence of deer, desert bighorn, and bison (Rawley 1985). Historical accounts indicate that mule deer were abundant when settlers first came into the area in the 1870's and 1880's. Due to heavy hunting pressure and excessive livestock grazing which resulted in very poor range conditions, deer numbers had reached a low between 1900 and 1910. With the inception of the U.S. Forest Service and grazing restrictions, and under the "buck only" hunting law enacted by the legislature in 1913, the deer herd began increasing again. By the 1940's, managers became concerned that deer numbers were exceeding the carrying capacity of their winter range. Antler less permits, second and third deer permits and post season hunts were all strategies used to reduce deer numbers.

Range Trend Studies

Abajo Mountains

The deer winter range of the San Juan-Blue Mountain unit was inventoried by Coles and Pederson in 1966 (published in 1967 as Pub. No. 67-1). They inventoried the summer range in 1967 (Coles and Pederson 1968). In 1981, 9 permanently staked line-intercept transects were established on the summer range with the intention of obtaining baseline data for monitoring range trend (Giunta and Musclow 1983). In the spring of 1986, local interagency personnel selected four of the most crucial line-intercept studies to be reread [Alkali Point (14-1), Harts Draw (14-9), Harts Point (14-10) and Shay Mesa (14-11)] and replaced with the interagency trend studies. These four studies have continued to be monitored through 2009. Four additional interagency trend studies were established in the summer of 1986 and monitored through 2009 [Brushy Basin (14-2), Jackson Ridge (14-5), Harts Draw Reservoir (14-6) and Peters Point (14-8)]. In 1994, an additional study [Shingle Mill (14-12)] was established and monitored through 2009. In 2009, a new study was established to monitor deer summer range [Dickson Gulch (14-35)]. Three studies [Gold Queen Basin (14-3), Camp Jackson Reservoir (14-4) and Shay Mountain (14-7)] have been suspended for various reasons and were not reread in 2009.

Elk Ridge

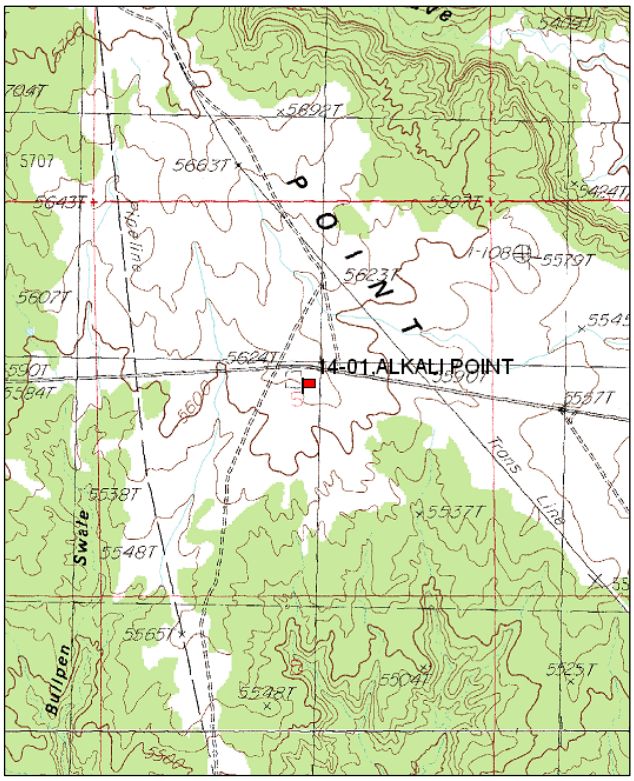
Twelve line-intercept transects were established on the Elk Ridge portion of unit 14 in 1981. Two of the 12 were reread and replaced by interagency trend studies in 1986 and have continued to be monitored through 2009 [Black Mesa (14-13) and Texas Flat (14-14)]. An additional seven study sites were selected and added in 1986 that have continued to be monitored through 2009 [Lower Lost Park (14-16), Woodenshoe (14-19), Gooseberry (14-20), Wild Cow Point (14-22), South Plain (14-23), Ruin Park (14-24) and Mormon Pasture Point (14-27)]. Three new sites were established in 1992 [Salt Creek Mesa (14-29), Milk Ranch Point (14-30) and Chippean Ridge (14-31)], and one new site in 1994 [Lower Deer Flat (14-32)] that have had continued monitoring through 2009. In 2004, two summer range sites [North Long Point (14-21) and The Wilderness (14-26)] were suspended and replaced with a new study [Big Flat (14-34)], which is in more of a key area. Two additional studies were established in 2009 [Dry Mesa (13-36) and Kilgalia Point II (13-37)]. Kilgalia Point II was established adjacent to the original Kilgalia Point (14-18) study, which was suspended due to the construction of a wildlife exclosure around the study transect. In addition to those already mentioned four studies [Harmony Flat (14-15), Deer Flat (14-17), Davis Pocket (14-25) and North Cottonwood (14-28)] have been suspended for various reasons and were not reread in 2009.

ALKALI POINT - TREND STUDY NO. 14-1-09

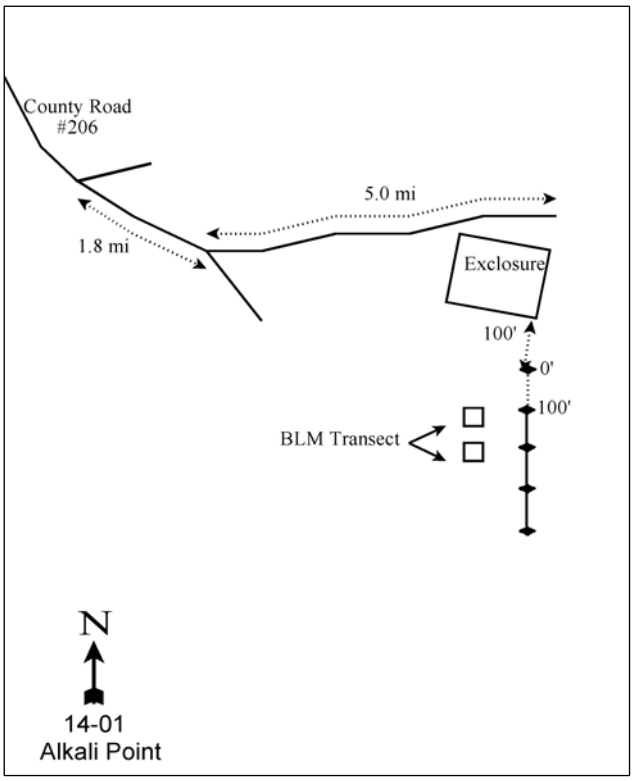
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Semidesert Loam (Wyoming Big Sagebrush), R035XY209UT
Land Ownership: BLM
Elevation: 5,600 ft (1,707 m)
Aspect: West
Slope: 5%
Transect bearing: 180 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
Turn east by A & M Propane 0.2 miles south of the UDOT shed on the south end of Blanding on SR-l91. Go 1.15 miles. Turn right (south) on county road #206 and travel along the main gravel road 7.0 miles to a fork. Stay right (passing the turnoff to "mustang", county road #207) and proceed 1.8 miles to another fork. Stay left and go 5 miles. Stop at the northeast corner of the exclosure. The transect starts 100 feet off the southeast corner (in line with the east boundary fence) and runs south from there. The 0-foot baseline stake is a fence post marked with a browse tag.

Map Name: Bradford Canyon



Diagrammatic Sketch:



Township: 38S, Range: 24E, Section: 5

GPS: NAD 83, UTM 12S 649869 E 4153067 N

ALKALI POINT - TREND STUDY NO. 14-1

Site Information

Site Description: The study samples an area that is an important wintering area for deer moving southwest off the Abajo Mountains. The long and flat tablelands are cut by intermittent-flow canyons which support pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands with open Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flats. This study is in a Wyoming big sagebrush community that has been invaded by cheatgrass. Water is limited on the flat. Pellet group data indicates very heavy use by deer and light to minimal use by elk and cattle since 1999 (Table - Pellet Group Data). Human activity in the area includes gas and oil exploration, drilling, pipeline and road construction, livestock grazing, and recreational activities.

Browse: The dominant browse species is Wyoming big sagebrush which provides the majority of the browse cover, but has been declining since 1994 (Table - Browse Trends). The density of Wyoming big sagebrush has also been declining since 1994. The sagebrush stand is overly mature with no sign of reproduction and high decadence found during all readings. The proportion of sagebrush plants displaying poor vigor has been very high since 2004. Sagebrush plants have displayed mostly heavy use over the sample years. Broom snakeweed (*Gutierrezia sarothrae*) has comprised a significant component of the community in many sample years, but was not sampled in 2009 (Table - Browse Characteristics). There are a few mature juniper trees on the flat, but they do not appear to be aggressively increasing and provide very little escape or thermal cover.

Herbaceous Understory: The herbaceous understory is poor and dominated by annual grasses, primarily cheatgrass (*Bromus tectorum*), which is the dominant species on the site. Cheatgrass provides nearly all of the grass cover on the site. Bottlebrush squirreltail (*Sitanion hystrix*) was common at the outset of the study, but declined significantly in 1999 and has not increased since. Forbs are lacking on the site with many annual species present (Table - Herbaceous Trends).

Soil: The soil is a sandy clay loam with a slightly alkaline pH and a moderately deep effective rooting depth. Phosphorus and potassium levels are both limiting to plant growth and development at 5.8 ppm and 54.4 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Protective ground cover is composed primarily of sagebrush with an understory of annual cheatgrass. Bare ground cover has fluctuated, but has been mostly moderately high since 1994 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1994 - slightly down (-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 remained high and the proportion of plants displaying poor vigor increased from 21% to 49%. There has been no new recruitment of young sagebrush plants.
- **1994 to 1999 - down (-2):** Density of sagebrush decreased by 19% from 2,680 plants/acre to 2,160 plants/acre, and cover decreased from 11% to 9%. Decadence of sagebrush increased from 63% to 80%, but poor vigor decreased to 18%.
- **1999 to 2004 - slightly down (-1):** There was little change in the density of sagebrush, but cover decreased to 7%. Decadence increased to 80% and poor vigor increased to 85% of the population. There is still no new recruitment of young sagebrush plants.
- **2004 to 2009 - down (-2):** The density of sagebrush decreased by 21% to 1,660 plants/acre, and cover decreased to 4%. Decadence and poor vigor both decreased slightly, but remained very high at 82% and 75%, respectively. No young sagebrush plants were sampled.

Grass:

- **1986 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial grasses decreased by 78% and cover decreased from 2% o less than 0.5%. There was a significant decrease in the nested frequency of bottlebrush squirreltail and a significant increase in the nested frequency of cheatgrass. Cheatgrass cover increased from 4% to 23%.
- **1999 to 2004 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses. The nested frequency of cheatgrass and sixweeks fescue both decreased significantly.
- **2004 to 2009 - stable (0):** The site is still dominated by cheatgrass with little change in the sum of nested frequency of perennial grasses.

Forb:

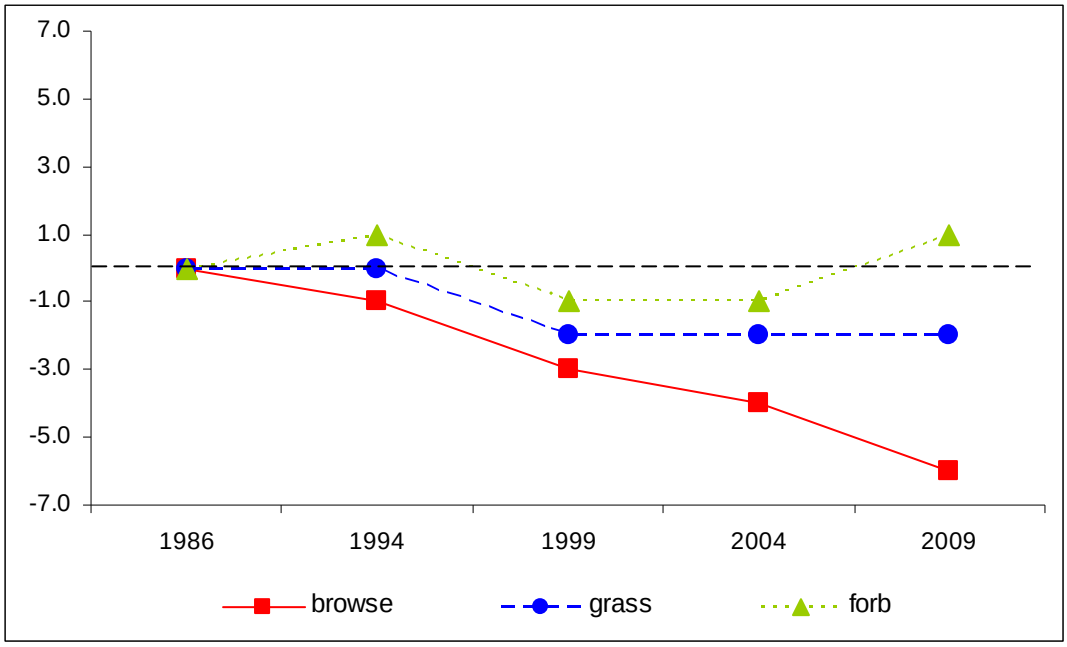
- **1986 to 1994 - slightly up (+1):** The sum of nested frequency of perennial forbs increased, but cover is still only 1%.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased markedly. Perennial forbs were almost nonexistent on the site with almost no cover.
- **1999 to 2004 - stable (0):** The sum of nested frequency of perennial forbs increased slightly, but the sum of nested frequency of annual forbs increased substantially. Almost all of the forb cover was provided by annual forbs.
- **2004 to 2009 - up (+2):** There was a substantial increase in the sum of nested frequency and cover of perennial forbs. The increase was almost entirely due to an increase in Fendler euphorbia (*Euphorbia fendleri*).

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 14, study no: 1

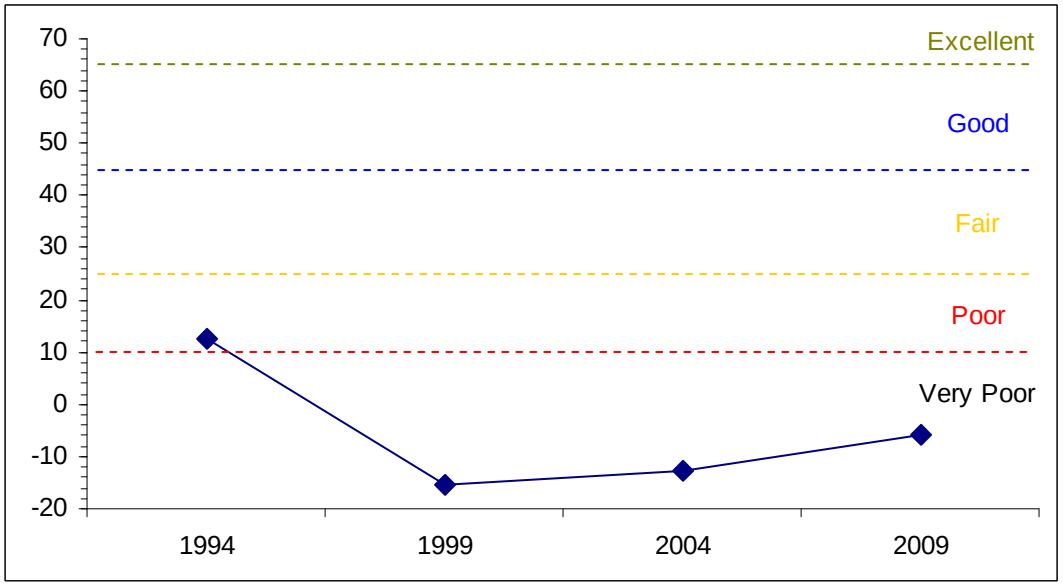
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	14.1	-3.9	0.0	3.5	-3.0	2.0	0.0	**12.7**	Poor
99	10.9	-9.0	0.0	0.8	-18.2	0.0	0.0	**-15.5**	Very Poor
04	9.3	-12.0	0.0	0.5	-10.8	0.3	0.0	**-12.7**	Very Poor
09	4.8	0.0	0.0	0.6	-14.1	2.8	0.0	**-5.9**	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 1



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 14, Study no: 1



HERBACEOUS TRENDS--
Management unit 14, Study no: 1

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
G	Bromus tectorum (a)	-	a287	b388	a261	a273	3.65	22.55	14.39	18.83
G	Hilaria jamesii	5	11	6	6	11	.12	.16	.07	.21
G	Oryzopsis hymenoides	-	9	6	7	3	.19	.04	.09	.03
G	Sitanion hystrix	b111	b105	a16	a8	a9	1.42	.20	.10	.07
G	Vulpia octoflora (a)	-	b171	b159	a9	a8	.36	1.65	.02	.01
Total for Annual Grasses		0	458	547	270	281	4.01	24.21	14.41	18.85
Total for Perennial Grasses		116	125	28	21	23	1.74	0.40	0.26	0.31
Total for Grasses		116	583	575	291	304	5.75	24.62	14.67	19.16
F	Astragalus convallarius	13	9	6	14	5	.02	.01	.05	.01
F	Astragalus mollissimus	4	-	-	-	-	-	-	-	-
F	Astragalus nuttallianus (a)	-	a-	a-	b182	a-	-	-	2.12	-
F	Astragalus sp.	a-	b48	a-	a-	a-	.12	-	-	-
F	Cordylanthus sp. (a)	a6	b60	a-	a-	a3	.25	-	-	.15
F	Cryptantha sp.	-	13	-	-	-	.06	-	-	-
F	Cymopterus acaulis	-	2	-	-	-	.00	-	-	-
F	Descurainia pinnata (a)	-	-	-	5	-	-	-	.01	-
F	Eriogonum cernuum (a)	-	-	-	2	-	-	-	.03	-
F	Erodium cicutarium (a)	-	a7	b49	b34	b59	.01	.33	.53	.87
F	Euphorbia fendleri	a13	a-	a-	a-	b162	-	-	-	1.09
F	Gilia sp. (a)	-	4	-	3	-	.01	-	.00	-
F	Lappula occidentalis (a)	-	b26	a-	c44	a4	.05	-	.97	.03
F	Navarretia intertexta (a)	-	-	7	11	-	-	.01	.02	-
F	Phlox longifolia	-	2	-	3	3	.01	-	.00	.00
F	Plantago patagonica (a)	-	7	2	5	4	.04	.00	.01	.03
F	Sphaeralcea coccinea	a5	b17	a-	b10	b16	.80	-	.10	.30
Total for Annual Forbs		6	104	58	286	70	0.35	0.35	3.71	1.10
Total for Perennial Forbs		35	91	6	27	186	1.01	0.01	0.17	1.41
Total for Forbs		41	195	64	313	256	1.37	0.37	3.88	2.52

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

BROWSE TRENDS--
Management unit 14, Study no: 1

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	65	67	61	55	11.27	8.68	7.43	3.81
B	Chrysothamnus nauseosus	4	0	0	0	.00	-	-	-
B	Echinocereus sp.	0	1	1	1	-	.00	.15	.03
B	Gutierrezia sarothrae	74	61	93	0	2.88	1.33	6.14	.00
B	Juniperus osteosperma	0	0	0	0	.63	.00	.85	.85
B	Opuntia sp.	5	0	0	0	.03	-	-	-
Total for Browse		148	129	155	56	14.82	10.02	14.58	4.70

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 1

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata wyomingensis	-	5.51	4.71
Gutierrezia sarothrae	-	5.91	-
Juniperus osteosperma	.60	1.00	1.56

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 1

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.3	1.3

BASIC COVER--
Management unit 14, Study no: 1

Cover Type	Average Cover %				
	'86	'94	'99	'04	'09
Vegetation	3.00	22.54	32.62	33.73	24.41
Rock	1.00	.03	.68	.24	.45
Pavement	.25	.20	.02	.01	.01
Litter	45.75	24.08	41.93	30.83	52.59
Cryptogams	8.00	1.78	1.97	.80	1.29
Bare Ground	42.00	52.84	30.11	45.40	36.15

SOIL ANALYSIS DATA --
Management unit 14, Study no: 1, Study Name: Alkali Point

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.8	7.4	62.9	14.6	22.6	1.7	5.8	54.4	0.4

PELLET GROUP DATA--
Management unit 14, Study no: 1

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	67	36	4	23
Elk	6	-	-	1
Deer	43	37	53	48
Cattle	-	5	-	3

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	2 (5)	-
135 (333)	103 (255)	119 (294)
2 (5)	4 (11)	12 (29)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 1

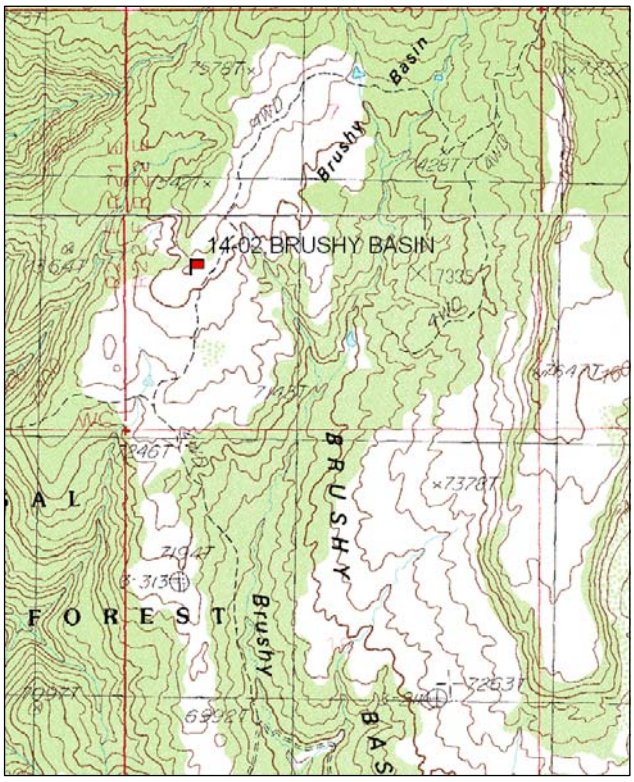
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis									
86	**4399**	0	35	65	-	12	88	21	22/23
94	**2680**	0	37	63	120	26	13	49	23/35
99	**2160**	0	20	80	-	52	46	18	26/33
04	**2100**	0	10	90	20	35	64	85	23/32
09	**1660**	0	18	82	20	40	52	75	26/37
Chrysothamnus nauseosus									
86	**0**	0	0	0	-	0	0	0	-/-
94	**100**	0	80	20	40	0	0	0	-/-
99	**0**	0	0	0	-	0	0	0	-/-
04	**0**	0	0	0	-	0	0	0	-/-
09	**0**	0	0	0	-	0	0	0	-/-
Echinocereus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	8/13
04	**20**	0	100	-	-	0	0	0	6/15
09	**20**	0	100	-	-	0	0	0	7/20
Gutierrezia sarothrae									
86	**5999**	4	96	0	199	1	2	0	8/9
94	**6840**	23	73	3	2380	0	0	2	8/9
99	**4660**	14	84	2	80	7	0	.85	9/9
04	**31760**	14	86	1	-	8	0	31	6/7
09	**0**	0	0	0	-	0	0	0	-/-
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
94	**120**	17	67	17	20	0	0	0	2/4
99	**0**	0	0	0	-	0	0	0	-/-
04	**0**	0	0	0	-	0	0	0	4/10
09	**0**	0	0	0	-	0	0	0	4/14

BRUSHY BASIN - TREND STUDY NO. 14-2-09

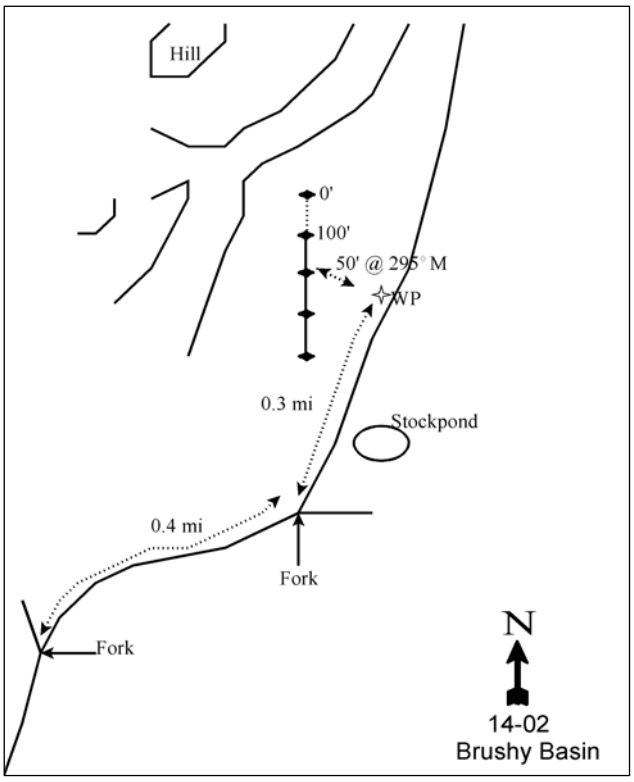
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Spring/Fall, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 7,400 ft (2,256 m)
Aspect: Southeast
Slope: 12%
Transect bearing: 180 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From Blanding, go northwest on the mountain road (toward the Causeway, Elk Ridge) to a junction 0.6 miles beyond the Forest Service boundary. Turn left. After 0.05 miles, go straight through an intersection and continue 0.6 miles to a fork. Turn left. Go 0.75 miles to another fork, turn right. Turn right again after 0.7 miles. Proceed 0.4 miles and stay left at the fork. After 0.3 miles you reach the edge of a chaining. Continue 0.1 miles to a fork. Turn right. Go 0.1 miles, pass a stockpond and continue 0.2 miles to a witness post (green fence post) 10 feet off the west side of the road. From the witness post, walk 50 feet at 295°M to the 200 stake. The 0 foot baseline stake is found 200 feet to the north, and has browse tag #7869 attached.

Map Name: Manco Jim Butte



Diagrammatic Sketch:



Township: 35S, Range: 22E, Section: 7

GPS: NAD 83, UTM 12S 627520 E 4178828 N

BRUSHY BASIN - TREND STUDY NO. 14-2

Site Information

Site Description: The study is located in the foothills south of the Abajo Mountains about 10 miles northwest of Blanding. The area is managed by the U.S. Forest Service and is part of a 1,400 acre chaining and seeding project done in 1971. Water is available in a stock pond about 0.2 miles down the road. The Brushy Basin unit is one of three units on a rest-rotation grazing system on the Camp Jackson Allotment. The area is a transition zone of Ponderosa pine (*Pinus ponderosa*), Gambel oak (*Quercus gambelii*), serviceberry (*Amelanchier utahensis*), sagebrush (*Artemisia spp.*), pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Pellet group data has indicated somewhat fluctuating deer use, but deer use has been mostly light to moderate since 1994. Estimated elk use has been moderate since 1994. Estimated cattle use was moderate in 1999, but has been light since 2004.

Browse: There is a good mixture of Utah serviceberry (*Amelanchier utahensis*), antelope bitterbrush (*Purshia tridentata*), and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) on the site with mountain big sagebrush being the dominant species in cover (Table - Browse Cover). The mountain big sagebrush population is mostly mature, but decadence has been low and recruitment of young sagebrush plants good over the length of the study. The number of sagebrush plants displaying poor vigor has been low in most years, but increased markedly in 2009. Utilization of sagebrush on the site has fluctuated from light to heavy use over the sample years. The Utah serviceberry population is comprised of mostly large, mature plants, but recruitment of young serviceberry plants has increased since 2004. Utilization of serviceberry has been mostly light to moderate over the sample years. Antelope bitterbrush is scattered over the site and is also mostly mature, but decadence is mostly low. Utilization of bitterbrush has been quite heavy over the sample years which has led it to have a prostrate growth form (Table - Browse Characteristics). Other preferred browse that occur on the site in low density and cover are true mountain mahogany (*Cercocarpus montanus*), dwarf rabbitbrush (*Chrysothamnus depressus*), and Gambel oak (*Quercus gambelii*). Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) are present in the chaining, but do not appear to be increasing greatly in size or density (Table - Point-Quarter Tree Data).

Herbaceous Understory: Herbaceous species are important on deer spring-fall transition range and elk winter range. In 1986, there was a vigorous and diverse stand of native and seeded grasses. Since then, the grass understory has declined somewhat, mostly due to a decrease in the nested frequency of intermediate wheatgrass (*Agropyron intermedium*) and mutton bluegrass (*Poa fendleriana*). These two species and crested wheatgrass (*Agropyron cristatum*) provide the majority of grass cover on the site. Perennial forbs are quite diverse, but do not provide an abundant source of forage. The most common forb is mat penstemon (*Penstemon caespitosus*) (Table - Herbaceous Trends).

Soil: This site has variable soils, generally deep loam surface soils with clay loam subsoil with a neutral pH and a deep effective rooting depth (Table - Soil Analysis Data). Litter cover is abundant, with most of the litter as persistent debris left from the chaining. Bare ground cover has been low to moderate over the sample years (Table - Basic Cover). In 1999, there was evidence of sheet erosion and roads and trails in the area showed active soil movement from high intensity summer storm events. The soil erosion condition was classified as stable in 2004, but was slight in 2009 due to flow patterns, and surface litter, surface rock and soil movement.

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 populations of any of the preferred browse species.

- **1994 to 1999 - up (+2):** The density of the primary browse species, mountain big sagebrush, increased by 25% from 2,320 plants/acre to 2,920 plants/acre, and cover increased from 5% to 7%. Recruitment of young sagebrush plants increased from 6% to 45% of the population. Density of bitterbrush decreased slightly, but recruitment of young bitterbrush plants increased from 3% to 17% of the population.
- **1999 to 2004 - stable (0):** There was little change in the cover or density of mountain big sagebrush. Decadence and vigor of sagebrush, and the recruitment of young sagebrush plants remained good. There was a slight increase in the density of serviceberry and a large increase in the density of bitterbrush, but bitterbrush is still not common.
- **2004 to 2009 - up (+2):** There was a 31% increase in the density of mountain big sagebrush to 3,920 plants/acre and cover increased to 9%. Decadence of sagebrush increased slightly, but remained good. However, the number of sagebrush plants displaying poor vigor increased from 3% to 30%. Recruitment of young sagebrush plants decreased, but still comprised 11% of the population. Recruitment of young serviceberry plants has increased slightly.

Grass:

- **1986 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 48% with a significant decrease in nested frequency of crested wheatgrass, smooth brome (*Bromus inermis*), and a *Carex sp.*
- **1994 to 1999 - slightly down (-1):** There was a 16% decrease in the sum of nested frequency of perennial grasses and cover decreased from 12% to 7%. There was a significant decrease in the nested frequency of intermediate wheatgrass.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 52% and cover decreased to 4%. There was a significant decrease in the nested frequency of crested wheatgrass, intermediate wheatgrass, and mutton bluegrass.
- **2004 to 2009 - slightly up (+1):** There was a 22% increase in the sum of nested frequency of perennial grasses, though levels are still lower than in 1999. Cover of perennial grasses increased to 6%.

Forb:

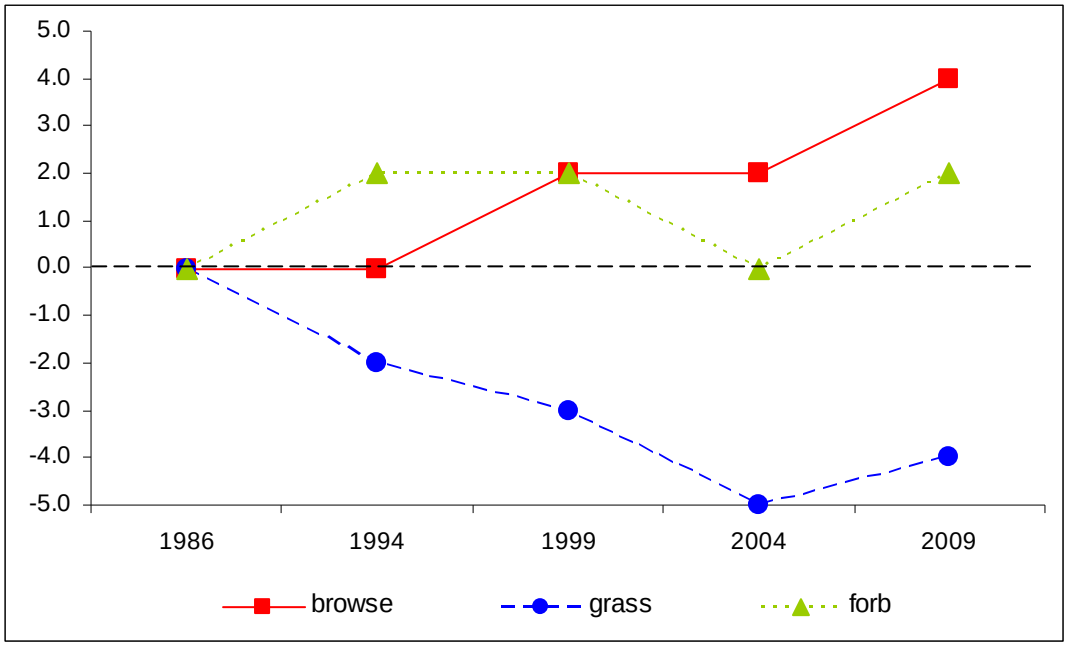
- **1986 to 1994 - up (+2):** There was over a three-fold increase in the sum of nested frequency of perennial forbs. There was a significant increase in the sum of nested frequency of many important perennial forbs including yellow sweet clover (*Melilotus officinalis*).
- **1994 to 1999 - stable (0):** There was no change in the sum of nested frequency of perennial forbs, but cover decreased slightly.
- **1999 to 2004 - down (-2):** There was a 41% decrease in the sum of nested frequency of perennial forbs and cover decreased from 4% to 3%.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased by 31% and cover increased to 4%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 14, study no: 2

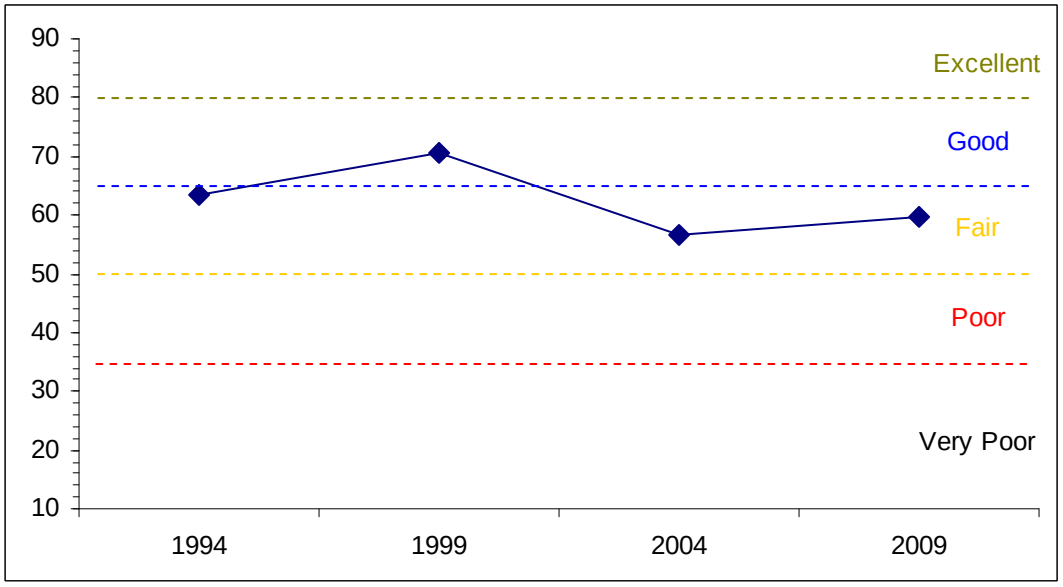
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	16.6	13.3	1.7	23.1	0.0	8.7	0.0	**63.5**	Fair-Good
99	20.0	14.1	14.6	14.3	0.0	7.7	0.0	**70.7**	Good
04	17.9	13.4	12.9	7.1	0.0	5.5	0.0	**56.8**	Fair
09	19.9	12.2	8.8	11.0	0.0	7.8	0.0	**59.6**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 2



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 14, Study no: 2



HERBACEOUS TRENDS--
Management unit 14, Study no: 2

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{c}$198	$_{ab}$76	$_{b}$112	$_{a}$66	$_{ab}$93	1.57	2.71	1.67	2.87
G	Agropyron intermedium	$_{bc}$410	$_{c}$218	$_{b}$152	$_{a}$79	$_{a}$68	7.75	3.11	1.27	1.14
G	Bromus inermis	$_{b}$26	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$2	-	-	.00	.03
G	Bromus japonicus (a)	-	1	6	-	-	.00	.03	-	-
G	Bromus tectorum (a)	-	-	2	-	-	-	.00	-	-
G	Carex sp.	$_{c}$80	$_{b}$43	$_{ab}$22	$_{a}$1	$_{a}$-	.76	.41	.03	-
G	Koeleria cristata	-	3	1	-	-	.03	.00	-	-
G	Oryzopsis hymenoides	-	1	3	7	1	.01	.03	.02	.00
G	Poa fendleriana	$_{c}$120	$_{bc}$90	$_{c}$87	$_{a}$31	$_{ab}$49	1.19	.85	.54	1.25
G	Sitanion hystrix	$_{b}$38	$_{ab}$27	$_{a}$6	$_{a}$-	$_{a}$11	.24	.02	-	.19
G	Stipa sp.	2	-	-	-	-	-	-	-	-
Total for Annual Grasses		0	1	8	0	0	0.00	0.03	0	0
Total for Perennial Grasses		874	458	383	184	224	11.55	7.15	3.54	5.50
Total for Grasses		874	459	391	184	224	11.56	7.19	3.54	5.50
F	Achillea millefolium	-	-	-	-	1	-	-	-	.00
F	Allium sp.	-	2	3	-	-	.00	.00	-	.00
F	Arabis sp.	-	1	7	-	-	.00	.04	-	-
F	Astragalus miser	5	4	4	12	12	.21	.21	.38	.25
F	Cirsium sp.	3	6	10	-	-	.01	.12	-	-
F	Crepis acuminata	-	2	8	-	4	.00	.04	-	.03
F	Cymopterus sp.	$_{a}$-	$_{c}$43	$_{c}$41	$_{ab}$10	$_{b}$17	.33	.50	.04	.09
F	Eriogonum elatum	-	3	-	-	2	.03	-	-	.03
F	Eriogonum racemosum	4	4	10	4	5	.04	.07	.01	.04
F	Helianthella uniflora	$_{a}$-	$_{a}$6	$_{b}$13	$_{a}$-	$_{a}$-	.09	.42	-	-
F	Hymenoxys acaulis	-	8	6	3	4	.21	.09	.03	.03
F	Lactuca serriola	-	9	-	-	-	.02	-	-	-
F	Lappula occidentalis (a)	-	3	-	-	-	.00	-	-	-
F	Lesquerella fendleri	16	25	19	7	13	.05	.05	.02	.06
F	Lupinus sp.	-	1	7	3	2	.15	.19	.15	.18
F	Machaeranthera canescens	-	-	-	1	-	-	-	.00	-
F	Machaeranthera grindelioides	8	-	5	6	3	-	.06	.06	.18
F	Medicago sativa	-	-	3	2	-	.15	.03	.00	-
F	Melilotus officinalis	$_{a}$-	$_{b}$16	$_{a}$5	$_{a}$3	$_{a}$2	1.01	.04	.00	.01
F	Pedicularis centranthera	-	7	-	-	8	.31	-	.00	.34
F	Penstemon caespitosus	$_{a}$-	$_{bc}$47	$_{a}$-	$_{b}$37	$_{c}$53	1.43	.06	1.48	1.73
F	Penstemon comarrhenus	-	-	-	7	3	-	-	.04	.15
F	Penstemon pachyphyllus	$_{ab}$8	$_{a}$3	$_{a}$6	$_{a}$2	$_{b}$21	.03	.06	.03	.67
F	Penstemon thompsoniae	$_{a}$-	$_{a}$-	$_{b}$53	$_{a}$-	$_{a}$-	-	1.82	-	-
F	Phlox longifolia	-	6	-	-	3	.01	-	.00	.03
F	Polygonum douglasii (a)	-	$_{a}$6	$_{b}$22	$_{a}$7	$_{a}$-	.01	.05	.01	-
F	Tragopogon dubius	3	8	1	-	-	.05	.00	-	-
F	Trifolium gymnocarpon	-	3	3	2	4	.15	.00	.03	.01
F	Unknown forb-perennial	$_{b}$9	$_{a}$-	$_{a}$-	$_{b}$21	$_{a}$-	-	-	.44	-

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
Total for Annual Forbs		0	9	22	7	0	0.01	0.05	0.01	0
Total for Perennial Forbs		56	204	204	120	157	4.33	3.84	2.77	3.88
Total for Forbs		56	213	226	127	157	4.35	3.89	2.78	3.88

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

BROWSE TRENDS--
Management unit 14, Study no: 2

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	7	5	6	11	3.05	3.33	2.91	1.88
B	Artemisia tridentata vaseyana	36	50	48	58	5.21	6.88	6.96	9.39
B	Atriplex confertifolia	0	0	0	0	-	-	-	1.00
B	Cercocarpus montanus	1	2	2	3	.00	.00	.00	.15
B	Chrysothamnus depressus	6	13	7	8	.15	.45	.33	.68
B	Chrysothamnus nauseosus hololeucus	1	0	1	1	.00	-	.00	.00
B	Gutierrezia sarothrae	15	13	17	21	.49	.21	.30	.93
B	Juniperus osteosperma	0	2	2	4	.81	1.16	.93	.06
B	Opuntia sp.	3	4	3	2	.15	.38	.15	.00
B	Pinus edulis	0	1	1	2	.94	3.52	3.79	5.16
B	Purshia tridentata	23	18	23	24	2.91	3.42	2.41	2.17
B	Quercus gambelii	0	3	4	6	1.00	.76	.78	1.00
B	Yucca sp.	1	1	0	1	.63	.00	-	.00
Total for Browse		93	112	114	141	15.37	20.13	18.60	22.45

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 2

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	4.00	6.93	5.19
Artemisia tridentata vaseyana	-	11.01	13.73
Cercocarpus montanus	-	.63	.70
Gutierrezia sarothrae	-	.31	.20
Juniperus osteosperma	1.00	2.21	1.63
Pinus edulis	2.20	9.51	7.28
Purshia tridentata	-	2.08	2.79
Quercus gambelii	-	1.58	1.21

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 2

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	2.2	1.2
Artemisia tridentata vaseyana	1.9	2.8
Cercocarpus montanus	3.0	2.4
Purshia tridentata	3.1	2.3

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 2

Species	Trees per Acre			
	'94	'99	'04	'09
Juniperus osteosperma	48	37	50	50
Pinus edulis	87	95	97	86

Average diameter (in)			
'94	'99	'04	'09
-	4.5	4.4	3.1
-	4.0	3.8	3.7

BASIC COVER--
Management unit 14, Study no: 2

Cover Type	Average Cover %				
	'86	'94	'99	'04	'09
Vegetation	4.75	31.59	30.04	24.81	30.70
Rock	4.50	4.86	6.09	7.54	5.94
Pavement	.75	.30	1.18	1.18	1.79
Litter	73.50	43.61	53.56	49.31	52.70
Cryptogams	.25	.04	.06	.00	.52
Bare Ground	16.25	20.18	27.41	32.04	27.32

SOIL ANALYSIS DATA --
Management unit 14, Study no: 2, Study Name: Brushy Basin

Effective rooting depth (in)	pH	sandy clay			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.6	6.6	46.9	10.6	42.6	2.9	6.8	102.4	0.6

PELLET GROUP DATA--
Management unit 14, Study no: 2

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	6	30	1	4
Elk	3	6	6	8
Deer	5	17	2	4
Cattle	-	4	-	2

Days use per acre (ha)		
'99	'04	'09
-	-	-
15 (37)	19 (8)	19 (46)
14 (35)	23 (58)	3 (7)
33 (82)	10 (25)	7 (16)

BROWSE CHARACTERISTICS--
Management unit 14, 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)
Amelanchier utahensis									
86	**0**	0	0	-	-	0	0	0	-/-
94	**140**	0	100	-	40	0	0	0	81/91
99	**100**	0	100	-	40	60	0	0	74/75
04	**200**	20	80	-	20	30	0	0	80/71
09	**240**	58	42	-	20	8	8	0	91/82
Artemisia tridentata vaseyana									
86	**3332**	78	22	0	199	17	1	13	14/22
94	**2320**	6	86	8	3120	0	.86	9	25/29
99	**2920**	45	49	6	3780	10	1	0	23/38
04	**2980**	29	65	6	1420	41	9	3	18/30
09	**3920**	11	76	13	360	15	35	30	16/23
Cercocarpus montanus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**20**	0	100	-	-	0	0	0	47/45
99	**40**	0	100	-	-	0	100	0	43/43
04	**40**	0	100	-	-	50	50	0	41/46
09	**60**	33	67	-	-	0	0	0	49/47
Chrysothamnus depressus									
86	**6965**	2	98	0	-	0	0	0	2/11
94	**120**	17	83	0	80	0	0	0	6/15
99	**800**	80	15	5	340	8	0	5	6/15
04	**160**	0	100	0	-	25	50	0	6/15
09	**220**	0	100	0	80	0	0	0	5/12
Chrysothamnus nauseosus hololeucus									
86	**0**	0	0	0	-	0	0	0	-/-
94	**20**	100	0	0	-	0	0	0	9/3
99	**0**	0	0	0	-	0	0	0	-/-
04	**20**	0	100	0	-	0	100	0	9/9
09	**20**	0	0	100	-	0	0	0	8/7
Echinocereus engelmanii									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	4/8
04	**0**	0	0	-	-	0	0	0	4/9
09	**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									
86	**7932**	11	88	2	-	0	0	0	6/6
94	**540**	15	85	0	20	0	0	0	8/9
99	**580**	14	79	7	20	0	0	7	7/10
04	**600**	3	97	0	-	0	0	0	9/10
09	**720**	3	92	6	20	0	0	0	8/10
Juniperus osteosperma									
86	**66**	0	0	100	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**40**	100	0	0	-	0	0	0	-/-
04	**40**	50	50	0	-	0	0	0	-/-
09	**80**	50	50	0	-	0	0	0	-/-
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
94	**80**	0	75	25	-	0	0	25	4/9
99	**80**	0	75	25	-	0	0	25	4/13
04	**120**	0	83	17	-	0	0	17	4/12
09	**80**	0	100	0	-	0	0	0	2/5
Pinus edulis									
86	**99**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	20	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**40**	50	50	-	-	0	0	0	-/-
Purshia tridentata									
86	**33**	0	100	0	166	0	100	0	15/35
94	**640**	3	88	9	-	3	0	0	12/34
99	**460**	17	83	0	80	30	48	0	13/38
04	**800**	8	80	13	-	13	65	13	9/26
09	**880**	0	91	9	-	23	34	7	10/26
Quercus gambelii									
86	**299**	100	0	-	-	89	11	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**160**	38	63	-	20	0	0	0	50/35
04	**260**	85	15	-	20	0	0	0	47/30
09	**320**	50	50	-	-	0	0	0	12/14
Sclerocactus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	4/4
09	**0**	0	0	-	-	0	0	0	-/-

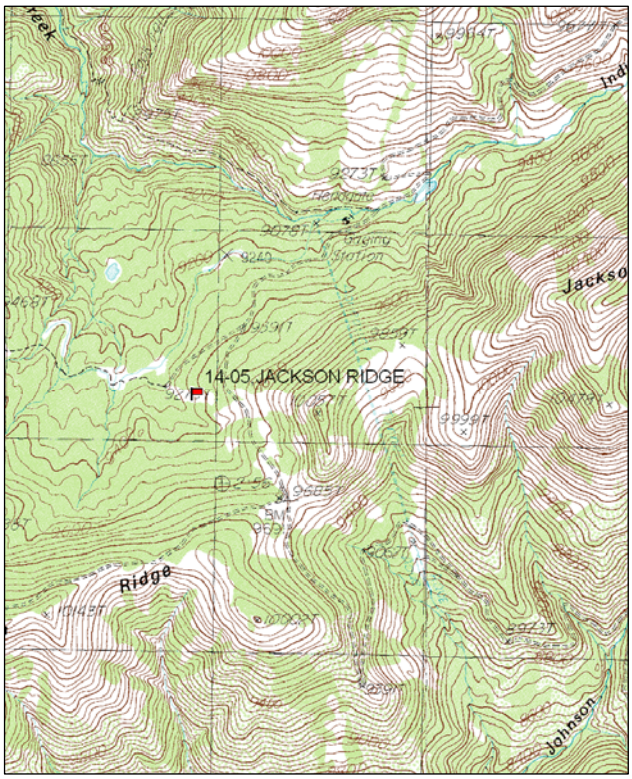
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	63/56
Yucca sp.									
86	**0**	0	0	0	-	0	0	0	-/-
94	**40**	0	100	0	-	0	0	100	14/29
99	**20**	0	0	100	-	0	0	100	-/-
04	**0**	0	0	0	-	0	0	0	5/10
09	**60**	0	100	0	-	0	0	0	6/11

JACKSON RIDGE - TREND STUDY NO. 14-5-09

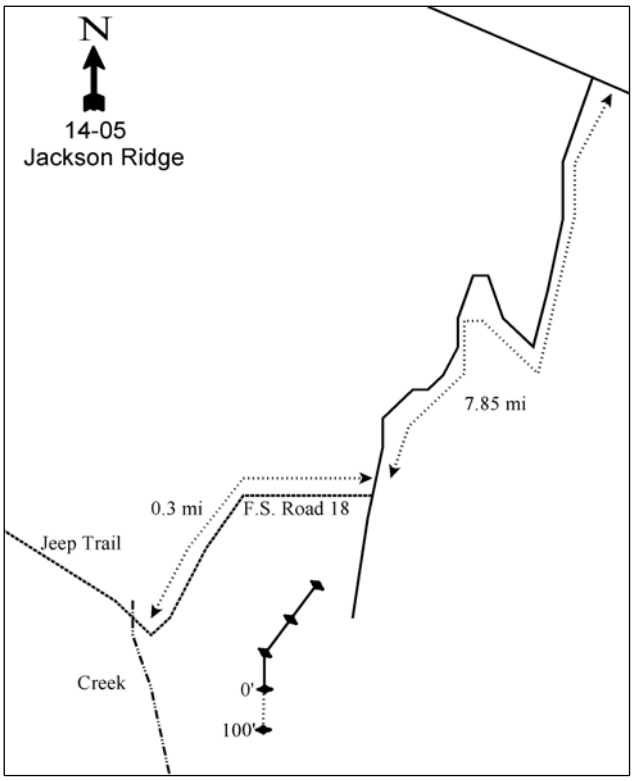
Vegetation Type: Aspen
Range Type: Crucial Deer Summer, Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 9,400 ft (2,865 m)
Aspect: Southwest
Slope: 21%-35%
Transect bearing: 180 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the junction of the Blue Mountain Road and the North Creek-Indian Creek Road (just west of Dalton Springs campground), go 7.25 miles to Indian Creek. From the crossing, continue 0.55 miles to a fork. Stay left on the main road. Continue 0.05 miles to another small fork to the right. Go down this jeep trail (F.S. Road 18) 0.3 miles to a sharp right bend in the road near a small stream. Stop here and walk southeast (105°M) up the clearing for 490 feet. The 0-foot baseline stake is a 4-foot tall green fence post with browse tag #479 attached.

Map Name: Mt. Linnaeus



Diagrammatic Sketch:



Township: 34S, Range: 22E, Section: 9

GPS: NAD 83, UTM 12S 630829 E 4188397 N

JACKSON RIDGE - TREND STUDY NO. 14-5

Site Information

Site Description: The study samples a moderately steep meadow in an aspen-spruce-fir forest on the headwaters of Indian Creek in the southern part of the Abajo Mountains. Water is not a limiting factor and the small perennial stream flowing northwest down the slope towards Indian Creek contains water late in the year. Annual precipitation is at least 20 inches per year. Because of an underground aqueduct moving water from this drainage, this area is considered part of the Blanding municipal watershed. Consequently, cattle grazing is not permitted on this part of the Manti-La Sal National Forest. However, cattle do sometimes break fence and trespass from the Camp Jackson allotment. Pellet group data has indicated light use from deer and elk since 1999. Minimal cattle use was measured in both 2004 and 2009 (Table - Pellet Group Data).

Browse: Surrounding the small meadow is a thick grove of quaking aspen (*Populus tremuloides*), Engelmann spruce (*Picea engelmannii*), white fir (*Abies concolor*), and Douglas fir (*Pseudotsuga menziesii*). The forest provides excellent cover for big game. There are young trees on the edge and these young aspen trees showed moderate to heavy use on all available portions of the plants in 1986, but use has been mostly light since then (Table - Browse Characteristics). All the mature aspen in the meadow are unavailable due to height. The overhead canopy cover of aspen has steadily increased from 21% in 1999 to 33% in 2009 (Table - Canopy Cover). Snowberry (*Symphoricarpos oreophilus*) occurs infrequently in the meadow with some plants showing moderate browsing in some sample years (Table - Browse Characteristics).

Herbaceous Understory: Because this is summer range, the herbaceous plants are the more important part of the community for wildlife. The herbaceous understory is diverse and abundant on the site. There are several native grasses on the site but the most abundant grass species is Kentucky bluegrass (*Poa pratensis*). Kentucky bluegrass has provided well over half of the total grass cover on the site since 1994. Other common grasses include slender wheatgrass (*Agropyron trachycaulum*), orchard grass (*Dactylis glomerata*), mountain brome (*Bromus carinatus*), a *Carex sp.*, and letterman needlegrass (*Stipa lettermani*). Many valuable and palatable forb species are common, including thickleaf peavine (*Lathyrus lanszwertii*), American vetch (*Vicia americana*), dandelion (*Taraxacum officinale*), and silvery lupine (*Lupinus argenteus*). Forbs have contributed over 60% of total vegetation cover since 1994.

Soil: The soil is a clay loam with a moderately acidic pH and a moderately deep effective rooting depth (Table - Soil Analysis Data). The soil has good vegetation and litter cover which provides excellent soil protection (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1994 - slightly up (+1):** Aspen was mistakenly not sampled in the density strips in 1994, so no comparison can be made. Vigor of aspen did appear to have improved, but browse is not a particularly important part of this summer range.
- **1994 to 1999 - stable (0):** There was little change in the browse component. The increase in density of aspen is likely due to the larger sample area used in 1994.
- **1999 to 2004 - stable (0):** There was little change in the density of aspen, but the overhead canopy cover increased from 21% to 31%.
- **2004 to 2009 - slightly down (-1):** Density of aspen decreased 40% from 600 plants/acre to 360 plants/acre due primarily to a decrease in the recruitment of young aspen plants. The overhead canopy cover of aspen increased slightly to 33%.

Grass:

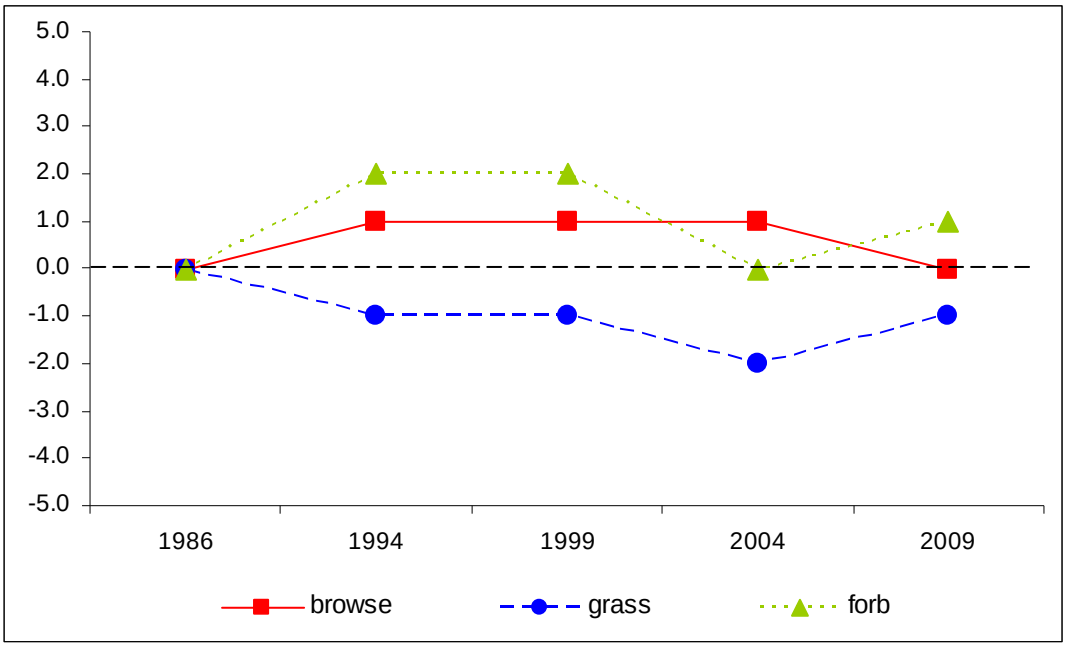
- **1986 to 1994 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 15%. There was a significant decrease in the nested frequency of mountain brome and Kentucky bluegrass.
- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, but cover increased from 11% to 17%. There was a significant increase in the nested frequency of Letterman needlegrass.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 12% and cover decreased to 15%. There was a significant increase in the nested frequency of the *Carex sp.* and a significant decrease in nested frequency of Kentucky bluegrass.
- **2004 to 2009 - slightly up (+1):** There was a 9% increase in the sum of nested frequency of perennial grasses and cover increased to 23%. There was a significant increase in the nested frequency of mountain brome, orchard grass, and Kentucky bluegrass.

Forb:

- **1986 to 1994 - up (+2):** The sum of nested frequency of perennial forbs increased by 50% with a significant increase in many of the palatable perennial forb species.
- **1994 to 1999 - stable (0):** There was a 9% decrease in the sum of nested frequency of perennial forbs, but cover increased from 24% to 28%.
- **1999 to 2004 - down (-2):** There was a 34% decrease in the sum of nested frequency of perennial forbs, though cover remained similar.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial forbs increased 18%, and cover increased to 44%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 5



HERBACEOUS TRENDS--
Management unit 14, Study no: 5

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron spicatum	b22	a-	a-	a-	a-	-	-	-	-
G	Agropyron trachycaulum	b104	b68	b55	b78	a12	.94	.62	1.95	.63
G	Bromus carinatus	bc48	a19	a8	ab31	c72	.27	.21	.53	2.57
G	Carex sp.	a5	abc21	ab7	c30	bc30	.43	.07	1.08	2.55
G	Dactylis glomerata	a3	ab9	b28	ab25	c65	.19	1.12	.73	1.79
G	Phleum pratense	1	-	4	-	-	-	.03	-	-
G	Poa pratensis	d362	c341	cd357	a251	b307	8.45	13.86	8.68	14.28
G	Poa secunda	-	-	-	-	8	-	-	-	.30
G	Stipa columbiana	-	-	-	-	2	-	-	-	.06
G	Stipa lettermani	bc48	ab45	c76	bc58	a19	.24	1.25	2.01	1.14
G	Trisetum spicatum	4	8	-	-	-	.66	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		597	511	535	473	515	11.20	17.17	15.00	23.35
Total for Grasses		597	511	535	473	515	11.20	17.17	15.00	23.35
F	Achillea millefolium	bc280	c291	c286	ab250	a253	6.55	9.22	7.01	12.02
F	Agoseris glauca	c37	bc23	ab13	abc22	a2	.10	.05	.10	.03
F	Androsace septentrionalis (a)	-	bc36	b55	a22	a31	.08	.21	.74	.09
F	Arabis sp.	-	1	10	5	-	.00	.07	.01	-
F	Aster sp.	-	-	-	-	4	-	-	-	.06
F	Castilleja sp.	-	-	-	1	1	-	-	.03	.03
F	Cerastium arvense	a-	b10	a-	a-	a-	.02	-	-	-
F	Chenopodium album (a)	-	a2	a-	a2	b12	.00	-	.00	.12
F	Cirsium sp.	-	-	-	-	7	-	-	-	.19
F	Cirsium wheeleri	a6	ab10	b24	ab18	ab6	.02	.49	.52	.60
F	Collomia linearis (a)	-	a-	a-	a-	b21	-	-	-	.31
F	Conioselinum scopulorum	-	11	-	-	7	1.32	-	-	.56
F	Delphinium nuttallianum	a-	b78	c190	a5	a4	.21	2.13	.01	.01
F	Descurainia pinnata (a)	-	-	-	-	-	-	-	-	.00
F	Erigeron engelmannii	10	10	-	-	-	.09	-	-	-
F	Erigeron flagellaris	b102	ab96	ab52	ab53	a47	.55	.29	.35	1.27
F	Erigeron sp.	a-	a-	a-	a-	b17	-	-	-	.13
F	Erigeron speciosus	ab10	b24	a2	a-	a-	.52	.06	-	-
F	Fragaria vesca	39	15	18	25	24	.24	.55	.37	.96
F	Galium bifolium (a)	-	ab9	b16	a-	a-	.01	.21	-	-
F	Gentiana amarella heterosepala	9	8	-	-	-	.01	-	-	-
F	Lathyrus lanszwertii	a16	a40	b92	b92	b97	1.56	2.41	5.93	6.05
F	Lupinus argenteus	a32	b92	bc122	a54	c132	1.64	2.38	4.05	6.47
F	Lupinus sp.	-	-	-	2	-	-	-	.01	-
F	Machaeranthera canescens	-	-	-	-	3	-	-	-	.00
F	Mertensia brevistyla	-	3	-	-	-	.03	-	-	-
F	Microsteris gracilis (a)	-	1	-	-	-	.00	-	-	-
F	Orthocarpus sp. (a)	-	-	7	-	-	-	.04	-	-
F	Osmorhiza occidentalis	37	25	27	19	33	.53	.28	.45	1.00

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
F	Phacelia hastata	$_{b}$23	$_{a}$4	$_{a}$-	$_{a}$-	$_{a}$-	.03	-	-	-
F	Phlox longifolia	3	-	-	-	-	-	-	-	-
F	Polygonum douglasii (a)	-	$_{b}$49	$_{ab}$15	$_{ab}$22	$_{a}$3	.11	.13	.03	.03
F	Potentilla gracilis	9	10	-	3	3	.18	-	.00	.03
F	Ranunculus sp.	$_{a}$-	$_{cd}$55	$_{b}$47	$_{ab}$22	$_{a}$29	.19	.30	.22	.13
F	Senecio neomexicanus	$_{a}$29	$_{b}$73	$_{b}$95	$_{a}$34	$_{b}$77	.64	.57	.33	1.17
F	Stellaria jamesiana	$_{a}$-	$_{c}$227	$_{bc}$204	$_{b}$150	$_{b}$132	2.57	2.82	2.61	1.72
F	Taraxacum officinale	$_{a}$168	$_{c}$215	$_{bc}$208	$_{a}$154	$_{ab}$166	3.09	5.08	3.71	5.23
F	Thermopsis montana	$_{a}$-	$_{b}$68	$_{a}$-	$_{a}$3	$_{a}$3	.51	-	.00	.38
F	Thlaspi montanum	$_{a}$22	$_{b}$62	$_{b}$73	$_{a}$21	$_{a}$12	.18	.35	.11	.03
F	Tragopogon dubius	$_{ab}$17	$_{ab}$16	$_{a}$7	$_{ab}$8	$_{b}$30	.66	.02	.45	.53
F	Unknown forb-annual (a)	-	-	-	-	2	-	-	-	.03
F	Unknown forb-perennial	$_{b}$96	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$9	-	-	-	.09
F	Valeriana occidentalis	7	5	-	-	-	.30	-	-	-
F	Veronica serpyllifolia	1	-	-	-	-	-	-	-	-
F	Vicia americana	$_{b}$145	$_{b}$165	$_{a}$98	$_{a}$90	$_{ab}$123	1.82	.64	2.29	5.18
F	Viola canadensis	-	4	6	8	5	.04	.01	.13	.18
Total for Annual Forbs		0	97	93	46	69	0.21	0.59	0.78	0.60
Total for Perennial Forbs		1098	1641	1574	1039	1227	23.70	27.76	28.76	44.14
Total for Forbs		1098	1738	1667	1085	1296	23.91	28.36	29.54	44.74

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

BROWSE TRENDS--
Management unit 14, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Abies concolor	0	0	2	1	-	-	.00	.38
B	Picea engelmannii	0	2	4	3	.03	.07	2.32	2.23
B	Populus tremuloides	0	19	22	12	.79	1.43	.81	2.35
B	Pseudotsuga menziesii	0	0	0	3	-	.01	.00	.63
B	Ribes sp.	0	0	1	1	-	-	.00	.38
B	Symphoricarpos oreophilus	2	5	3	4	.53	.42	.33	.36
Total for Browse		2	26	32	24	1.35	1.94	3.47	6.34

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 5

Species	Percent Cover		
	'99	'04	'09
Abies concolor	-	-	.48
Picea engelmannii	-	3.45	6.28
Populus tremuloides	21.20	30.64	33.31
Pseudotsuga menziesii	-	-	.56
Symphoricarpos oreophilus	-	.11	-

BASIC COVER--
Management unit 14, Study no: 5

Cover Type	Average Cover %				
	'86	'94	'99	'04	'09
Vegetation	25.50	38.06	49.25	45.20	58.29
Rock	6.50	8.04	7.12	6.33	5.02
Pavement	1.75	.01	.44	1.03	.22
Litter	55.00	44.68	67.18	38.79	41.50
Cryptogams	0	.06	.64	.24	.19
Bare Ground	11.25	3.96	4.85	18.11	10.69

SOIL ANALYSIS DATA --
Management unit 14, Study no: 5, Study Name: Jackson Ridge

Effective rooting depth (in)	pH	clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.5	6	36.9	34.6	28.6	5.3	15.6	390.4	0.3

PELLET GROUP DATA--
Management unit 14, Study no: 5

Type	Quadrat Frequency			
	'94	'99	'04	'09
Moose	5	-	-	-
Elk	-	7	6	5
Deer	1	1	1	4
Cattle	-	-	-	-

Days use per acre (ha)		
'99	'04	'09
-	-	-
12 (30)	13 (33)	15 (36)
2 (5)	6 (15)	1 (3)
-	1 (2)	1 (2)

BROWSE CHARACTERISTICS--
Management unit 14, 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)
Abies concolor									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**40**	100	0	-	-	0	0	0	-/-
09	**40**	100	0	-	-	0	0	0	-/-
Picea engelmannii									
86	**33**	100	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**40**	100	0	0	80	0	0	0	-/-
04	**100**	80	20	0	20	0	0	0	-/-
09	**60**	33	33	33	20	0	0	33	-/-

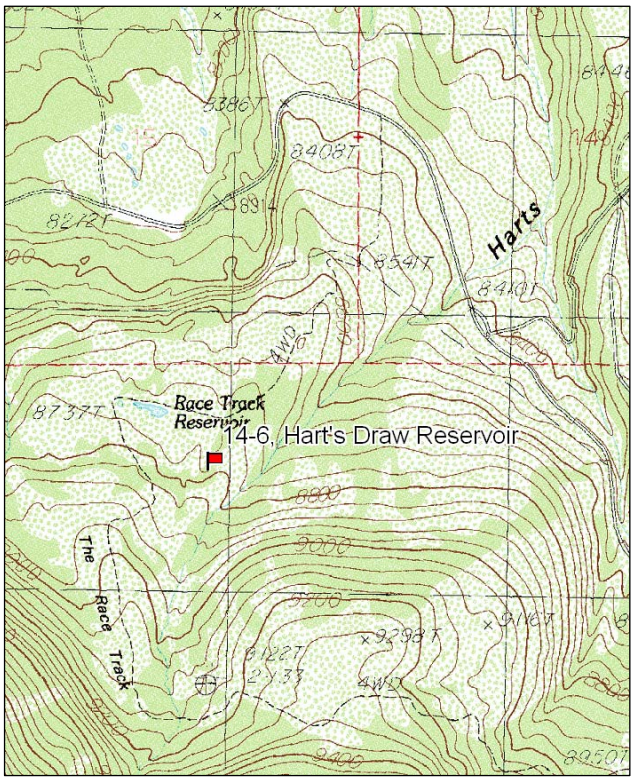
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Populus tremuloides									
86	**532**	81	6	12	333	25	25	44	393/300
94	**0**	0	0	0	-	0	0	0	-/-
99	**620**	23	77	0	-	0	0	0	-/-
04	**600**	57	43	0	-	0	3	3	-/-
09	**360**	11	89	0	160	0	0	0	-/-
Pseudotsuga menziesii									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	180	0	0	0	-/-
04	**0**	0	0	-	180	0	0	0	-/-
09	**120**	100	0	-	180	0	0	0	-/-
Ribes sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	26/11
09	**20**	0	100	-	120	0	0	0	37/28
Sambucus racemosa									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	13/13
09	**0**	0	0	-	-	0	0	0	-/-
Symphoricarpos oreophilus									
86	**33**	0	100	0	-	100	0	0	24/2
94	**60**	0	100	0	-	0	0	0	23/101
99	**240**	17	50	33	-	17	0	17	18/32
04	**360**	50	44	6	-	56	0	0	13/28
09	**180**	78	22	0	60	11	0	0	13/24

HARTS DRAW RESERVOIR - TREND STUDY NO. 14-6-09

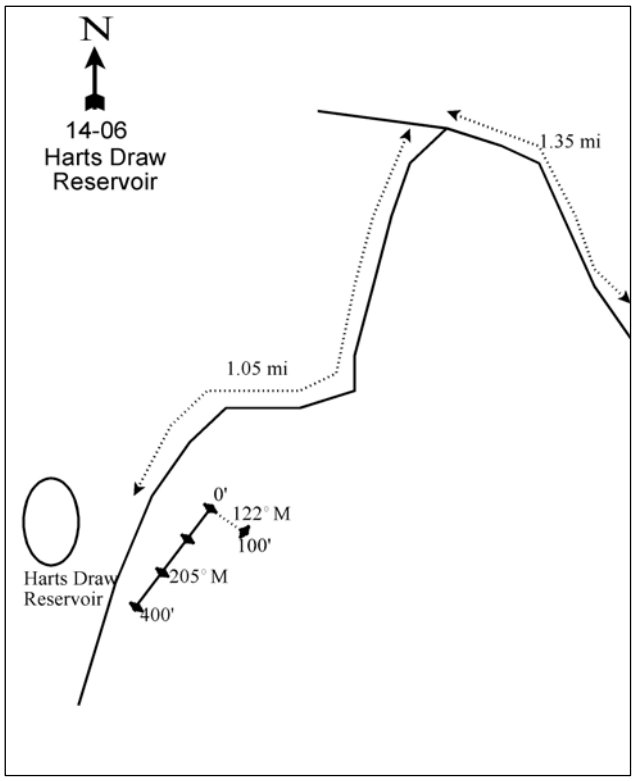
Vegetation Type: Mixed Oak-Sagebrush
Range Type: Crucial Deer Summer, Crucial Elk Spring/Fall
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,900 ft (2,713 m)
Aspect: North
Slope: 2%-4%
Transect bearing: 0'to 100' post - 122 degrees magnetic, 0' to 400' post - 205 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft)

Directions:
From the turnoff on the Blue Mountain Road to the Spring Creek Road by Monticello Lake (Spring Creek), proceed west on the paved road towards Foy Lake for 1.35 miles. Turn left (south) on a very rough dirt road (F.S. Rd 113) and go up 1.05 miles to a point 200 feet east of Harts Draw Reservoir (Race Track Reservoir). From here, walk south 5 paces to the transect starting point, a 12-inch high red fence post. The frequency baseline runs southeast through the sage and small oaks to another red fence post. The first hundred feet run at 122°M. The rest of the baseline is doglegged off of the 0 foot and run at 205°M.

Map Name: Monticello Lake



Diagrammatic Sketch:



Township: 33S, Range: 22E, Section: 22

GPS: NAD 83, UTM 12S 632802 E 4195835 N

HARTS DRAW RESERVOIR - TREND STUDY NO. 14-6

Site Information

Site Description: The study is on National Forest land in a Gambel oak (*Quercus gambelii*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community with aspen (*Populus tremuloides*) clones covering the surrounding hillsides. The area is part of the Harts Draw allotment (the Harts Draw unit is one of three on the allotment). The area was seeded over twenty years ago with no land treatments planned for the near future. Water is plentiful at the nearby reservoir and grazing pressure does not appear to be concentrated in the immediate area of the water. Escape cover is provided by thick clumps of oak and nearby groves of aspen. The road to the site is quite rough, so public pressure is low except during the hunting season. Pellet group data has indicated mostly light use from deer and elk since 1999 and moderately heavy use from cattle over the same period (Table - Pellet Group Data).

Browse: The sagebrush-grass vegetation sampled with this trend study is closely intermingled with oakbrush. Gambel oak was the dominant browse species in cover in 2009. Mountain big sagebrush is the dominant preferred browse species, but has steadily decreased in cover and density since 1999. Utah serviceberry (*Amelanchier utahensis*), a highly preferred browse species, has increased in cover since 1994 and now provides nearly as much cover as sagebrush (Table - Browse Trends). The sagebrush population has had high decadence in the past, but since 1994 as density has decreased so has decadence. Recruitment of young sagebrush plants has been mostly good since 1994 and utilization of sagebrush has been mostly light to moderate except in 1986 when most use was moderate or heavy. The serviceberry population consists of mostly healthy plants with low decadence. Serviceberry is especially vigorous and nearby six-foot tall shrubs provide abundant forage and seed. Recruitment of young serviceberry plants has been good over the sample years. Utilization of serviceberry has been mostly moderate with some heavy use noted in 2004, but there was mostly light use in 2009. Gambel oak on the site occur in isolated clones and vary in height from 4 to 10 feet. Use has been mostly light, vigor good and percent decadence low since 1994 (Table - Browse Characteristics).

Herbaceous Understory: Grasses are abundant in the understory, but are not very diverse. Two non-native species, smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*), dominate the herbaceous component. Smooth brome and Kentucky bluegrass provide nearly all of the grass cover on the site. Total grass cover declined in 2004 due to drought conditions, but smooth brome and Kentucky bluegrass still provided the majority of the vegetation cover. Other grasses are rare. Forbs are diverse but only a lupine (*Lupinus holosericeus*) is abundant. The lupine has produced over 60% of the total forb cover since 1994. Other important forbs are fewflower peavine (*Lathyrus pauciflorus*), dusty penstemon (*Penstemon comarrhenus*), redroot eriogonum (*Eriogonum racemosum*), and American vetch (*Vicia americana*).

Soil: Soil in the area is a red-brown loam with a slightly acid pH and a moderately deep effective rooting depth (Table - Soil Analysis Data). Most of the study site has a thick protective vegetation and litter cover leaving little bare ground cover (Table - Basic Cover). Gullies are found on the steeper slopes surrounding the site that are devoid of vegetation. The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1994 - slightly down (-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, mountain big sagebrush, increased from 47% to 78% and poor vigor increased from 28% to 43%. Recruitment of young sagebrush plants improved slightly.
- **1994 to 1999 - slightly down (-1):** Density of sagebrush decreased by 17% from 3,100 plants/acre to 2,580 plants/acre. Recruitment of young sagebrush plants decreased from 10% to 5% of the population. However, decadence of sagebrush decreased to 42% and poor vigor decreased to 13%.

- **1999 to 2004 - slightly down (-1):** Density of sagebrush decreased by 10% to 2,320 plants/acre and cover decreased from 8% to 5%. Recruitment of young plants improved to 10% of the population and decadence decreased to 30%.
- **2004 to 2009 - down (-2):** The density of mountain big sagebrush decreased by 37% to 1,460 plants/acre, and cover decreased to 3%. Recruitment of young sagebrush plants increased slightly and decadence decreased slightly to 27% of the population.

Grass:

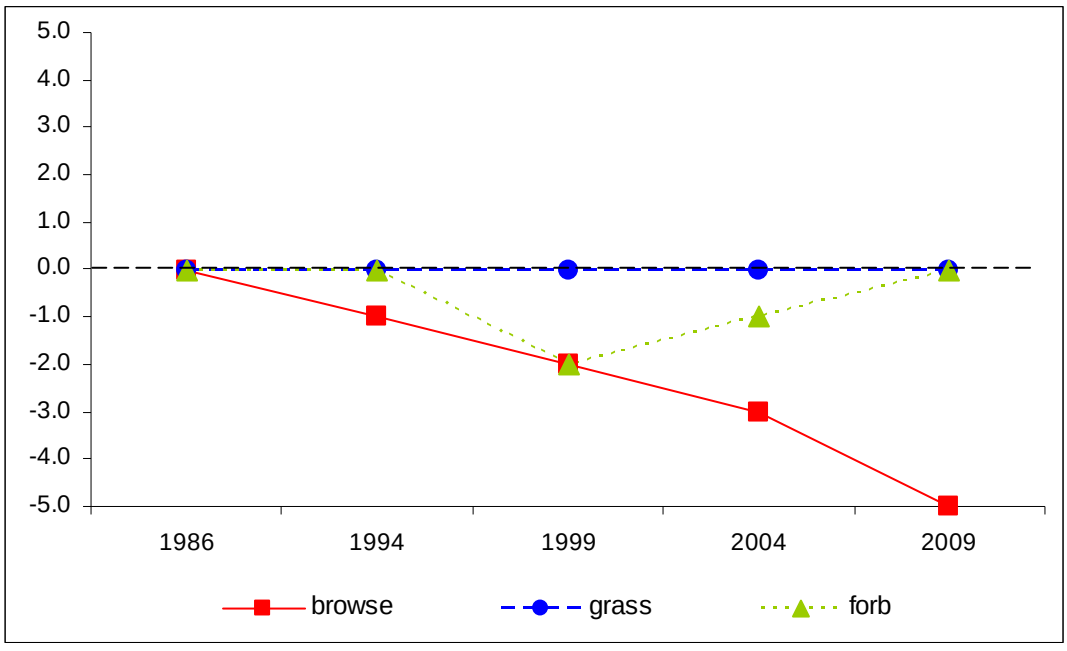
- **1986 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1994 to 1999 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial grasses, though cover increased from 20% to 41%.
- **1999 to 2004 - stable (0):** There was a slight increase in the sum of nested frequency of perennial, though cover decreased to 27%.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased to 55%.

Forb:

- **1986 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial forbs.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 22%, though cover increased from 12% to 20%.
- **1999 to 2004 - slightly up (+1):** There was a 13% increase in the sum of nested frequency of perennial forbs, though cover decreased slightly.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 11% and cover increased slightly.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 6



HERBACEOUS TRENDS--
Management unit 14, Study no: 6

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	12	2	3	-	-	.01	.03	-	-
G	Bromus inermis	a301	ab323	b336	b333	b340	8.02	20.12	17.22	27.72
G	Carex sp.	c54	b22	a-	c52	bc43	.43	-	1.17	1.01
G	Dactylis glomerata	-	-	2	-	-	-	.15	-	-
G	Koeleria cristata	-	-	-	3	3	-	-	.03	.03
G	Poa fendleriana	c130	b68	a-	b46	a9	2.01	-	.61	.12
G	Poa pratensis	a143	b270	c326	b270	c316	9.58	20.21	7.82	25.48
G	Poa secunda	-	-	-	-	3	-	-	-	.15
G	Sitanion hystrix	3	3	-	-	-	.00	-	-	-
G	Unknown grass - perennial	4	-	-	-	-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		647	688	667	704	714	20.08	40.52	26.86	54.53
Total for Grasses		647	688	667	704	714	20.08	40.52	26.86	54.53
F	Achillea millefolium	-	-	3	-	3	-	.00	-	.03
F	Agoseris glauca	-	-	-	3	1	-	-	.00	.03
F	Androsace septentrionalis (a)	-	a7	a7	b28	b31	.63	.04	.07	.22
F	Antennaria rosea	-	-	-	-	2	-	-	-	.03
F	Antennaria sp.	b9	ab5	a1	a1	a-	.15	.15	.03	-
F	Arabis sp.	-	6	-	-	-	.01	-	-	-
F	Arenaria sp.	-	-	7	9	-	-	.30	.30	-
F	Aster sp.	-	1	-	-	-	.00	-	-	-
F	Calochortus nuttallii	-	-	2	-	-	-	.00	-	-
F	Castilleja linariaefolia	6	8	13	19	12	.05	.25	.15	.13
F	Collinsia parviflora (a)	-	ab19	a5	b36	a9	.05	.03	.14	.02
F	Crepis acuminata	-	3	-	2	3	.63	-	.01	.15
F	Erigeron flagellaris	ab29	a25	a12	a17	b49	.07	.03	.19	.98
F	Eriogonum racemosum	b76	ab52	a27	ab38	ab52	.53	.50	.72	1.01
F	Gayophytum ramosissimum(a)	-	b25	a-	a-	a-	.04	-	-	-
F	Ipomopsis aggregata	b17	a4	a-	a1	a-	.63	-	.00	-
F	Lathyrus pauciflorus	ab42	ab42	a31	ab56	b61	.79	.37	1.34	1.85
F	Lomatium parryi	a-	b26	a-	a-	a-	.87	-	-	-
F	Lupinus holosericeus	a178	c235	bc244	ab197	a173	7.76	17.11	15.04	14.18
F	Microsteris gracilis (a)	a-	a-	c51	b11	a-	-	.47	.05	-
F	Penstemon comarrhenus	c138	b64	a7	ab33	b43	.29	.07	.27	.44
F	Phlox longifolia	a16	b68	a30	b92	b93	.22	.07	.63	.91
F	Polygonum douglasii (a)	-	ab31	a7	ab20	b48	.06	.01	.04	.24
F	Senecio neomexicanus	b21	a7	a1	a5	a1	.02	.00	.04	.00
F	Taraxacum officinale	a3	a7	a9	a9	b43	.01	.07	.02	.43
F	Thlaspi sp.	b12	a-	a-	a-	a-	-	-	-	-
F	Unknown forb-perennial	-	-	-	-	7	-	-	-	.04
F	Vicia americana	a-	a-	b44	a6	a-	-	.70	.06	-
Total for Annual Forbs		0	82	70	95	88	0.78	0.56	0.31	0.49
Total for Perennial Forbs		547	553	431	488	543	12.09	19.67	18.85	20.26

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
Total for Forbs		547	635	501	583	631	12.87	20.23	19.15	20.75

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

BROWSE TRENDS--
Management unit 14, Study no: 6

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	15	16	14	14	.55	1.37	1.91	2.02
B	Artemisia tridentata vaseyana	81	60	61	46	6.02	8.42	5.24	2.83
B	Quercus gambelii	0	37	30	37	8.86	5.94	6.77	14.90
B	Symphoricarpos oreophilus	24	13	15	21	1.02	.92	1.25	2.66
Total for Browse		120	126	120	118	16.46	16.66	15.18	22.42

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 6

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	2.70	2.56
Artemisia tridentata vaseyana	-	8.11	3.38
Quercus gambelii	.40	13.51	18.58
Symphoricarpos oreophilus	-	.45	2.08

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 6

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	2.4	3.3
Artemisia tridentata vaseyana	1.5	1.6

BASIC COVER--
Management unit 14, Study no: 6

Cover Type	Average Cover %				
	'86	'94	'99	'04	'09
Vegetation	7.50	58.87	64.00	59.07	73.06
Rock	0	1.08	.04	.09	.04
Pavement	.50	.22	.12	1.09	.16
Litter	76.00	57.97	67.18	63.27	62.04
Cryptogams	.25	.11	.12	.15	.19
Bare Ground	15.75	2.75	4.34	5.81	5.00

SOIL ANALYSIS DATA --
Management unit 14, Study no: 6, Study Name: Harts Draw Reservoir

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.9	6.4	44	35.4	20.6	3.1	23.2	272	0.5

PELLET GROUP DATA--
Management unit 14, Study no: 6

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	3	12	5	2
Elk	1	-	4	-
Deer	8	2	5	4
Cattle	2	11	13	18

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (3)	3 (7)	6 (15)
18 (44)	7 (17)	5 (12)
74 (183)	41 (102)	52 (127)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 6

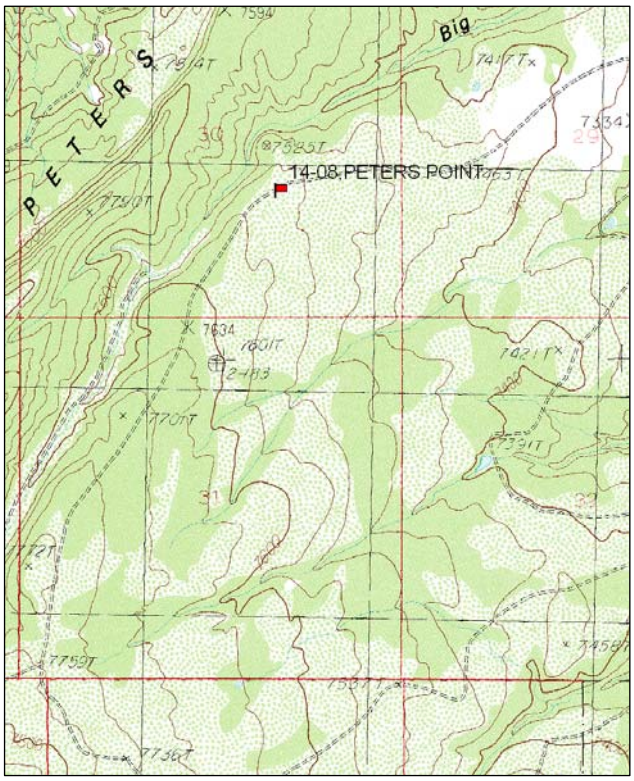
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
86	**999**	100	0	0	-	93	7	0	-/-
94	**360**	28	44	28	60	11	0	22	39/55
99	**380**	37	63	0	-	47	0	0	31/25
04	**320**	6	94	0	-	56	38	0	42/38
09	**440**	36	64	0	-	9	5	0	60/50
Artemisia tridentata vaseyana									
86	**5399**	0	53	47	-	56	42	28	18/18
94	**3100**	7	15	78	2160	2	1	43	19/25
99	**2580**	5	53	42	140	12	4	13	20/23
04	**2320**	10	59	30	5460	32	10	18	22/29
09	**1460**	19	53	27	440	14	0	11	22/29
Cercocarpus montanus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	17/22
Quercus gambelii									
86	**4065**	59	23	18	1133	64	36	44	41/21
94	**0**	0	0	0	-	0	0	0	-/-
99	**3740**	29	64	7	160	17	0	1	45/29
04	**4040**	20	79	1	-	6	0	.49	40/25
09	**5380**	19	81	0	180	0	0	0	59/45
Symphoricarpos oreophilus									
86	**598**	33	56	11	-	78	11	78	14/7
94	**600**	7	93	0	-	17	0	10	15/22
99	**460**	13	87	0	-	13	0	0	18/19
04	**500**	28	72	0	20	4	0	0	16/18
09	**800**	10	90	0	140	0	0	0	19/23

PETERS POINT - TREND STUDY NO. 14-8-09

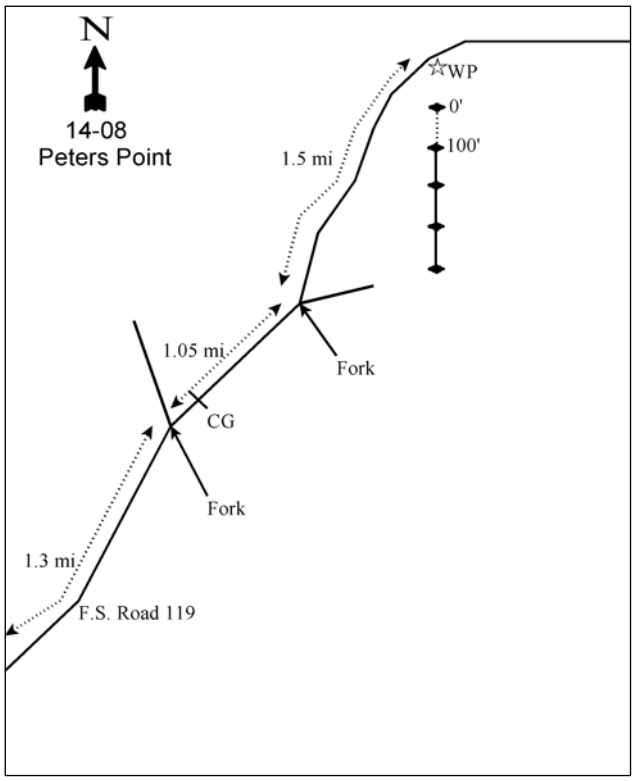
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Spring/Fall, Crucial Elk Year Long
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 7,500 ft (2,286 m)
Aspect: Southeast
Slope: 6%-8%
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From Monticello Lake, take the dirt road (Spring Creek Road) 0.7 miles to a fork. Stay right and continue 2.2 miles to a fork. Turn left (F.S. Road 119) and go north 1.3 miles to a fork. Stay right towards an exclosure and go 0.25 miles to a cattleguard. Continue 0.8 miles to a fork. Stay left and continue 1.5 miles to a witness post on the right side of the road. The 0 foot stake is 100 feet south of the witness post, and has browse tag #1888 attached.

Map Name: Monticello Lake



Diagrammatic Sketch:



Township: 32S, Range: 23E, Section: 30

GPS: NAD 83, UTM 12S 637489 E 4203056 N

PETERS POINT - TREND STUDY NO. 14-8

Site Information

Site Description: The study is located on Peters Point Plateau on the northeast side of the Abajo Mountains. Fifteen hundred acres of pinyon-juniper woodland were chained and seeded in the area in 1962. The Forest Service conducted follow up treatments in 1985 which included burning the perimeter of the old chaining and a Tordon treatment of approximately 200 acres. The study site is near the road in the middle of the chaining. The availability of water is limited, although there are some seasonal sources and small stock ponds. This area is grazed by cattle in the summer as part of the Harts Draw allotment. This area is considered spring-fall range for deer as Peters Point is just above the Harts Draw winter concentration area. This plateau has the potential to become an important elk wintering area. Pellet group data has indicated light use by deer, elk, and cattle since 1999 (Table - Pellet Group Data).

Browse: The key browse species on the site is mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Although some individual sagebrush had different leaf color and growth forms, they were all classified as mountain big sagebrush. Mountain big sagebrush is the dominant browse species on the site and has steadily increased in cover since 1994 (Table - Browse Trends). Density of sagebrush has also been increasing since 1999. Decadence of sagebrush has been mostly low and there has been good recruitment of young plants over the sample years. Sagebrush plants displaying poor vigor were high in 1994, but have been low in all other sample years. Utilization of sagebrush has been mostly light with some moderate use (Table - Browse Characteristics).

Encroachment by Utah juniper (*Juniperus osteosperma*) into this particular area has been rather slow. The point-quarter density of juniper has changed little since 2004, though the average mean diameter increased slightly in 2009. A few widely spaced pinyon pine (*Pinus edulis*) trees are also found on the site, but at lower size and density (Table - Point-Quarter Tree Data). Broom snakeweed (*Gutierrezia sarothrae*) is fairly abundant on the site and has increased substantially since 1994 (Table - Browse Characteristics). Shrubs not encountered on the density plots include scattered Gambel oak (*Quercus gambelii*), large and lightly browsed Utah serviceberry (*Amelanchier utahensis*), and some true mountain mahogany (*Cercocarpus montanus*).

Herbaceous Understory: The seeding treatment successfully established a dense stand of crested wheatgrass (*Agropyron cristatum*). Crested wheatgrass occurs in vigorous, large patches and has provided over 80% of the grass cover since 1994. Mutton bluegrass (*Poa fendleriana*) is the only other common grass species on the site. Forbs are lacking and do not provide much forage. The most numerous forb species is rock goldenrod (*Petradoria pumila*) which also provides the majority of the forb cover (Table - Herbaceous Trends).

Soil: The soil is a reddish sandy loam with a neutral pH and a relatively shallow effective rooting depth (Table - Soil Analysis Data). Some pavement is concentrated on the surface in some scattered exposed spots, but this still contributes little cover. Average cover of bare ground has steadily increased from 1986 to 2004 and was moderately high in 2009 (Table - Basic Cover). Much of this increase is likely due to the inevitable decomposition of chaining litter. The soil erosion condition was classified as slight in 2004 due to pedestaling of plants and flow patterns, but was classified as stable in 2009.

Trend Assessments

Browse:

- **1986 to 1994 - slightly down (-1):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. The number of mountain big sagebrush plants displaying poor vigor increased from 5% to 67% and decadence increased from 7% to 21%.

- **1994 to 1999 - stable (0):** The density of the primary browse species, mountain big sagebrush, decreased by 17%, but cover increased from 8% to 11%. Sagebrush plants displaying poor vigor decreased substantially to 6% and decadence decreased to 8%.
- **1999 to 2004 - slightly up (+1):** Density of mountain big sagebrush increased by 18% from 2,300 plants/acre to 2,720 plants/acre, and cover increased to 13%. Decadence and poor vigor of sagebrush increased slightly, but remained good.
- **2004 to 2009 - up (+2):** The density of mountain big sagebrush increased by 31% to 3,580 plants/acre, and cover increased to 14%. Decadence and vigor of sagebrush remained good, and the recruitment of young sagebrush plants increased slightly from 14% to 16% of the population.

Grass:

- **1986 to 1994 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 13% with a significant decrease in the nested frequency of crested wheatgrass.
- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses, though there was a significant increase in the nested frequency of crested wheatgrass.
- **1999 to 2004 - slightly down (-1):** There was a 16% decrease in the sum of nested frequency of perennial grasses and cover decreased from 15% to 10%. There was a significant decrease in the nested frequency of crested wheatgrass.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses.

Forb:

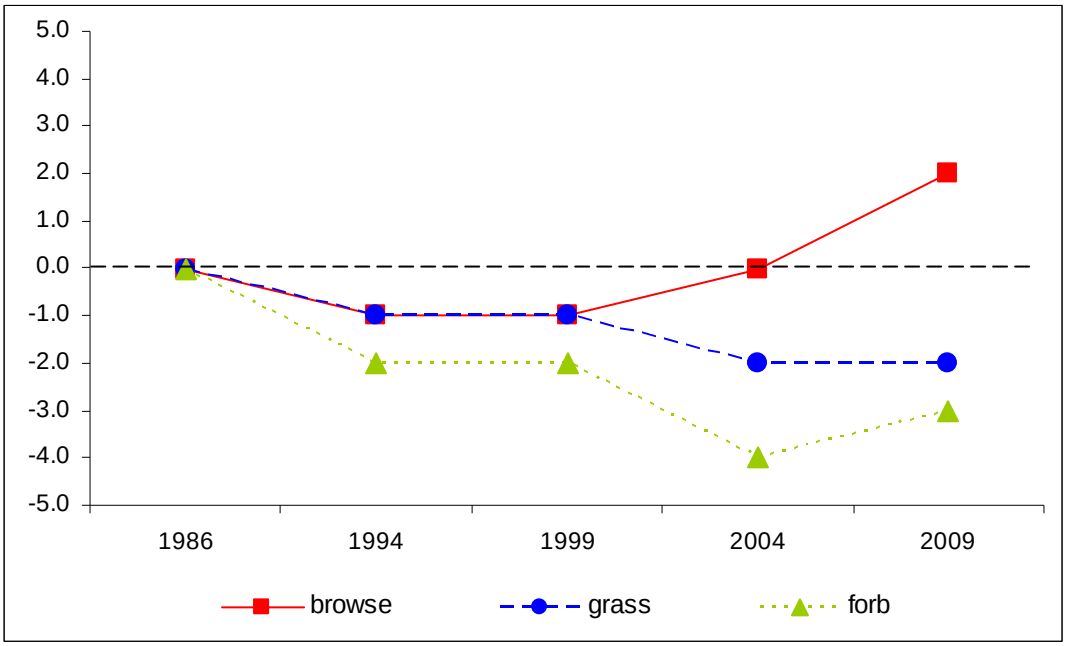
- **1986 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased by 24%.
- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover decreased slightly from 6% to 4%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 47% and cover decreased to 2%.
- **2004 to 2009 - slightly up (+1):** There was a slight increase in the sum of nested frequency of perennial forbs and cover increased to 3%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 14, study no: 8

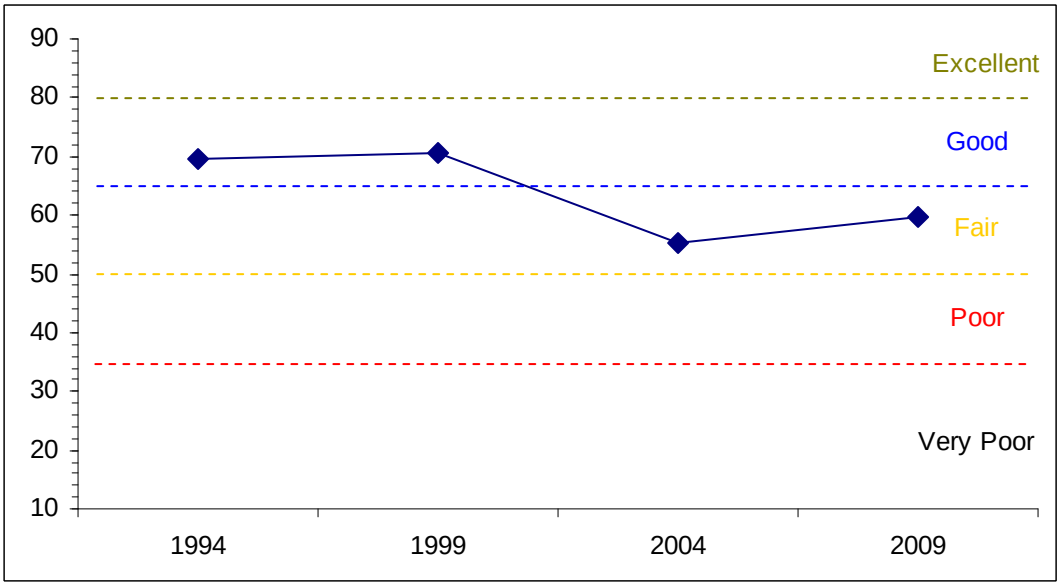
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	9.9	8.7	11.5	30.0	-0.6	10.0	0.0	**69.5**	Good
99	14.2	12.6	6.5	30.0	-0.1	7.4	0.0	**70.7**	Good
04	16.1	9.6	7.0	19.2	0.0	3.5	0.0	**55.3**	Fair
09	17.9	9.9	8.0	18.8	0.0	5.2	0.0	**59.8**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 8



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 14, Study no: 8



HERBACEOUS TRENDS--
Management unit 14, Study no: 8

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{b}$324	$_{a}$242	$_{b}$285	$_{a}$216	$_{a}$227	14.34	14.65	9.14	8.33
G	Bromus tectorum (a)	-	8	22	13	14	.78	.11	.05	.06
G	Koeleria cristata	-	14	3	13	1	1.54	.00	.08	.03
G	Oryzopsis hymenoides	-	4	5	6	-	.03	.15	.03	-
G	Poa fendleriana	$_{a}$3	$_{ab}$27	$_{ab}$20	$_{ab}$20	$_{b}$39	.52	.56	.27	1.01
G	Poa pratensis	-	7	-	-	-	.38	-	-	-
G	Sitanion hystrix	$_{ab}$9	$_{a}$-	$_{ab}$3	$_{b}$11	$_{a}$-	.00	.01	.06	-
Total for Annual Grasses		0	8	22	13	14	0.78	0.11	0.05	0.06
Total for Perennial Grasses		336	294	316	266	267	16.82	15.38	9.58	9.38
Total for Grasses		336	302	338	279	281	17.60	15.50	9.64	9.44
F	Arabis sp.	1	4	1	-	-	.01	.00	-	-
F	Artemisia ludoviciana	1	-	-	-	1	-	-	-	.00
F	Cryptantha humilis	-	4	-	4	3	.63	-	.03	.01
F	Descurainia pinnata (a)	-	-	-	7	1	-	-	.01	.00
F	Draba sp. (a)	-	-	2	8	-	-	.00	.01	-
F	Erigeron pumilus	$_{ab}$4	$_{a}$-	$_{b}$12	$_{a}$-	$_{ab}$13	-	.08	.00	.08
F	Eriogonum alatum	1	3	-	3	-	.00	-	.01	-
F	Heterotheca villosa	-	-	1	-	-	-	.03	-	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{a}$3	$_{b}$17	$_{a}$4	-	.00	.10	.01
F	Lesquerella rectipes	$_{b}$10	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$2	-	-	-	.01
F	Machaeranthera grindelioides	-	-	-	-	3	-	-	-	.00
F	Microsteris gracilis (a)	-	$_{a}$4	$_{a}$3	$_{a}$4	$_{b}$78	.01	.00	.01	.21
F	Oenothera sp.	-	6	-	-	-	.02	-	-	-
F	Pedicularis centranthera	-	-	4	-	4	-	.06	-	.06
F	Penstemon pachyphyllus	$_{a}$9	$_{b}$20	$_{a}$7	$_{a}$-	$_{a}$4	1.54	.01	-	.01
F	Petradoria pumila	$_{b}$118	$_{ab}$70	$_{ab}$75	$_{a}$48	$_{a}$44	3.45	3.50	1.68	2.43
F	Phlox longifolia	-	-	2	-	-	-	.01	-	-
F	Polygonum douglasii (a)	-	-	-	-	8	-	-	-	.02
F	Ranunculus testiculatus (a)	-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$61	-	-	-	.12
F	Sphaeralcea coccinea	-	2	2	-	-	.00	.01	-	-
Total for Annual Forbs		0	4	8	36	152	0.00	0.01	0.14	0.37
Total for Perennial Forbs		144	109	104	55	74	5.67	3.72	1.73	2.61
Total for Forbs		144	113	112	91	226	5.68	3.73	1.87	2.98

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

BROWSE TRENDS--
Management unit 14, Study no: 8

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata vaseyana	53	53	55	69	7.89	11.36	12.91	14.35
B	Chrysothamnus nauseosus	3	1	3	1	.01	.00	.03	.00
B	Chrysothamnus viscidiflorus	0	2	0	0	-	.00	-	-
B	Gutierrezia sarothrae	9	16	21	38	.01	.04	.29	.33
B	Juniperus osteosperma	0	6	5	5	2.57	4.34	4.81	3.26
B	Opuntia sp.	4	5	5	6	.00	.03	.00	.15
Total for Browse		69	83	89	119	10.48	15.78	18.06	18.11

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 8

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata vaseyana	-	13.75	15.93
Chrysothamnus nauseosus	-	.05	-
Gutierrezia sarothrae	-	1.06	.40
Juniperus osteosperma	1.79	4.80	7.33

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 8

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.0	1.7

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 8

Species	Trees per Acre				Average diameter (in)			
	'94	'99	'04	'09	'94	'99	'04	'09
Juniperus osteosperma	75	68	87	73	4.3	4.2	4.4	5.8
Pinus edulis	19	21	22	24	2.6	2.7	2.4	3.3

BASIC COVER--
Management unit 14, Study no: 8

Cover Type	Average Cover %				
	'86	'94	'99	'04	'09
Vegetation	15.25	29.00	35.43	31.02	28.51
Rock	1.00	.50	.43	.41	.91
Pavement	1.25	.96	1.86	1.91	1.35
Litter	63.25	35.18	42.61	36.85	40.74
Cryptogams	0	.16	2.39	1.18	.75
Bare Ground	19.25	32.11	34.52	45.59	43.61

SOIL ANALYSIS DATA --

Management unit 14, Study no: 8, Study Name: Peters Point

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.8	7.2	62.9	18.6	18.6	2.3	8.5	86.4	0.6

PELLET GROUP DATA--

Management unit 14, Study no: 8

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	23	39	9	46
Elk	-	-	4	4
Deer	6	13	12	5
Cattle	-	2	4	9

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (2)	11 (26)	8 (20)
13 (32)	15 (36)	5 (12)
7 (17)	12 (29)	20 (50)

BROWSE CHARACTERISTICS--

Management unit 14, 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	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	54/94
Artemisia frigida									
86	**99**	0	100	-	-	0	0	0	9/7
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Artemisia tridentata vaseyana									
86	**1832**	29	64	7	133	35	13	5	20/20
94	**2780**	23	56	21	460	17	5	67	19/33
99	**2300**	13	79	8	60	4	6	6	19/31
04	**2720**	14	68	18	2200	35	7	10	18/31
09	**3580**	16	66	17	13160	30	1	8	18/33
Cercocarpus montanus									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	33/31
99	**0**	0	0	-	-	0	0	0	64/55
04	**0**	0	0	-	-	0	0	0	55/44
09	**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)
Chrysothamnus nauseosus									
86	**1431**	74	14	12	33	53	5	19	43/52
94	**160**	0	0	100	-	50	0	88	15/14
99	**20**	0	100	0	-	100	0	0	-/-
04	**60**	0	0	100	-	0	0	100	-/-
09	**20**	0	100	0	-	100	0	0	12/13
Chrysothamnus viscidiflorus									
86	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**40**	0	50	50	-	0	0	50	-/-
04	**0**	0	0	0	-	0	0	0	-/-
09	**0**	0	0	0	-	0	0	0	-/-
Gutierrezia sarothrae									
86	**899**	15	82	4	33	0	0	4	6/6
94	**200**	0	90	10	-	0	0	20	6/7
99	**1580**	33	67	0	260	0	0	0	4/4
04	**1160**	0	72	28	-	19	0	10	8/11
09	**2420**	19	81	0	60	0	0	0	6/7
Juniperus osteosperma									
86	**166**	80	20	-	-	20	0	0	88/42
94	**0**	0	0	-	-	0	0	0	-/-
99	**140**	29	71	-	-	0	0	0	-/-
04	**120**	17	83	-	-	0	0	0	-/-
09	**120**	0	100	-	-	0	0	0	-/-
Opuntia sp.									
86	**299**	22	78	-	-	0	0	0	3/8
94	**80**	50	50	-	-	0	0	0	5/15
99	**120**	0	100	-	-	0	0	0	3/10
04	**100**	20	80	-	-	0	0	0	4/11
09	**120**	17	83	-	-	0	0	17	4/10
Pediocactus simpsonii									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	1/2
Pinus edulis									
86	**0**	0	0	-	33	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-

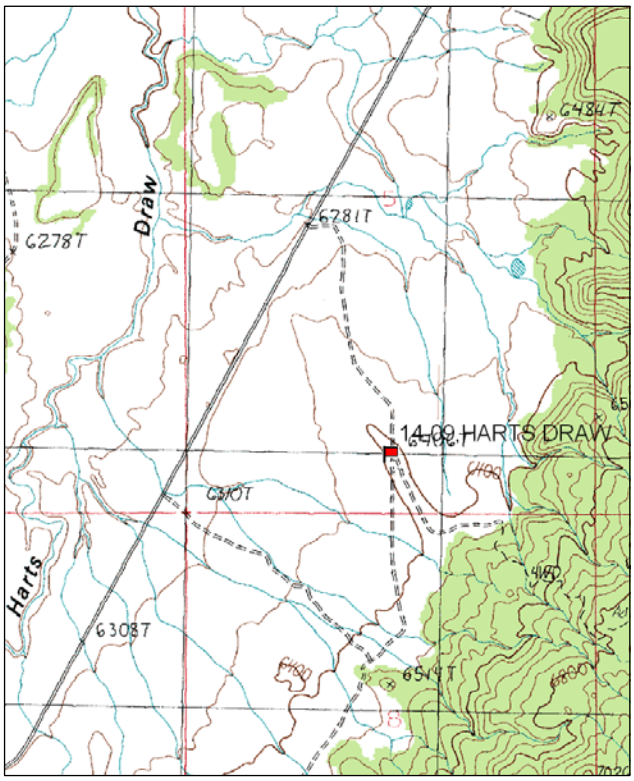
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Purshia tridentata									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	11/21
09	**0**	0	0	-	-	0	0	0	9/27

HARTS DRAW - TREND STUDY NO. 14-9-09

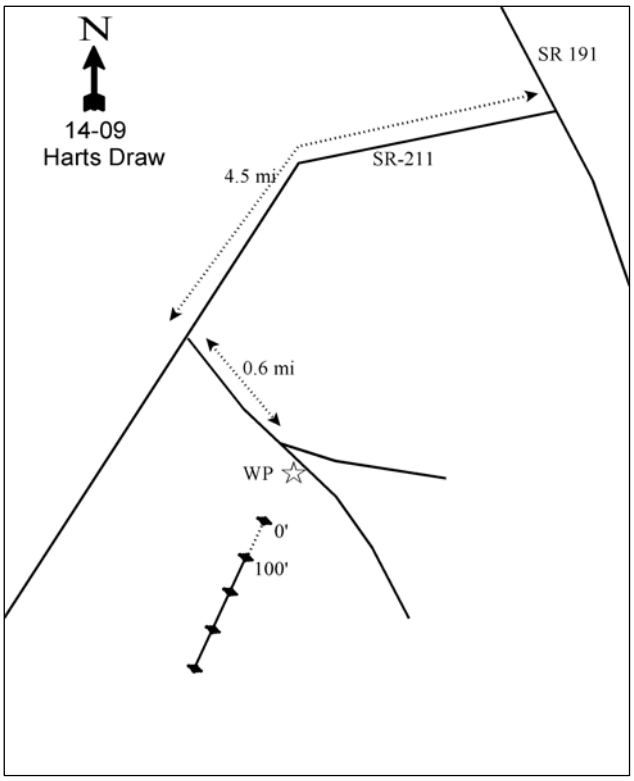
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Upland Loam (Basin Big Sagebrush), R035XY306UT
Land Ownership: BLM
Elevation: 6,400 ft (1,951 m)
Aspect: Southwest
Slope: 4%
Transect bearing: 180 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
Go north from Monticello on SR 191 to the turnoff to Canyonlands National Park (0.3 miles north of mile marker 86). Turn left (west) onto SR-211 and proceed approximately 4.0 miles to mile marker 14. Continue 0.5 miles past the mile marker, then turn left onto a dirt road that goes up and along a small ridge. Go 0.6 miles, bearing right at a faint fork and looking for two green fence posts on your left between the roads. There is a witness post on the right hand side of the road. The 0-foot stake is 19 paces away from the witness post at 218°M. The 0 ft baseline stake is also near a small juniper.

Map Name: Photograph Gap



Diagrammatic Sketch:



Township: 32S, Range: 23E, Section: 5

GPS: NAD 83, UTM 12S 638774 E 4209177 N

Site Information

Site Description: The study is located in an extensive Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community below the pinyon-juniper covered slopes of Peters Point mesa. In the valley below the ridge, sagebrush has been removed and the flat has been planted to crested wheatgrass. Cattle use the flat rather heavily, with sign of grazing less common further up the hill. A pellet group transect located nearby at an elevation of 6,600 feet continually shows the highest use of any transect on the herd unit with a 10 year average ('87-'97) of 91deer days use/acre (225 ddu/ha). Pellet group data on the site has indicated very heavy use by deer since 1999. Estimated cattle use was mostly light in 1999 and 2004, with more moderate use measured in 2009 (Table - Pellet Group Data).

Browse: The key browse species is Wyoming big sagebrush, but sagebrush has been steadily decreasing on the site in cover and density since 1994 (Table - Herbaceous Trends). Decadence in the sagebrush population has been relatively high, especially in 2004 when it increased to 92% of the population. Sagebrush plants displaying poor vigor have also been relatively high with a large increase to 82% in 2004. Both decadence and vigor returned to more normal levels in 2009. Recruitment of young sagebrush plants has been fairly low over all the sample years. Utilization of sagebrush has been mostly moderate, but there was a lot of heavy use of sagebrush in 2004 (Table - Browse Characteristics). Much of the decline in the sagebrush population in 2004 is attributed to drought conditions in the years prior to the 2004 sampling. Two weedy increaser species, narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) and broom snakeweed (*Gutierrezia sarothrae*), are the only other common browse species on the site.

Herbaceous Understory: Blue grama (*Bouteloua gracilis*), a warm season grass, is fairly abundant on the site and forms thick low mats on the side hill. It has increased steadily in cover since 1999 and was the dominant species in cover in 2009. Other native perennial grasses found on the site include bottlebrush squirreltail (*Sitanion hystrix*), needle-and-thread (*Stipa comata*), Indian ricegrass (*Oryzopsis hymenoides*), and galleta (*Hilaria jamesii*). Cheatgrass (*Bromus tectorum*) is common on the site, but cover has fluctuated drastically with climatic variables. Forbs are insignificant with a total cover of only about 1% in each reading (Table - Herbaceous Trends).

Soil: The soil on the site is a reddish sandy loam with a slightly alkaline pH and relatively shallow effective rooting depth (Table - Soil Analysis Data). Much of the sandy soil is exposed on the site. Grasses provide good protection against erosion where they occur, but the amount of herbaceous vegetation and litter cover is low and variable. The soil erosion condition was classified as stable in 2004 and 2009.

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 proportion of Wyoming big sagebrush plants displaying poor vigor increased from 16% to 32%. Decadence of sagebrush decreased slightly, but is still high.
- **1994 to 1999 - slightly down (-1):** The density of the primary browse species, Wyoming big sagebrush, decreased by 7% from 3,580 plants/acre to 3,340 plants/acre. Cover of sagebrush also decreased from 12% to 10%, though both decadence and vigor improved. The density of the undesirable species, broom snakeweed, increased more than three-fold and cover increased from 1% to 4%.
- **1999 to 2004 - down (-2):** The density of Wyoming big sagebrush decreased by 37% to 2,120 plants/acre and cover decreased to 7%. Decadence increased to 92% and plants displaying poor vigor increased to 82%. There was, however, a substantial decrease in broom snakeweed as well.

- **2004 to 2009 - slightly up (+1):** There was a slight decrease in the density and cover of sagebrush, but decadence and the proportion of plants displaying poor vigor decreased to 37% and 31%, respectively. While these measurements are still relatively high, it is a large improvement over 2004 conditions. Recruitment of young sagebrush plants also increased slightly, but is still low at only 5% of the population.

Grass:

- **1986 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses. There was a significant increase in nested frequency of bottlebrush squirreltail and a significant decrease in nested frequency of needle-and-thread.
- **1994 to 1999 - slightly down (-1):** There was a slight increase in the sum of nested frequency of perennial grasses, but cover decreased slightly. There was also a significant decrease in the nested frequency of the dominant perennial grass, blue grama, and a significant increase in the nested frequency of cheatgrass. The cover of cheatgrass increased to nearly 13% and was the dominant species on the site.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 24%, though cover increased from 8% to 15%. Most of this increase was due to a significant increase in the nested frequency of blue grama and subsequent increase in cover. However, there was a significant decrease in most of the other important native perennial grasses on the site as well. Cheatgrass also had a significant decrease in nested frequency and had less than 1% cover.
- **2004 to 2009 - up (+2):** The sum of nested frequency increased by 59% and cover increased to 20%. There was a significant increase in the nested frequency of blue grama and bottlebrush squirreltail. Cheatgrass also had a significant increase in nested frequency and cover increased to 3%.

Forb:

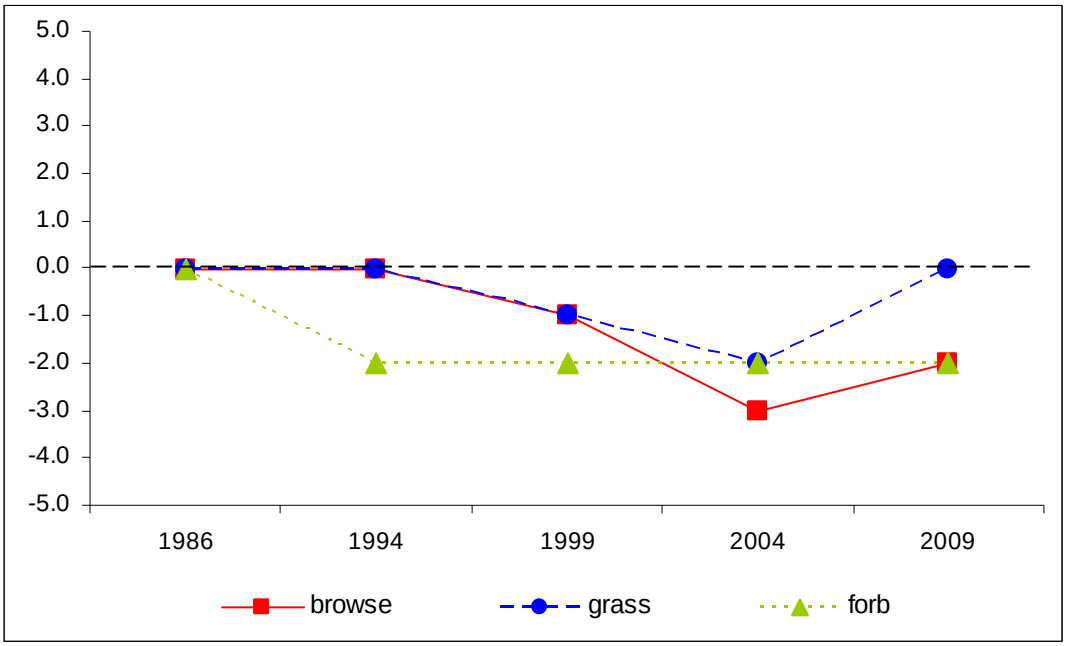
- **1986 to 1994 - down (-2):** There was a significant decrease in the nested frequency of the only two common perennial forbs, scarlet globemallow (*Sphaeralcea coccinea*) and low fleabane (*Erigeron pumilus*).
- **1994 to 1999 - stable (0):** There was a slight increase in the sum of nested frequency of perennial forbs, but forbs are so rare that there was little real change.
- **1999 to 2004 - stable (0):** Forbs are very rare on the site with little change in the sum of nested frequency or cover of perennial forbs.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency and cover of perennial forbs.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 14, study no: 9

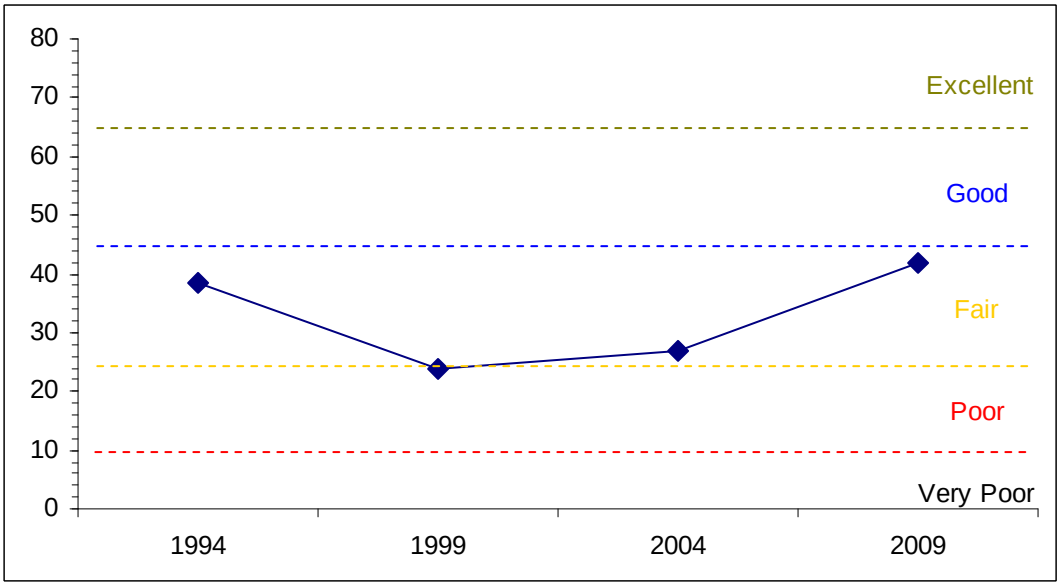
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	14.8	1.2	1.0	21.2	-0.5	0.8	0.0	**38.5**	Fair
99	11.9	5.1	0.5	15.0	-9.9	1.3	0.0	**23.9**	Poor-Fair
04	8.9	-12.6	1.0	29.5	-0.4	0.4	0.0	**26.8**	Poor-Fair
09	7.1	3.9	2.5	30.0	-2.4	0.7	0.0	**41.8**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 9



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 14, Study no: 9



HERBACEOUS TRENDS--
Management unit 14, Study no: 9

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	a-	a6	a4	a-	b17	.03	.06	-	.34
G	Bouteloua gracilis	b165	b130	a77	b166	c210	5.41	2.97	12.73	17.41
G	Bromus tectorum (a)	-	a16	c344	a19	b165	.07	12.91	.52	3.25
G	Hilaria jamesii	a1	a5	b39	a-	ab15	.04	1.52	-	.31
G	Oryzopsis hymenoides	a-	b15	b20	b9	b27	.39	.27	1.03	.72
G	Sitanion hystrix	a25	b123	c153	a46	b82	4.70	2.62	.93	1.12
G	Sporobolus cryptandrus	-	-	-	2	-	-	-	.00	-
G	Stipa comata	b81	a-	a4	a4	a9	-	.04	.03	.07
G	Vulpia octoflora (a)	-	d240	c99	b11	a-	.55	.33	.02	-
Total for Annual Grasses		0	256	443	30	165	0.62	13.24	0.54	3.25
Total for Perennial Grasses		272	279	297	227	360	10.59	7.50	14.73	19.99
Total for Grasses		272	535	740	257	525	11.21	20.75	15.28	23.25
F	Arnica mollis	7	-	-	-	-	-	-	-	-
F	Astragalus mollissimus	2	-	5	-	-	-	.06	-	-
F	Chenopodium album (a)	-	-	-	3	-	-	-	.01	-
F	Chenopodium sp. (a)	-	2	-	-	-	.00	-	-	-
F	Cryptantha sp.	a-	b12	b20	a-	a-	.03	.23	-	-
F	Descurainia pinnata (a)	-	b38	a1	a10	a7	.09	.00	.21	.44
F	Erigeron pumilus	c44	a1	b17	a1	a3	.03	.31	.01	.03
F	Erigeron sp.	b9	a-	a-	a-	ab3	-	-	-	.04
F	Eriogonum cernuum (a)	-	1	-	-	-	.00	-	-	-
F	Gilia hutchinifolia (a)	-	ab20	a8	b34	a-	.05	.02	.30	-
F	Lappula occidentalis (a)	-	a-	a1	b17	a6	-	.00	.27	.01
F	Lepidium sp. (a)	-	c20	ab7	a3	bc17	.42	.23	.07	.26
F	Leucelene ericoides	-	10	-	7	-	.33	-	.09	-
F	Orobanche fasciculata	-	-	4	-	-	-	.01	-	-
F	Phlox longifolia	-	-	-	3	-	-	-	.00	-
F	Ranunculus testiculatus (a)	-	-	-	1	-	-	-	.00	-
F	Schoencrambe linifolia	-	-	-	-	-	-	-	-	.00
F	Sclerocactus sp.	2	-	-	-	-	-	-	-	-
F	Senecio multilobatus	-	-	-	4	-	-	-	.00	-
F	Sphaeralcea coccinea	b52	a14	a13	a6	a18	.03	.05	.07	.28
F	Unknown forb-perennial	-	-	-	1	-	-	-	.03	-
Total for Annual Forbs		0	81	17	68	30	0.58	0.26	0.87	0.71
Total for Perennial Forbs		116	37	59	22	24	0.42	0.67	0.21	0.35
Total for Forbs		116	118	76	90	54	1.00	0.94	1.09	1.07

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

BROWSE TRENDS--
Management unit 14, Study no: 9

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	77	78	70	64	11.80	9.50	7.10	5.69
B	Chrysothamnus viscidiflorus stenophyllus	10	6	9	10	.18	.46	1.77	1.21
B	Gutierrezia sarothrae	70	94	38	56	1.02	3.95	2.40	1.46
B	Opuntia sp.	11	5	3	4	.04	.18	.18	.30
B	Sclerocactus sp.	0	0	0	4	.01	-	-	.15
Total for Browse		168	183	120	138	13.07	14.11	11.46	8.82

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 9

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	8.23	8.18
Chrysothamnus viscidiflorus stenophyllus	1.01	1.93
Gutierrezia sarothrae	2.53	1.46

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 9

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.4	0.9

BASIC COVER--
Management unit 14, Study no: 9

Cover Type	Average Cover %				
	'86	'94	'99	'04	'09
Vegetation	4.25	21.01	34.93	28.69	34.25
Rock	0	.45	.09	.04	.06
Pavement	8.25	1.01	2.01	2.56	3.79
Litter	35.75	18.98	30.61	27.45	35.43
Cryptogams	.75	1.52	1.99	1.28	.57
Bare Ground	51.00	51.87	41.37	48.84	41.95

SOIL ANALYSIS DATA --
Management unit 14, Study no: 9, Study Name: Harts Draw

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.4	7.6	72.9	12.6	14.6	1.3	8.8	51.2	0.4

PELLET GROUP DATA--
Management unit 14, Study no: 9

Type	Quadrat Frequency			
	'94	'99	'04	'09
Sheep	-	1	-	1
Rabbit	14	53	9	36
Elk	8	1	-	-
Deer	36	40	41	29
Cattle	-	1	5	4

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	-	-
-	-	-
84 (207)	104 (256)	68 (167)
7 (17)	15 (38)	30 (73)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 9

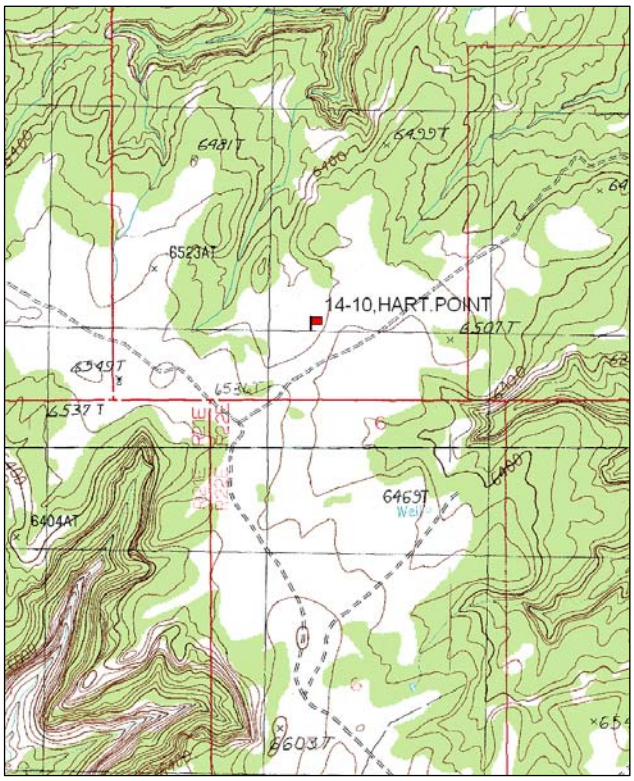
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis									
86	**3331**	2	48	50	-	46	14	16	20/19
94	**3580**	2	51	46	40	60	9	32	20/33
99	**3340**	1	66	33	-	53	23	14	23/31
04	**2120**	2	7	92	40	32	63	82	23/34
09	**2000**	5	58	37	-	29	17	31	20/33
Chrysothamnus viscidiflorus stenophyllus									
86	**199**	33	67	0	-	0	0	33	9/11
94	**480**	8	92	0	-	0	0	0	10/18
99	**300**	20	53	27	20	0	0	0	12/16
04	**400**	0	85	15	-	0	0	10	13/23
09	**460**	9	65	26	-	17	4	9	16/26
Gutierrezia sarothrae									
86	**12865**	29	66	5	3533	.51	0	.51	8/6
94	**5480**	11	88	2	260	1	0	2	5/6
99	**19600**	17	82	2	80	0	0	2	7/8
04	**2580**	2	97	2	-	0	0	2	8/11
09	**3020**	16	83	1	40	0	0	.66	6/8
Opuntia sp.									
86	**133**	0	100	0	-	0	0	50	3/6
94	**360**	33	61	0	20	0	0	0	2/10
99	**120**	17	83	0	-	0	0	17	3/7
04	**60**	0	67	33	-	0	0	33	2/4
09	**80**	0	100	0	-	0	0	0	3/7
Sclerocactus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	3/9
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**80**	25	75	-	-	0	0	25	1/1

HARTS POINT - TREND STUDY NO. 14-10-09

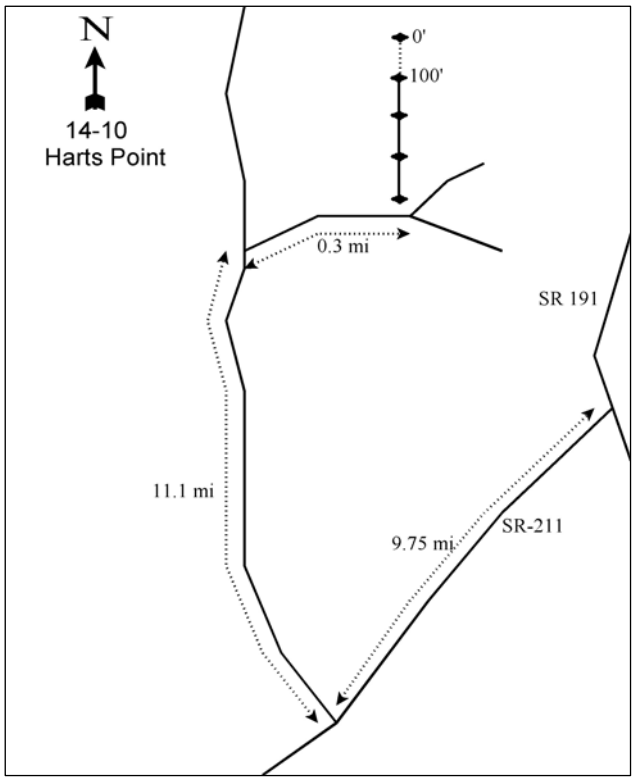
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Upland Loam (Basin Big Sagebrush), R035XY306UT
Land Ownership: BLM
Elevation: 6,400 ft (1,951 m)
Aspect: Northwest
Slope: 5%
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)
Site Notes: No rebar on line 4, 0' lands in a two-track, put rebar on 20' mark.

Directions:
From the turnoff to the Needles District, Canyonlands National Park (onto SR-211 from SR-191), go west and south on the main paved road for 9.75 miles. At this point, just before the road drops down into Indian Creek Canyon, turn right onto the Harts Point Road. Go north on this road 11.1 miles. Turn right onto a small dirt road and go down 0.3 miles to a faint fork. The transect is north and west of these two roads. The last baseline stake is located approximately 30 feet from the fork. The start of the baseline is located 400 feet north and is marked by a fence post with browse tag #7820 attached.

Map Name: Harts Point North



Diagrammatic Sketch:



Township: 30S, Range: 22E, Section: 31

GPS: NAD 83, UTM 12S 627129 E 4221208 N

HARTS POINT - TREND STUDY NO. 14-10

Site Information

Site Description: The study is located on a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat surrounded by slickrock domes and Utah juniper (*Juniperus osteosperma*) covered hills. It is an arid site with a stock pond constructed in the area where a small drainage flows between two sandstone bluffs. The pond collects seasonal water in the spring time. Pellet group data has indicated moderate to heavy use by deer since 1999 with some minimal use by elk noted in 1999. Estimated cattle use has been fairly light since 1999 (Table - Pellet Group Data). Another principal use for this area is oil and gas exploration and extraction. A new pipeline was constructed across Harts Point in 1986.

Browse: Wyoming big sagebrush is the key species on this winter range with a small population of the preferred browse, winterfat (*Ceratoides lanata*), also scattered over the site. The sagebrush appears to have some of the characteristics of both mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Wyoming big sagebrush and is likely a hybrid between the two subspecies. All sagebrush on the site was classified as Wyoming big sagebrush. The sagebrush population is mostly mature with a moderate amount of decadence. Vigor has been mostly good in the population except for the 1994 sampling when plants displaying poor vigor increased to 60%. Recruitment of young sagebrush plants has decreased over the sample years with no young plants sampled in 2009. Utilization of sagebrush has been mostly light to moderate. The winterfat population has displayed very heavy use since 2004 (Table - Browse Characteristics).

Herbaceous Understory: Seven perennial grass species have been sampled on this site. Blue grama (*Bouteloua gracilis*) is the dominant grass on the site with sand dropseed (*Sporobolus cryptandrus*) and needle-and-thread (*Stipa comata*) also being fairly abundant. Galleta (*Hilaria jamesii*), Indian ricegrass (*Oryzopsis hymenoides*), and bottlebrush squirreltail (*Sitanion hystrix*) are also somewhat common, but not very abundant. Cheatgrass (*Bromus tectorum*) is present on the site and its abundance has been reflective of precipitation patterns. Forbs are sparse on the site with only one forb, lobeleaf groundsel (*Senecio multilobatus*) being sampled in 2009 (Table - Herbaceous Trends).

Soil: The soil is a sandy loam with a slightly alkaline pH and a fairly deep effective rooting depth. Phosphorus and potassium have limited availability for plant growth and development at 4.9 ppm and 38.4 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is fairly high on the site with large open areas in the interspaces of shrubs. Cryptogam cover is quite high on the site with most cover occurring around shrubs (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 and 2009 due primarily to pedastaling. There was a small gully beginning to form on the north end of the transect in 2009.

Trend Assessments

Browse:

- **1986 to 1994 - slightly down (-1):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. The number of sagebrush plants displaying poor vigor increased from 9% to 60%. Recruitment of young sagebrush plants decreased substantially.
- **1994 to 1999 - slightly up (+1):** There was little change in the density of the primary browse species, Wyoming big sagebrush, but plants displaying poor vigor decreased to 4% and decadence decreased from 26% to 11%. Recruitment of young sagebrush plants increased from 6% of the population to 12%.
- **1999 to 2004 - slightly down (-1):** There was a slight decrease in the density of sagebrush, but cover increased from 12% to 14%. Decadence of sagebrush increased to 42% and recruitment of young plants decreased to 3% of the population.

- **2004 to 2009 - slightly up (+1):** There was an 11% increase in the density of Wyoming big sagebrush from 3,420 plants/acre to 3,800 plants/acre. Decadence of sagebrush decreased slightly to 31%, but is still fairly high. There was no new recruitment of young plants sampled in 2009.

Grass:

- **1986 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though there was a significant decrease in the nested frequency of blue grama and a significant increase in the nested frequency of Indian ricegrass and sand dropseed.
- **1994 to 1999 - down (-2):** There was a 20% decrease in the sum of nested frequency of perennial grasses and cover decreased from 11% to 6%. There was a significant increase in the nested frequency of cheatgrass and cover increased from 3% to 4%.
- **1999 to 2004 - stable (0):** The sum of nested frequency of perennial grasses decreased slightly, but cover increased slightly to 8%. There was a significant decrease in the nested frequency of cheatgrass and cover fell to less than 0.1%. There was a significant increase in the nested frequency of sand dropseed and needle-and-thread.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased to 12%.

Forb:

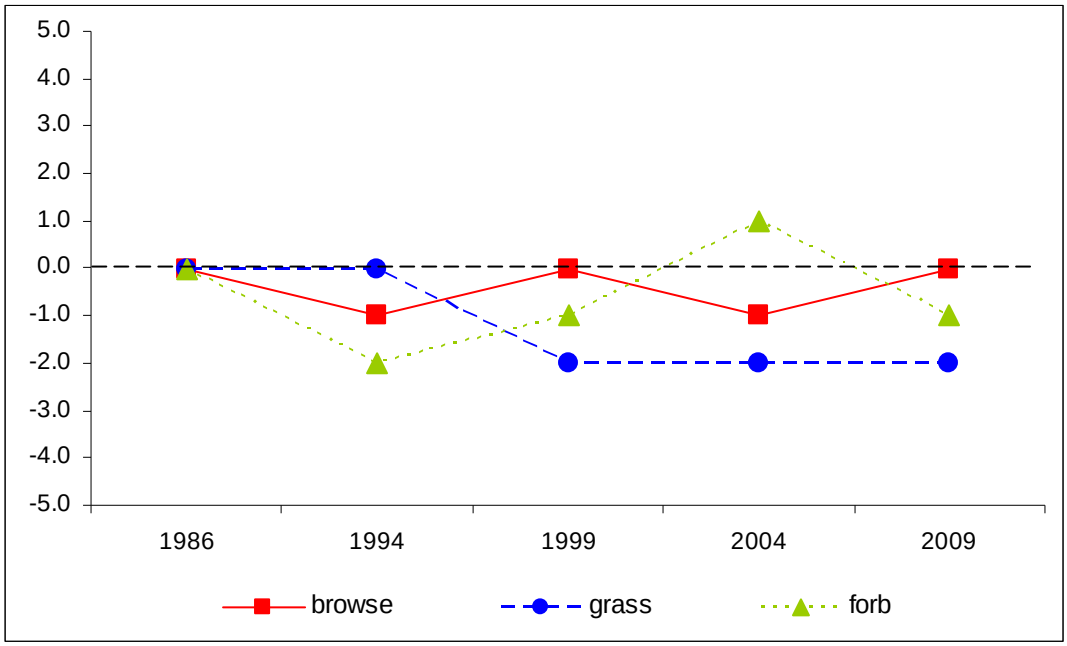
- **1986 to 1994 - down (-2):** Forbs are rare on the site. The sum of nested frequency of perennial forbs decreased due to a significant decrease in the nested frequency of low fleabane (*Erigeron pumilus*).
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased slightly and cover increased from less than 1% to over 2%.
- **1999 to 2004 - up (+2):** There was a two-fold increase in the sum of nested frequency of perennial forbs and cover increased to 6%. There was a significant increase in the nested frequency of lobeleaf groundsel.
- **2004 to 2009 - down (-2):** Lobeleaf groundsel was the only forb sampled on the site in 2009 and it decreased significantly in nested frequency. Total forb cover decreased to less than 0.1%.

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

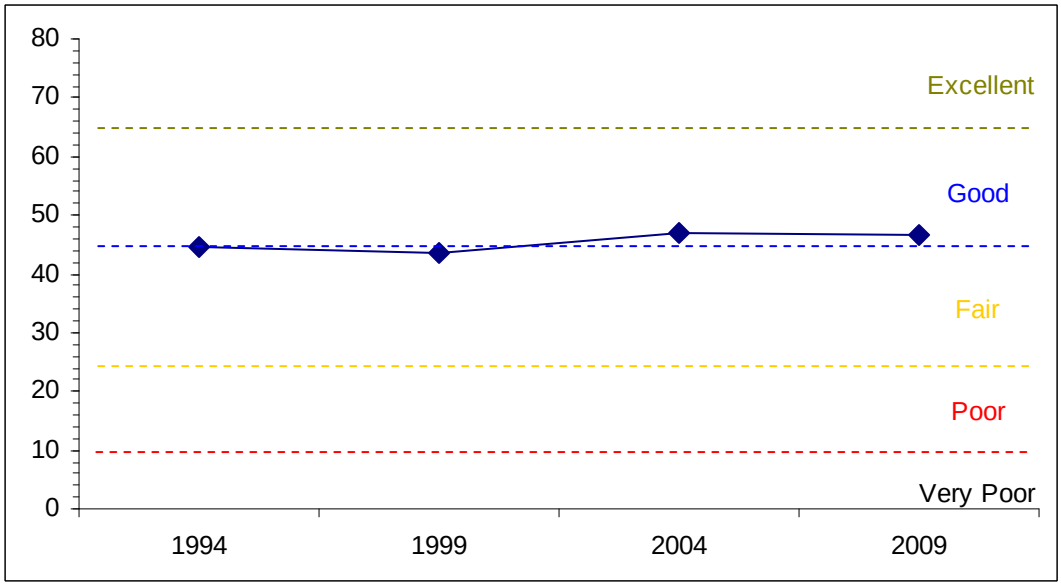
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	14.4	7.2	3.0	22.2	-2.9	0.7	0.0	**44.6**	Fair-Good
99	14.6	11.7	6.0	12.0	-5.6	4.9	0.0	**43.6**	Fair-Good
04	17.9	2.5	1.5	16.0	-0.9	10.0	0.0	**47.0**	Fair-Good
09	18.5	5.7	0.0	23.5	-1.3	0.1	0.0	**46.6**	Fair-Good

Trend Summary

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



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



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

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
G	Bouteloua gracilis	$_{c}$234	$_{b}$168	$_{ab}$159	$_{a}$127	$_{ab}$137	8.36	4.55	4.97	7.87
G	Bromus tectorum (a)	-	$_{ab}$75	$_{c}$270	$_{a}$33	$_{b}$70	2.93	4.39	.09	.96
G	Hilaria jamesii	$_{abc}$31	$_{bc}$45	$_{c}$45	$_{ab}$17	$_{a}$14	.70	.42	.26	.11
G	Oryzopsis hymenoides	$_{a}$7	$_{b}$27	$_{c}$64	$_{a}$9	$_{ab}$14	.09	.53	.18	.29
G	Poa secunda	-	-	1	1	2	-	.00	.00	.06
G	Sitanion hystrix	$_{b}$27	$_{b}$30	$_{ab}$19	$_{a}$7	$_{ab}$13	.16	.11	.04	.28
G	Sporobolus cryptandrus	$_{a}$-	$_{b}$47	$_{b}$20	$_{c}$91	$_{c}$71	.78	.15	1.73	2.00
G	Stipa comata	$_{c}$110	$_{bc}$88	$_{a}$17	$_{b}$56	$_{b}$52	1.00	.23	.80	1.13
G	Vulpia octoflora (a)	-	$_{c}$307	$_{c}$299	$_{b}$131	$_{a}$93	.88	3.07	1.07	.74
Total for Annual Grasses		0	382	569	164	163	3.81	7.46	1.17	1.70
Total for Perennial Grasses		409	405	325	308	303	11.12	6.02	7.99	11.76
Total for Grasses		409	787	894	472	466	14.93	13.48	9.16	13.46
F	Calochortus nuttallii	6	-	3	2	-	-	.00	.00	-
F	Cryptantha sp.	-	6	-	-	-	.02	-	-	-
F	Cymopterus sp.	-	3	-	-	-	.15	-	-	-
F	Delphinium nuttallianum	$_{a}$-	$_{a}$-	$_{a}$1	$_{b}$7	$_{a}$-	-	.00	.02	-
F	Draba reptans (a)	-	7	3	-	-	.02	.01	-	-
F	Erigeron flagellaris	-	1	3	-	-	.00	.00	-	-
F	Erigeron pumilus	$_{b}$77	$_{a}$1	$_{a}$3	$_{a}$-	-	.01	.18	-	-
F	Gilia hutchinifolia (a)	-	$_{bc}$42	$_{c}$70	$_{b}$17	$_{a}$-	.09	.87	.06	-
F	Lappula occidentalis (a)	-	1	2	-	3	.00	.00	-	.00
F	Machaeranthera canescens	1	-	-	-	-	-	-	-	-
F	Oenothera sp.	-	-	-	2	-	-	-	.00	-
F	Plantago patagonica (a)	-	$_{c}$147	$_{c}$160	$_{b}$49	$_{a}$-	.30	1.10	.19	-
F	Ranunculus testiculatus (a)	-	-	3	-	-	-	.03	-	-
F	Senecio multilobatus	$_{a}$9	$_{b}$42	$_{b}$61	$_{c}$137	$_{a}$9	.16	2.25	5.80	.05
Total for Annual Forbs		0	197	238	66	3	0.42	2.02	0.25	0.00
Total for Perennial Forbs		93	53	71	148	9	0.35	2.45	5.82	0.05
Total for Forbs		93	250	309	214	12	0.77	4.47	6.08	0.05

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

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

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	79	78	76	78	11.46	11.60	14.13	14.80
B	Ceratoides lanata	9	5	3	5	.04	.06	.15	.03
B	Gutierrezia sarothrae	2	1	0	0	.00	-	-	-
B	Opuntia sp.	3	2	1	0	.06	-	-	.01
Total for Browse		93	86	80	83	11.58	11.66	14.28	14.84

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

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	21.66	20.60
Ceratoides lanata	.15	.11

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

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	4.2	1.3

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

Cover Type	Average Cover %				
	'86	'94	'99	'04	'09
Vegetation	10.75	27.60	27.80	29.40	27.66
Rock	0	.00	0	.02	0
Pavement	0	0	.00	.02	0
Litter	45.75	19.87	18.33	19.85	29.15
Cryptogams	4.50	2.95	6.25	7.65	6.76
Bare Ground	39.00	49.35	43.04	54.29	48.17

SOIL ANALYSIS DATA --
Management unit 14, Study no: 10, Study Name: Harts Point

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
22.4	7.5	64.9	18.6	16.6	1	4.9	38.4	0.4

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

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	36	47	15	58
Elk	-	-	-	-
Deer	30	21	18	35
Cattle	6	7	6	4

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (3)	-	-
48 (119)	32 (79)	52 (129)
22 (54)	7 (16)	15 (38)

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

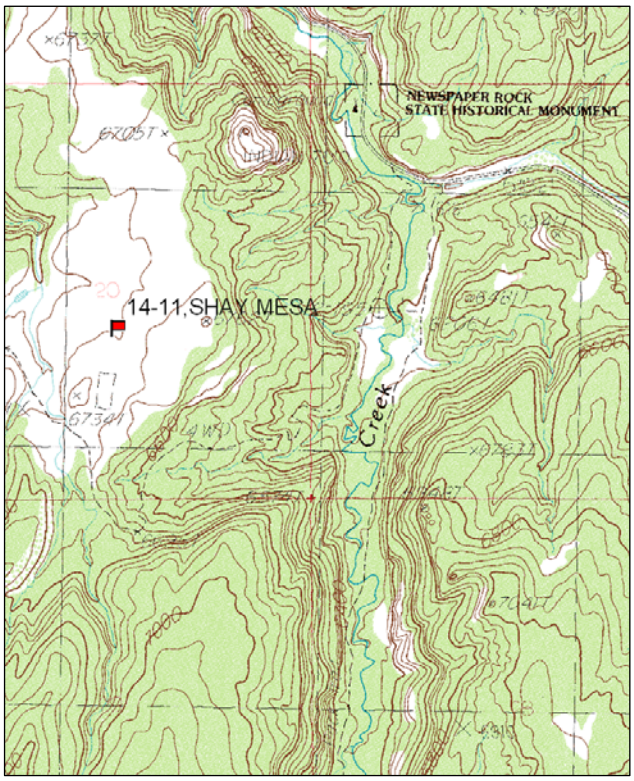
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis									
86	**3732**	20	57	23	999	18	64	9	17/22
94	**3560**	6	67	26	20	13	9	60	37/49
99	**3580**	12	77	11	-	30	11	4	25/36
04	**3420**	3	56	42	40	43	0	18	26/40
09	**3800**	0	69	31	-	39	19	9	22/35
Ceratoides lanata									
86	**0**	0	0	0	-	0	0	0	-/-
94	**220**	0	73	27	-	0	0	9	7/21
99	**180**	0	100	0	-	0	11	0	6/8
04	**100**	0	100	0	-	0	100	0	8/8
09	**260**	0	100	0	-	8	69	0	13/10
Gutierrezia sarothrae									
86	**0**	0	0	-	-	0	0	0	-/-
94	**40**	0	100	-	-	0	0	0	8/10
99	**20**	0	100	-	-	0	0	0	8/8
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	10/11
Juniperus osteosperma									
86	**66**	0	100	-	-	0	0	0	69/70
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
94	**60**	0	67	33	20	0	0	33	8/9
99	**60**	0	100	0	-	0	0	0	4/9
04	**20**	0	100	0	-	0	0	0	6/9
09	**0**	0	0	0	20	0	0	0	5/16

SHAY MESA - TREND STUDY NO. 14-11-09

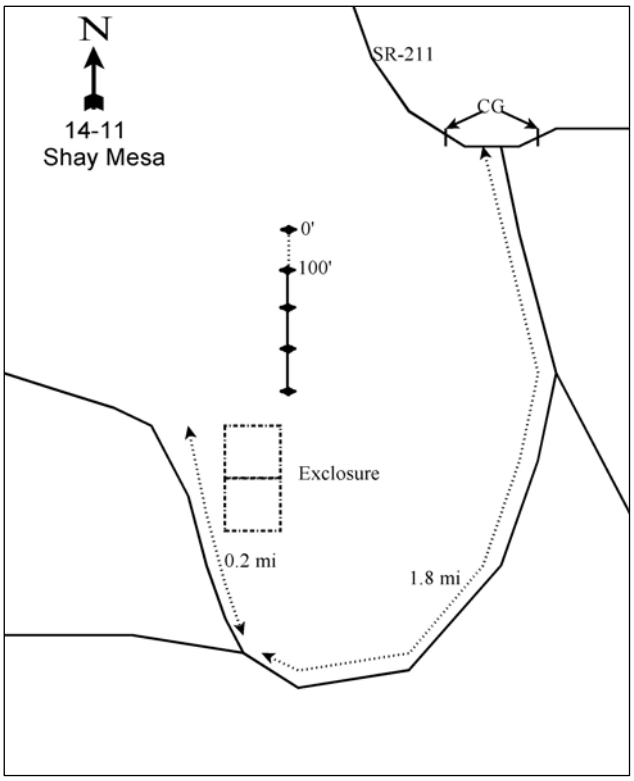
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Loam (Basin Big Sagebrush), R035XY306UT
Land Ownership: BLM
Elevation: 7,000 ft (2,134 m)
Aspect: East
Slope: 5%
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From the junction of SR-l91 and 211 (about 14 miles north af Monticello), turn west on the road towards Canyonlands National Park and Newspaper Rock. Go approximately 13 miles on this paved road, the last two miles dropping into the canyon of a tributary to Indian Creek. Cross a cattleguard and turn left just before another cattleguard and 0.1 miles east of Newspaper Rock. Turn left on this road, cross Indian Creek and go 1.8 miles up onto the mesa. Look for a faint road going up to the right through an old pinyon-juniper chaining to an exclosure. Follow this road 0.2 miles to the north end of the exclosure. The end of the baseline is located 100 feet north of the northeast corner of the exclosure. The 0 foot end of the baseline is 400 feet north and the stake is tagged #7877.

Map Name: Shay Mountain



Diagrammatic Sketch:



Township: 32S, Range: 22E, Section: 20

GPS: NAD 83, UTM 12S 629124 E 4204634 N

SHAY MESA - TREND STUDY NO. 14-11

Site Information

Site Description: The study is located on Shay Mesa and samples a former mixed pinyon-juniper woodland. A large chaining and seeding project was done in the mid- 1960's on the high mesa foothills north of the Abajo Mountains. The seed mixture included crested wheatgrass (*Agropyron cristatum*), pubescent wheatgrass (*A. trichophorum*), alfalfa (*Medicago sativa*), and a ground application of four-wing saltbush (*Atriplex canescens*), bitterbrush (*Purshia tridentata*), and cliffrose (*Cowania mexicana* ssp. *stansburiana*) at selected locations. There was little evidence of the seeding on this particular study site, as all species encountered during all readings were native. The area was part of the Shay Mesa Phase II Watershed Restoration Initiative project (project# 1091) done in the early summer of 2009 that treated over 1,300 acres in the area. The study was within a bullhog and seeding section of the project (Table - Seed Mix) that was done in conjunction with several other treatment types in the area. The treatments were designed to reduce pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) cover and increase shrub and herbaceous production and diversity. The bullhog treatment removed nearly all the pinyon and juniper on the study site. The bullhog project was done just prior to the sampling in 2009 with many fresh tire tracks throughout the site and the cut trees still being green. The study transect was placed just outside a 1958 BLM two-way exclosure and is 700 feet above Indian Creek, which is a perennial stream. Pellet group data indicated minimal use by deer in 1999 and 2004, but increased to moderate use in 2009. Estimated elk use has been light on the site since 2004. Estimated cattle use was fairly moderate in 1999, but decreased to light use since 2004 (Table - Pellet Group Data).

Browse: The key browse species is mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) which provides nearly all of the preferred browse forage on the site. The bullhog treatment reduced sagebrush cover, but with the reduction in pinyon and juniper, sagebrush is now the dominant browse species on the site (Table - Browse Trends). The bullhog treatment reduced the density of sagebrush and increased decadence, but the population still appeared healthy. The sagebrush population should recover over time. Utilization of sagebrush has been mostly moderate over the sample years (Table - Browse Characteristics). Other palatable browse species in the area include fourwing saltbush, slender buckwheat (*Eriogonum microthecum*), and winterfat (*Ceratoides lanata*). Broom snakeweed (*Gutierrezia sarothrae*), a weedy increaser, is also common.

Prior to the treatment, the dominant overstory was pinyon with a few juniper. Point-center quarter data from 2004 estimated 34 juniper and 79 pinyon trees/acre. Average diameter of juniper was estimated at 8.5 inches, while pinyon was estimated at just over 5 inches. About 50% of the juniper and 61% of the pinyon trees were greater than 12 feet in height. There were few trees sampled in 2009 and all of the sampled trees were less than 4 feet tall.

Herbaceous Understory: Grasses are fairly abundant with much of the cover provided by native perennial species. Blue grama (*Bouteloua gracilis*) is the dominant grass species, but the annual grass cheatgrass (*Bromus tectorum*) provided similar cover in 1999. Cheatgrass abundance has been related to precipitation patterns over the sample years. Other grass species found less frequently include needle-and-thread (*Stipa comata*), western wheatgrass (*Agropyron smithii*), and bottlebrush squirreltail (*Sitanion hystrix*). Several typical pinyon-juniper associated forb species are present, although overall density and usefulness is limited. The total cover of forbs has averaged only a little over 1% since 1994. The most common perennial species is scarlet globemallow (*Sphaeralcea coccinea*).

Soil: The soil is a light red sandy clay loam with a neutral pH and a moderately deep effective rooting depth (Table - Soil Analysis Data). There is one large gully about 20 yards northeast of the baseline which was active in 1986, but appeared to be healing as of 1999. Bare ground cover has been high in the past, but decreased slightly after the treatment in 2009 with an increase in litter cover (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 due to pedestaling and flow patterns, but was stable in 2009.

SEED MIX
Management Unit 14, study no. 11
Project name: Shay Mesa Phase II

WRI Database #: 1091	Size (acre):	1310
Seed type	lbs in mix	lbs/acre
Ricegrass, Indian (N)	1968	1.5
Wheatgrass, Western (N)	2624	2.0
Bluegrass, Sandberg's (N)	656	0.5
Needle and Thread (N)	656	0.5
Wheatgrass, Crested (I)	1049.6	0.8
Milkvetch, Cicer (I)	1312	1.0
Blue Flax-Appar (I)	656	0.5
Sainfoin (I)	1968	1.5
Bitterbrush (N)	1312	1.0
Big sagebrush, Mountain (N)	656	0.5
Sweetclover, Yellow (I)	1312	1.0
Winterfat (N)	1312	1.0
TOTAL:	15481.6	11.82

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 sagebrush population, though poor vigor increased slightly and recruitment of young sagebrush plants decreased.
- **1994 to 1999 - stable (0):** There was little change in the density of mountain big sagebrush, though cover increased slightly. Sagebrush plants displaying poor vigor decreased to less than 1%, though recruitment of young sagebrush plants continued to decrease.
- **1999 to 2004 - slightly up (+1):** The density of mountain big sagebrush increased by 43% from 2,060 plants/acre to 2,960 plants/acre, and cover increased from 6% to 10%. However, decadence increased from 6% to 27% and plants displaying poor vigor increased to 18%. Recruitment of young sagebrush plants continued to decrease and now represents only 4% of the population.
- **2004 to 2009 - down (-2):** After the bullhog treatment, density of sagebrush decreased by 51% to 1,440 plants/acre and cover decreased to 6%. Decadence and poor vigor both increased slightly, and recruitment of young sagebrush plants was minimal at 1%. The sagebrush population should recover quickly with the removal of pinyon and juniper by the treatment.

Grass:

- **1986 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 41% with a significant decrease in the nested frequency of western wheatgrass and needle-and-thread.
- **1994 to 1999 - slightly down (-1):** There was an 8% decrease in the sum of nested frequency of perennial grasses, though cover increased slightly. There was a significant increase in the nested frequency of cheatgrass and cover increased to 5%, making cheatgrass the dominant grass species in 1999. There was a significant decrease in the nested frequency of needle-and-thread.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 30%, though cover remained similar. There was a significant decrease in the nested frequency of western wheatgrass and needle-and-thread. A positive trend was the significant decrease in the nested frequency of cheatgrass and a decrease in cover to less than 0.1%.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover decreased slightly. There was a significant increase in the nested frequency of cheatgrass and cover increased to 2%.

Forb:

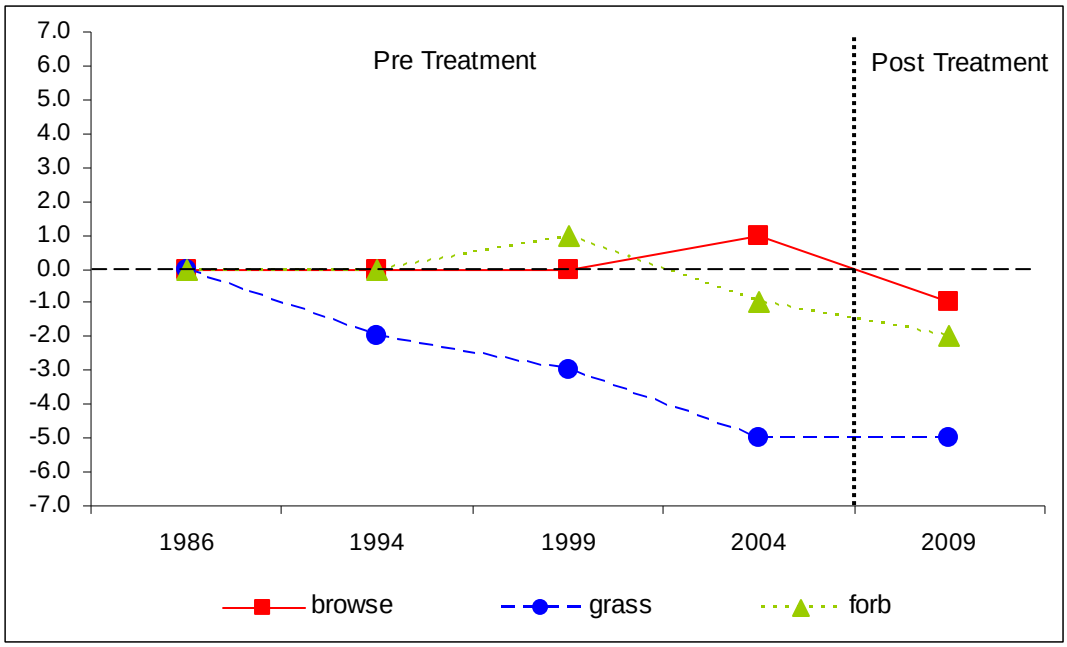
- **1986 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though there was a significant decrease in the nested frequency of low fleabane (*Erigeron pumilus*).
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 11% and cover increased slightly.
- **1999 to 2004 - down (-2):** There was a 36% decrease in the sum of nested frequency of perennial forbs and cover decreased to less than 1%. There was a significant decrease in the nested frequency of the dominant forb, scarlet globemallow.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 15%, though cover remained similar.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 14, study no: 11

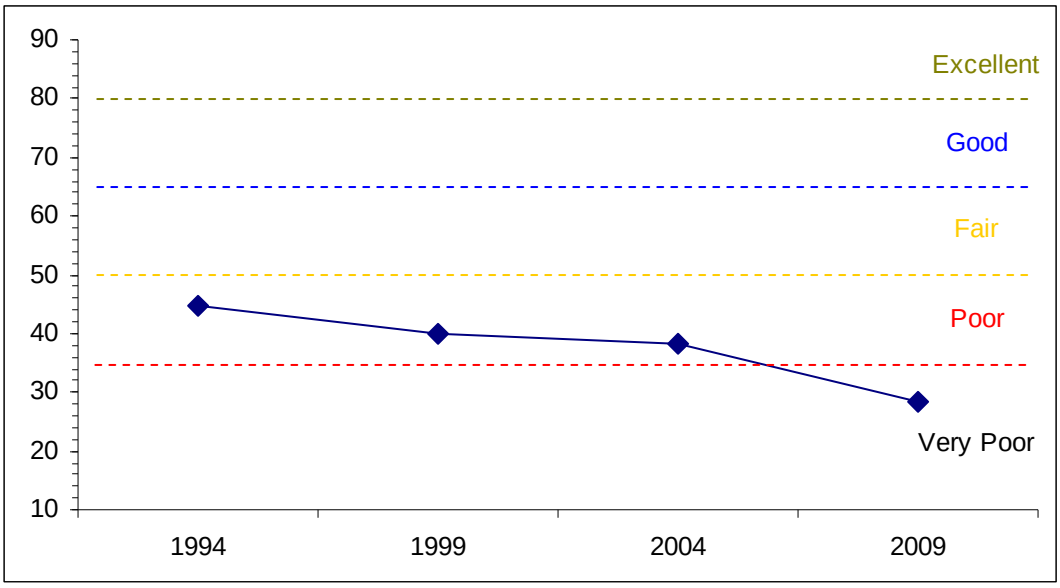
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	4.6	13.7	10.6	14.4	-0.4	2.1	0.0	**44.8**	Poor
99	7.2	13.1	4.2	16.5	-4.2	3.2	0.0	**40.0**	Poor
04	13.1	7.2	1.9	14.7	0.0	1.4	0.0	**38.3**	Poor
09	7.8	5.9	1.1	13.6	-1.4	1.5	0.0	**28.5**	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14 Study no: 11



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 14, Study no: 11



HERBACEOUS TRENDS--
Management unit 14, Study no: 11

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	c204	b69	b72	a38	a25	.42	.46	.21	.12
G	Bouteloua gracilis	168	154	163	150	150	3.05	5.13	5.67	5.36
G	Bromus tectorum (a)	-	b49	d222	a2	c104	.18	5.43	.03	1.79
G	Hilaria jamesii	-	-	-	-	3	-	-	-	.03
G	Oryzopsis hymenoides	-	4	10	3	9	.03	.02	.03	.07
G	Poa fendleriana	1	1	-	-	1	.00	-	-	.00
G	Sitanion hystrix	2	12	19	12	17	.03	.09	.16	.18
G	Sporobolus cryptandrus	b53	a3	a7	a9	a7	.00	.01	.07	.04
G	Stipa comata	d280	c178	b117	a60	a47	3.65	2.50	1.19	.96
G	Vulpia octoflora (a)	-	b121	a39	a12	a20	.40	.17	.03	.06
Total for Annual Grasses		0	170	261	14	124	0.58	5.60	0.06	1.85
Total for Perennial Grasses		708	421	388	272	259	7.20	8.24	7.35	6.79
Total for Grasses		708	591	649	286	383	7.79	13.85	7.41	8.65
F	Astragalus mollissimus	ab11	b15	a1	a-	ab11	.09	.03	-	.08
F	Calochortus nuttallii	2	-	4	-	2	-	.03	-	.00
F	Chaenactis douglasii	-	3	-	-	-	.01	-	-	-
F	Descurainia pinnata (a)	-	b16	b16	a6	a-	.04	.04	.01	-
F	Draba sp. (a)	-	b65	a-	a-	a1	.14	-	-	.00
F	Erigeron pumilus	b44	a-	a9	a-	a2	-	.02	-	.03
F	Eriogonum cernuum (a)	3	5	4	-	3	.01	.01	-	.00
F	Gilia sp. (a)	-	4	-	4	1	.01	-	.01	.00
F	Holosteum umbellatum (a)	-	3	1	-	-	.01	.00	-	-
F	Lappula occidentalis (a)	-	b18	a4	a4	a2	.05	.01	.15	.01
F	Penstemon sp.	-	3	3	-	3	.03	.00	-	.03

Type	Species	Nested Frequency					Average Cover %			
		'86	'94	'99	'04	'09	'94	'99	'04	'09
F	Phlox hoodii	$_{a}$-	$_{b}$19	$_{b}$22	$_{b}$16	$_{b}$13	.26	.27	.06	.15
F	Phlox longifolia	$_{a}$-	$_{b}$8	$_{b}$16	$_{b}$10	$_{a}$3	.02	.06	.09	.03
F	Plantago patagonica (a)	-	$_{b}$99	$_{ab}$74	$_{b}$100	$_{a}$55	.25	.24	.31	.19
F	Ranunculus testiculatus (a)	-	$_{b}$16	$_{b}$36	$_{a}$-	$_{b}$24	.03	.14	-	.07
F	Senecio multilobatus	3	-	1	-	-	-	.03	-	-
F	Sphaeralcea coccinea	$_{bc}$118	$_{bc}$126	$_{c}$139	$_{ab}$98	$_{a}$72	.60	1.16	.56	.42
F	Tragopogon dubius	-	1	-	-	-	.00	-	-	-
Total for Annual Forbs		3	226	135	114	86	0.56	0.45	0.48	0.29
Total for Perennial Forbs		178	175	195	124	106	1.03	1.62	0.71	0.77
Total for Forbs		181	401	330	238	192	1.59	2.07	1.20	1.06

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

BROWSE TRENDS--
Management unit 14, Study no: 11

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata vaseyana	44	40	56	30	3.49	5.55	10.04	5.75
B	Atriplex canescens	3	2	2	2	.03	.03	.30	.03
B	Ceratoides lanata	0	1	1	1	-	.00	.00	.00
B	Chrysothamnus nauseosus	0	0	4	0	-	-	.00	-
B	Echinocereus sp.	0	5	2	0	.00	.01	.01	-
B	Eriogonum microthecum	14	18	19	17	.12	.15	.10	.44
B	Gutierrezia sarothrae	18	62	19	27	.11	1.12	.03	.13
B	Juniperus osteosperma	0	1	0	0	.76	1.88	-	-
B	Leptodactylon pungens	21	26	30	34	.00	.00	.00	.00
B	Opuntia sp.	0	0	1	0	.16	.55	.41	.81
B	Pediocactus simpsonii	0	8	3	0	-	.00	.00	.00
B	Pinus edulis	0	0	0	0	9.51	9.40	9.44	.15
B	Yucca sp.	0	0	0	0	-	.03	-	.03
Total for Browse		100	163	137	111	14.20	18.76	20.34	7.34

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 11

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata vaseyana	-	13.81	5.66
Eriogonum microthecum	-	.05	.08
Gutierrezia sarothrae	-	.08	.26
Juniperus osteosperma	3.59	-	-
Opuntia sp.	-	3.56	2.25
Pinus edulis	12.80	12.93	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 11

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	1.6	1.3

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 11

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	30	34	5
Pinus edulis	86	79	8

Average diameter (in)		
'99	'04	'09
5.4	8.5	1.0
4.8	5.1	0.9

BASIC COVER--
Management unit 14, Study no: 11

Cover Type	Average Cover %				
	'86	'94	'99	'04	'09
Vegetation	14.00	23.29	33.92	27.69	16.04
Rock	0	.01	0	0	0
Pavement	0	.01	.00	.01	0
Litter	61.25	36.06	40.02	29.13	58.26
Cryptogams	4.25	1.69	5.40	3.53	.84
Bare Ground	20.50	39.61	41.13	59.37	30.24

SOIL ANALYSIS DATA --
Management unit 14, Study no: 11, Study Name: Shay Mesa

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.8	7.3	58.9	18.6	22.6	1.5	7.9	83.2	0.6

PELLET GROUP DATA--
Management unit 14, Study no: 11

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	62	60	56	43
Elk	-	-	20	4
Deer	9	3	1	12
Cattle	3	11	3	-

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	13 (31)	11 (28)
1 (2)	2 (5)	25 (63)
26 (64)	8 (20)	7 (16)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 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)
Artemisia frigida									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	3/11
Artemisia tridentata vaseyana									
86	**2265**	77	21	3	-	76	9	6	23/25
94	**2100**	20	76	4	20	0	0	18	18/22
99	**2060**	8	86	6	20	49	17	.97	22/30
04	**2960**	4	69	27	-	52	16	18	16/25
09	**1440**	1	67	32	-	35	21	28	19/29
Atriplex canescens									
86	**199**	0	100	0	-	67	33	0	5/3
94	**120**	50	17	33	20	0	0	33	20/30
99	**40**	0	50	50	-	0	50	50	23/21
04	**40**	0	100	0	-	0	0	0	16/19
09	**60**	67	33	0	-	0	0	0	22/20
Ceratoides lanata									
86	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	11/11
99	**20**	0	100	0	-	0	100	0	11/12
04	**20**	0	100	0	-	0	100	0	12/14
09	**20**	0	0	100	-	0	0	100	7/8
Chrysothamnus nauseosus									
86	**3199**	23	77	-	-	4	96	0	15/16
94	**0**	0	0	-	-	0	0	0	9/39
99	**0**	0	0	-	-	0	0	0	-/-
04	**80**	0	100	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Echinocereus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**100**	60	40	-	-	0	0	0	3/6
04	**80**	100	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	2/17

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Ephedra viridis									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	26/28
99	**0**	0	0	-	-	0	0	0	20/30
04	**0**	0	0	-	-	0	0	0	15/24
09	**0**	0	0	-	-	0	0	0	25/39
Eriogonum microthecum									
86	**532**	37	63	0	-	0	0	0	11/6
94	**560**	46	43	11	60	0	0	0	3/4
99	**1020**	24	73	4	40	18	51	0	6/5
04	**620**	3	97	0	-	0	0	0	4/3
09	**620**	13	77	10	40	6	0	0	8/7
Gutierrezia sarothrae									
86	**8264**	17	80	3	-	0	0	0	7/5
94	**640**	19	72	9	-	0	0	0	6/6
99	**4120**	15	83	2	60	0	0	.97	7/7
04	**700**	3	97	0	40	0	0	0	6/7
09	**1100**	11	78	11	-	0	7	4	6/7
Leptodactylon pungens									
86	**999**	0	93	7	-	0	0	0	1/3
94	**0**	0	0	0	-	0	0	0	-/-
99	**20**	0	100	0	-	0	0	0	-/-
04	**0**	0	0	0	-	0	0	0	-/-
09	**0**	0	0	0	-	0	0	0	-/-
Opuntia sp.									
86	**265**	25	75	0	-	0	0	0	3/4
94	**580**	10	66	24	-	0	0	3	3/11
99	**760**	18	79	3	60	0	0	0	6/13
04	**1240**	2	95	3	-	0	0	3	5/14
09	**960**	6	88	6	-	0	4	19	3/13
Pediocactus simpsonii									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**40**	0	100	-	-	0	0	0	2/2
09	**0**	0	0	-	-	0	0	0	-/-
Pinus edulis									
86	**199**	33	67	-	-	0	0	0	114/45
94	**0**	0	0	-	-	0	0	0	-/-
99	**160**	25	75	-	20	0	0	0	-/-
04	**60**	0	100	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-

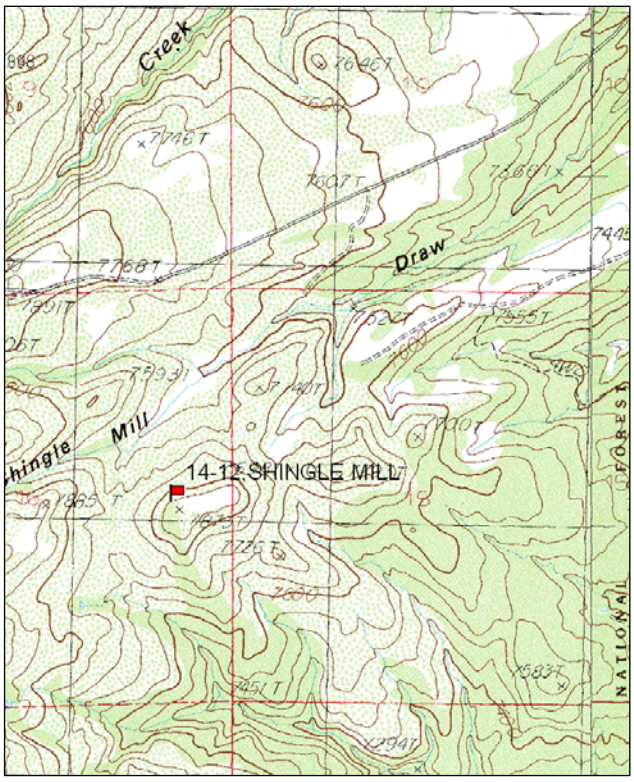
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus									
86	**199**	0	100	-	-	67	33	33	15/22
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Yucca sp.									
86	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	33/38
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	7/19

SHINGLE MILL - TREND STUDY NO. 14-12-09

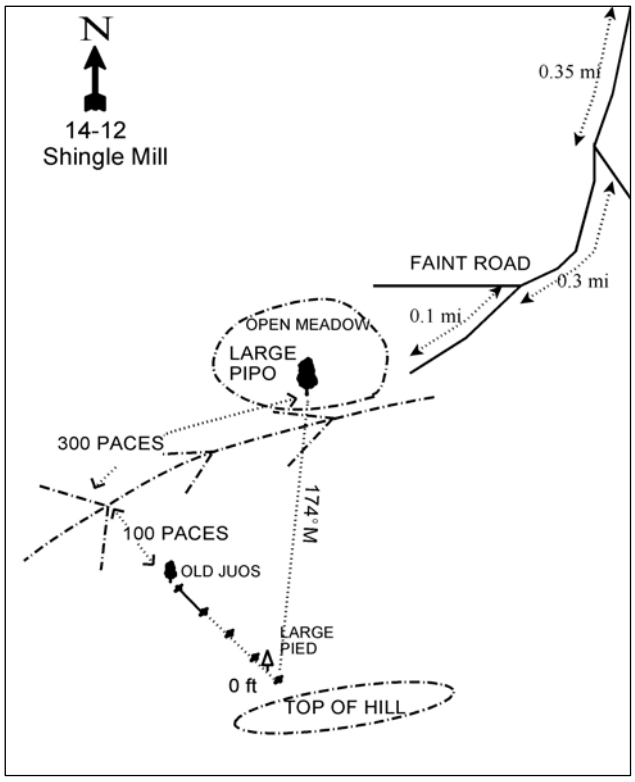
Vegetation Type: Mixed Oak-Mountain Brush
Range Type: Crucial Deer Summer, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 7,800 ft (2,377 m)
Aspect: Southeast
Slope: 30%
Transect bearing: 278 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
On South Creek Road (the road to Loyd's Lake) go 3.5 miles from the junction of North Creek (200 S. heading West out of Monticello) and South Creek Roads. Turn left on Forest Service Road #261 and continue 0.35 miles to a fork. Turn right on a faint road and go 0.3 miles to a fork. Bear left for 0.1 miles to a large ponderosa pine in a flat. Park here and take a bearing of 174°M. The site is on a hillside about ½ mile away. The 0 foot stake is uphill, with the baseline running down at 278°M.

Map name: Abajo Peak



Diagrammatic Sketch:



Township: 34S, Range: 23E, Section: 16

GPS: NAD 83, UTM 12S 641327 E 4187273 N

SHINGLE MILL - TREND STUDY NO. 14-12

Site Information

Site Description: The study samples a mixed mountain brush type west of Monticello. The site is a steep hillside with scattered Ponderosa pine (*Pinus ponderosa*), Gambel oak (*Quercus gambelii*) and mixed mountain browse. A stream runs in the bottom of Shingle Mill Draw about one-third of a mile to the west and downhill from the site. The area is managed by the Forest Service as part of the Lakes allotment. Pellet group data has indicated moderately high deer use and light elk and cattle use since 1999 (Table - Pellet Group Data).

Browse: The site supports several useful and preferred browse species including Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), true mountain mahogany (*Cercocarpus montanus*), and squaw-apple (*Peraphyllum ramosissimum*). Mountain big sagebrush, true mountain mahogany, and squaw-apple are the key species on the site. They have contributed, on average, nearly one-half of the shrub cover since 1994 (Table - Browse Trends) and have shown moderate to heavy use over the sample years. Other species present include black sagebrush (*Artemisia nova*), dwarf rabbitbrush (*Chrysothamnus depressus*), Gambel oak, and snowberry (*Symphoricarpos oreophilus*). There is a mix of mountain big sagebrush and black sagebrush on the slope and likely some hybrids. Black sagebrush occurs on the steeper portions of the slope in isolated patches of more shallow soil. Some Gambel oak occurs in isolated clones near the top of the ridge. Dwarf rabbitbrush and snowberry are abundant and mostly unutilized (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is diverse and abundant. Grasses are dominated by native perennial species with mutton bluegrass (*Poa fendleriana*) being the most abundant. Other common grasses include prairie junegrass (*Koleria cristata*), subalpine needlegrass (*Stipa columbiana*), slender wheatgrass (*Agropyron trachycaulum*), and bottlebrush squirreltail (*Sitanion hystrix*). Forbs are also diverse and abundant. Most species are uncommon, however, with three species, weedy milkvetch (*Astragalus miser*), silvery lupine (*Lupinus argenteus*), and mat penstemon (*Penstemon caespitosus*), providing the majority of forb cover since 1994 (Table - Herbaceous Trends).

Soil: The soil is a clay with a neutral pH with a deep with an effective rooting depth (Table - Soil Analysis Data). Parent material appears to be granite, but there is also some shale present on the site. There has been great deal of erosion in the past as evidenced by the large gullies in the bottom of the drainage. Bare ground cover has steadily decreased on the site since 1999 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1994 to 1999 - stable (0):** Density of the primary browse species, mountain big sagebrush, increased by 20%, but the density of the two other key browse species, true mountain mahogany and squaw-apple, both decreased by 16% and 41%, respectively. Recruitment of young plants increased in both the mountain big sagebrush and true mountain mahogany populations.
- **1999 to 2004 - stable (0):** Density of mountain big sagebrush decreased by 14%, but the density of true mountain mahogany and squaw apple each increased. Decadence and poor vigor increased to 36% and 20%, respectively, in the sagebrush population, and to 34% and 13%, respectively, in the squaw apple population. Recruitment of young sagebrush plants decreased to just 2% of the population.
- **2004 to 2009 - up (+2):** The density of mountain big sagebrush increased by 19% and the density of squaw apple increased by 32%. Decadence and poor vigor decreased for both mountain big sagebrush and squaw apple as well. Recruitment of young plants increased to 10% of the sagebrush population and 7% of the squaw apple population.

Grass:

- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial grasses increased by 26% and cover increased from 9% to 17%. There was a significant increase in the nested frequency of subalpine needlegrass and Kentucky bluegrass (*Poa pratensis*)
- **1999 to 2004 - down (-2):** There was a 42% decrease in the sum of nested frequency of perennial grasses and cover decreased to 9%. There was a significant decrease in the nested frequency of slender wheatgrass, a *Carex sp.*, Kentucky bluegrass, and subalpine needlegrass.
- **2004 to 2009 - up (+2):** There was a 28% increase in the sum of nested frequency of perennial grasses and cover increased to 15%. There was a significant increase in the nested frequency of slender wheatgrass and subalpine needlegrass.

Forb:

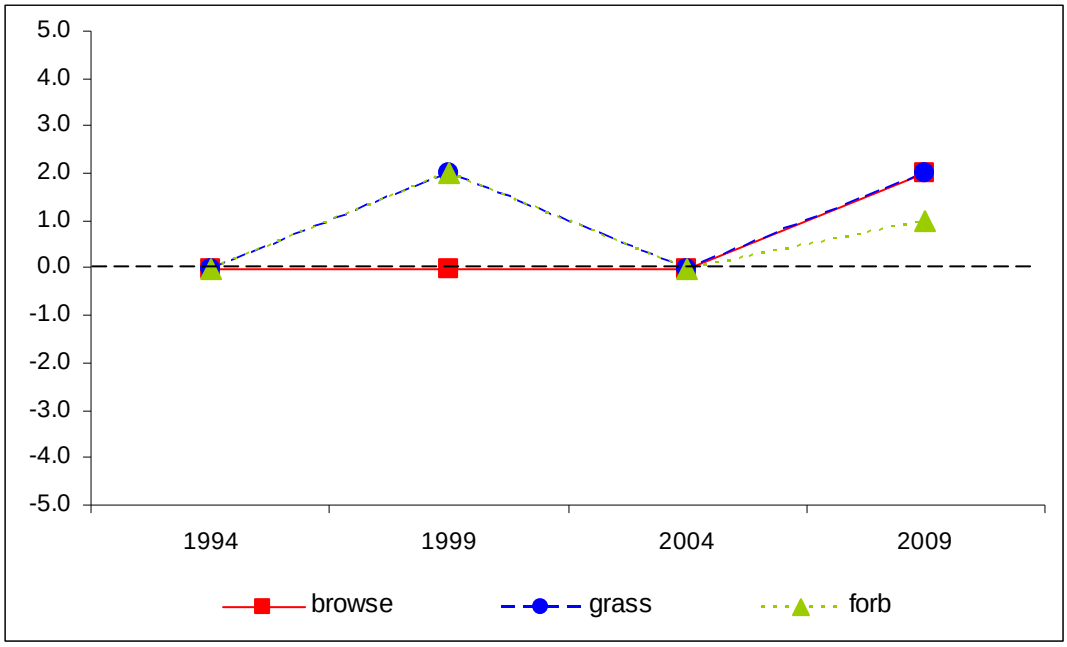
- **1994 to 1999 - up (+2):** There was a 20% increase in the sum of nested frequency of perennial forbs and cover increased from 11% to 23%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 32% and cover decreased to 7%. There was a significant decrease in the nested frequency of weedy milkvetch.
- **2004 to 2009 - slightly up (+1):** There was an 18% increase in the sum of nested frequency of perennial forbs and cover increased to 11%. There was a significant increase in the nested frequency of silvery lupine and weedy milkvetch.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 14, study no: 12

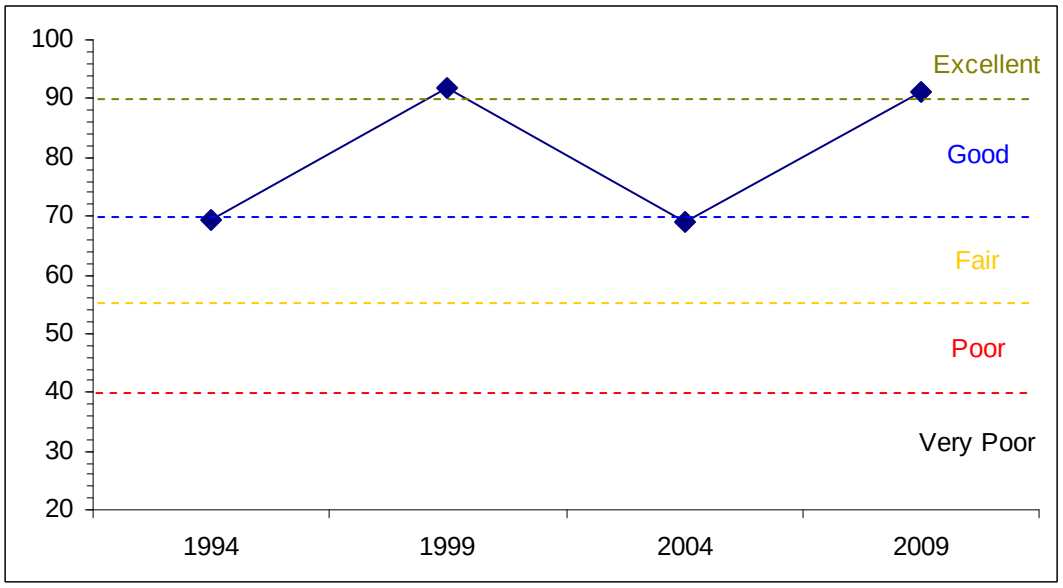
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	27.8	11.3	2.9	17.2	0.0	10.0	0.0	**69.2**	Fair-Good
99	30.0	12.9	8.8	30.0	0.0	10.0	0.0	**91.7**	Good-Excellent
04	29.2	8.2	3.9	17.8	0.0	10.0	0.0	**69.0**	Fair-Good
09	30.0	12.6	9.4	29.1	0.0	10.0	0.0	**91.1**	Good-Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 12



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL
Management unit 14, Study no: 12



HERBACEOUS TRENDS--
Management unit 14, Study no: 12

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	5	20	3	13	.01	.12	.03	.19
G	Agropyron trachycaulum	ab40	b57	a16	b40	.82	.75	.36	1.62
G	Carex sp.	b23	b33	a3	a3	1.23	.93	.00	.06
G	Koeleria cristata	33	82	56	55	.51	3.25	.88	1.27
G	Oryzopsis hymenoides	ab13	a9	ab14	b27	.09	.01	.13	.18
G	Poa fendleriana	241	254	204	222	3.86	6.80	6.36	7.12
G	Poa pratensis	a7	b43	a-	a14	.16	1.04	-	.74
G	Sitanion hystrix	b91	a29	a41	a42	.72	.46	.68	1.04
G	Stipa columbiana	a17	b104	a25	a52	.52	3.16	.37	2.12
G	Stipa comata	-	6	3	-	-	.06	.01	-
G	Stipa lettermani	b35	a-	a3	a3	.66	-	.03	.18
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		505	637	368	471	8.59	16.62	8.88	14.55
Total for Grasses		505	637	368	471	8.59	16.62	8.88	14.55
F	Achillea millefolium	b24	b20	a-	a-	.22	.57	-	-
F	Agastache urticifolia	-	-	7	-	-	-	.02	-
F	Agoseris glauca	4	-	1	-	.01	-	.01	.00
F	Allium sp.	7	-	10	-	.02	-	.02	-
F	Arabis sp.	4	-	8	-	.01	-	.02	-
F	Arenaria fendleri	-	-	1	-	-	-	.00	-
F	Artemisia ludoviciana	10	3	-	4	.01	.03	-	.06
F	Astragalus miser	b154	b207	a97	b147	5.65	13.08	3.05	5.10
F	Calochortus nuttallii	2	13	3	1	.00	.31	.01	.00
F	Castilleja linariaefolia	5	4	-	-	.03	.03	-	-
F	Cirsium sp.	4	1	-	-	.01	.00	-	-
F	Crepis acuminata	2	13	7	8	.00	.08	.05	.05
F	Cymopterus sp.	1	3	-	-	.00	.00	-	-
F	Descurainia pinnata (a)	-	-	-	3	-	-	-	.01
F	Erigeron eatonii	-	-	1	2	-	-	.03	.06
F	Erigeron flagellaris	4	4	3	7	.01	.03	.03	.07
F	Eriogonum elatum	2	-	-	3	.00	-	-	.01
F	Hymenoxys acaulis	9	13	4	8	.09	.05	.03	.19
F	Lactuca serriola	-	-	3	-	-	-	.03	-
F	Lappula occidentalis (a)	-	a-	b22	a-	-	-	.93	-
F	Lathyrus lanszwertii	4	-	-	-	.00	-	-	-
F	Lomatium dissectum	14	25	18	20	.17	.21	.13	.12
F	Lupinus argenteus	b39	a46	b42	b32	1.99	3.58	1.02	2.00
F	Penstemon caespitosus	b144	ab165	a106	b160	2.26	4.53	1.79	2.79
F	Penstemon pachyphyllus	ab3	a-	a2	b5	.01	-	.03	.09
F	Petradoria pumila	-	7	2	2	-	.09	.01	.03
F	Phlox hoodii	-	-	3	-	-	-	.00	-
F	Phlox longifolia	a72	a52	b95	a72	.19	.16	.46	.25
F	Polygonum douglasii (a)	-	-	1	-	-	-	.00	-

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
F	Senecio multilobatus	-	-	-	1	-	-	-	.03
F	Senecio neomexicanus	3	1	-	-	.00	.00	-	-
F	Taraxacum officinale	-	28	1	9	-	.14	.00	.13
F	Tragopogon dubius	3	2	1	2	.00	.01	.00	.00
F	Trifolium gymnocarpon	1	3	4	4	.03	.00	.01	.00
F	Zigadenus paniculatus	-	10	3	10	-	.02	.01	.05
Total for Annual Forbs		0	0	23	3	0	0	0.94	0.01
Total for Perennial Forbs		515	620	422	497	10.79	22.98	6.84	11.08
Total for Forbs		515	620	445	500	10.79	22.98	7.78	11.10

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

BROWSE TRENDS--
Management unit 14, Study no: 12

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	24	17	17	19	.72	1.07	.43	.72
B	Artemisia tridentata vaseyana	65	67	69	70	10.02	12.66	9.03	9.43
B	Cercocarpus montanus	27	25	32	26	2.77	2.91	2.75	2.39
B	Chrysothamnus depressus	51	38	57	51	1.68	2.32	3.73	3.16
B	Gutierrezia sarothrae	5	2	5	6	.01	.03	.18	.21
B	Juniperus osteosperma	0	1	0	0	-	.00	-	-
B	Opuntia sp.	0	0	4	4	-	-	.03	.07
B	Peraphyllum ramosissimum	30	24	27	28	3.87	3.62	3.76	3.43
B	Pinus edulis	0	3	5	1	.42	.69	.81	1.18
B	Quercus gambelii	0	24	23	23	4.10	7.50	4.75	7.43
B	Symphoricarpos oreophilus	77	71	69	77	5.64	9.85	7.94	8.11
Total for Browse		279	272	308	305	29.27	40.67	33.43	36.16

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 12

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	1.31	1.08
Artemisia tridentata vaseyana	-	12.60	14.63
Cercocarpus montanus	-	1.89	1.54
Chrysothamnus depressus	-	3.70	3.75
Gutierrezia sarothrae	-	.20	.21
Peraphyllum ramosissimum	-	4.16	4.38
Pinus edulis	2.40	3.63	3.54
Quercus gambelii	-	3.08	6.83
Symphoricarpos oreophilus	-	12.16	17.31

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 12

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	2.6	3.0
Artemisia tridentata vaseyana	1.5	1.5
Cercocarpus montanus	2.6	2.7
Peraphyllum ramosissimum	2.3	2.5

BASIC COVER--
Management unit 14, Study no: 12

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	47.95	66.71	49.92	54.34
Rock	17.14	17.51	18.15	16.23
Pavement	2.46	5.48	6.04	6.23
Litter	25.22	40.04	30.17	31.28
Cryptogams	.28	.95	.11	.40
Bare Ground	17.34	22.88	13.73	8.97

SOIL ANALYSIS DATA --
Management unit 14, Study no: 12, Study Name: Shingle Mill

Effective rooting depth (in)	pH	clay			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.7	7.3	26.9	20.6	52.6	3.4	5.6	86.4	0.4

PELLET GROUP DATA--
Management unit 14, Study no: 12

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	-	4	11	5
Elk	5	-	10	5
Deer	17	27	21	16
Cattle	-	-	1	2

Days use per acre (ha)		
'99	'04	'09
-	-	-
7 (17)	19 (46)	11 (28)
40 (99)	54 (134)	50 (122)
9 (22)	1 (2)	4 (9)

BROWSE CHARACTERISTICS--
Management unit 14, 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)
Amelanchier utahensis									
94	**860**	28	60	12	-	2	5	0	12/15
99	**840**	45	50	5	40	17	17	12	17/20
04	**400**	15	80	5	-	10	70	5	15/21
09	**760**	8	92	0	20	32	13	0	14/18
Artemisia nova									
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	15/35
09	**0**	0	0	-	-	0	0	0	-/-
Artemisia tridentata vaseyana									
94	**2420**	5	71	24	740	2	2	7	18/27
99	**2920**	13	75	12	20	15	0	2	18/31
04	**2500**	2	62	36	4260	44	9	20	16/28
09	**2980**	10	70	20	200	24	3	5	15/26
Cercocarpus montanus									
94	**1020**	12	82	6	40	41	16	0	20/22
99	**860**	23	65	12	-	16	53	9	27/33
04	**940**	21	68	11	-	6	91	9	20/25
09	**800**	13	83	5	20	30	60	0	24/28
Chrysothamnus depressus									
94	**3600**	0	100	0	20	0	0	0	5/9
99	**3360**	0	100	0	-	1	0	0	4/8
04	**6000**	1	99	0	-	24	4	0	6/10
09	**4940**	1	98	1	20	7	0	.40	4/10
Gutierrezia sarothrae									
94	**120**	0	100	-	-	0	0	0	8/8
99	**80**	0	100	-	-	0	0	0	6/6
04	**180**	0	100	-	-	0	0	0	7/11
09	**180**	11	89	-	-	0	0	0	7/9
Juniperus osteosperma									
94	**0**	0	0	0	-	0	0	0	-/-
99	**20**	0	0	100	-	0	0	100	-/-
04	**0**	0	0	0	-	0	0	0	-/-
09	**0**	0	0	0	-	0	0	0	-/-
Opuntia sp.									
94	**0**	0	0	-	20	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**100**	60	40	-	-	0	0	0	2/3
09	**100**	40	60	-	-	0	0	0	1/4

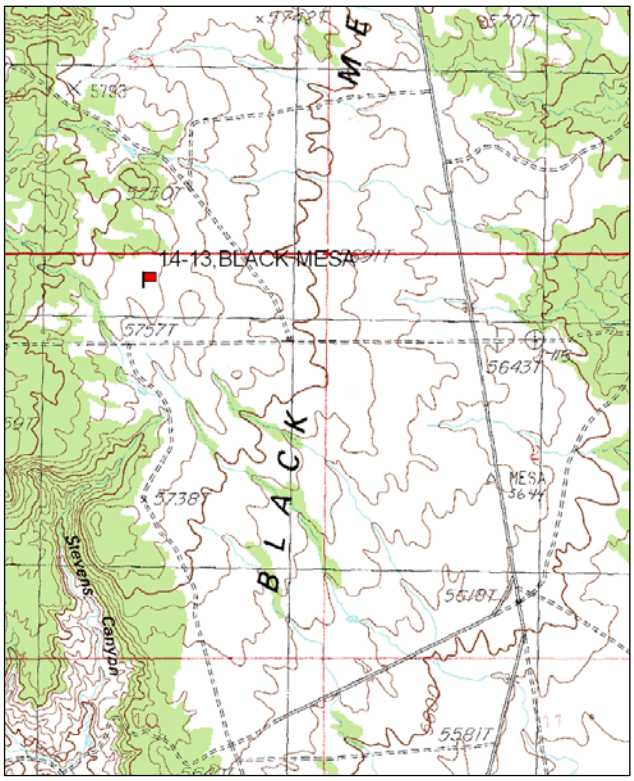
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Peraphyllum ramosissimum									
94	**1520**	8	87	5	-	36	3	3	18/27
99	**900**	7	91	2	-	42	20	0	18/25
04	**1060**	2	64	34	-	8	43	13	22/31
09	**1400**	7	91	1	80	36	0	1	23/31
Pinus edulis									
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	100	0	-	-	0	0	33	-/-
04	**100**	100	0	-	20	0	0	0	-/-
09	**20**	0	100	-	20	0	0	0	-/-
Quercus gambelii									
94	**0**	0	0	0	-	0	0	0	-/-
99	**3520**	30	68	2	-	24	10	2	25/21
04	**2440**	20	66	15	-	43	7	7	19/15
09	**2280**	46	53	1	340	10	0	4	22/44
Symphoricarpos oreophilus									
94	**6820**	13	86	1	100	1	0	0	13/21
99	**5780**	6	93	1	80	3	.34	.34	14/23
04	**6500**	8	91	2	-	11	12	.30	12/20
09	**8680**	5	95	0	140	7	1	0	14/23
Tetradymia canescens									
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	16/19

BLACK MESA - TREND STUDY NO. 14-13-09

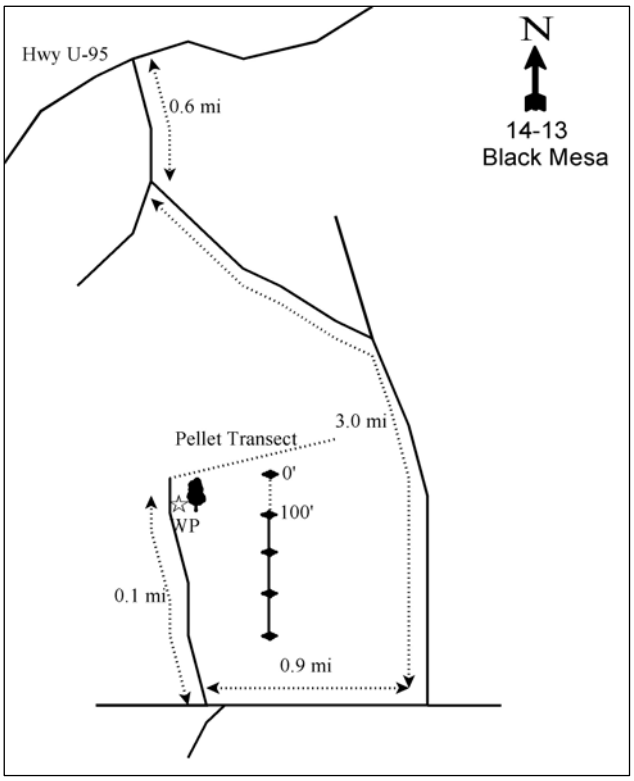
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Semidesert Loam (Wyoming Big Sagebrush), R035XY209UT
Land Ownership: BLM
Elevation: 5,700 ft (1,737 m)
Aspect: Southeast
Slope: 3%
Transect bearing: 163 degrees magnetic.
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
From mile marker 114 on Highway U-95 near Cottonwood Canyon east of Comb Ridge, go 0.5 miles east to County Road #233. Go south on #233 0.6 miles to a fork. Stay left and go 3.0 miles to an intersection (Road #280). Turn right and go 0.9 miles beyond a fork to the left, to a very faint road to the right. Turn right on this faint road before two gullies and go 0.1 miles to a fence post which is six feet from the right side of the road. There is a lone juniper just behind the stake. From this witness post, go about 600 feet (95 paces) at 40°M (following the deer pellet group transect) to the first baseline stake which is located 25 feet south of pellet transect stake #8718 (a 6 inch tall yellow rebar). The baseline stake is a three foot tall green fence post tagged #7822. The transect runs south from the 0-foot baseline stake, with 100 feet between all posts.

Map Name: Hotel Rock



Diagrammatic Sketch:



Township: 38S, Range: 21E, Section: 3

GPS: NAD 83, UTM 12S 624339 E 4153317 N

BLACK MESA - TREND STUDY NO. 14-13

Site Information

Site Description: This study is on top of the Black Mesa southeast of Elk Ridge. This is one of the lowest elevation studies (5,700 feet) on the unit, located on a large, flat mesa dominated by open sagebrush flats and pinyon-juniper woodlands. Sign of cattle use has been infrequent and not concentrated on the site during past readings. Pellet group data indicated moderately heavy use by cattle in 1999, but light use since 2004. Historically, a pellet transect on Black Mesa has shown moderate to heavy use by deer, depending on the winter (Jense et al. 1992). Pellet group data taken on the site has indicated moderately high to high use by deer since 1999. Estimated elk use has been light since 1999. Human pressure in the area is generally low, however there are several mining claims staked out near the study area.

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the key browse species on the site. The sagebrush population has become overly mature and has been in a steady state of decline since 1994. Sagebrush decadence has been high and recruitment of young sagebrush plants has steadily decreased since 1994. Utilization of sagebrush is mostly moderate with some years of heavy use (Table - Browse Characteristics). Many of the declines in the sagebrush population on the site are attributed to drought combined with abundance of winter annuals drying the soil profile, as well as continued heavy use. The scattered juniper trees in the flat are generally vigorous and could possibly be slowly increasing. Point quarter data has shown an increase in the density and size of juniper trees since 1999 (Table - Point-Quarter Tree Data). The site also contains a population of broom snakeweed (*Gutierrezia sarothrae*), but density has varied with annual precipitation patterns.

Herbaceous Understory: Five perennial grasses and two annual grasses are found on this site. Cheatgrass (*Bromus tectorum*) is a major component of the community, with fluctuating cover and frequency over the sample years. Cheatgrass increased significantly in nested frequency to become the dominant species on the site in 1999 and 2004, but decreased significantly in nested frequency in 2009. Cheatgrass was common in 2009, but was no longer the dominant species in cover. Galleta (*Hilaria jamesii*) is the dominant perennial grass species in cover. Other common perennial grass species include sand dropseed (*Sporobolus cryptandrus*), bottlebrush squirreltail (*Sitanion hystrix*), and needle-and-thread (*Stipa comata*). Forbs are not very diverse with most species being annuals, and none are overly abundant. Total forb cover has been around or less than 1% since 1994 (Table - Herbaceous Trends).

Soil: The soil is a sandy clay loam with a neutral pH and a moderately deep effective rooting depth (Table - Soil Analysis Data). Bare ground cover has been high over the sample years with low vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1992 - stable (0):** Differences in density may be related to the larger sample area used in 1992; therefore, trend was determined using other parameters. Decadence of sagebrush increased from 37% to 57%, but poor vigor decreased from 20% to 7%. Recruitment of young sagebrush plants remained similar.
- **1992 to 1994 - up (+2):** Density of the primary browse species, Wyoming big sagebrush, increased by 27% from 2,880 plants/acre to 3,660 plants/acre, and cover increased from 8% to 12%. Decadence in sagebrush decreased to 39%, though poor vigor increased to 22%. Recruitment of young sagebrush plants increased to 26% of the population
- **1994 to 1999 - down (-2):** Density of Wyoming big sagebrush decreased by 42% to 2,140 plants/acre and cover decreased to 5%. Decadence increased to 60% and poor vigor remained high at 22%. Recruitment of young sagebrush plants decreased to 9% of the population.

- **1999 to 2004 - down (-2):** Density of sagebrush decreased by 21% to 1,680 plants/acre, though cover increased slightly to 7%. The population is very unhealthy as decadence increased to 69% and poor vigor increased to 77%. Recruitment of young sagebrush plants constitutes only 1% of the population.
- **2004 to 2009 - stable (0):** There was little change in the density or cover of sagebrush, though decadence decreased slightly to 51% and poor vigor decreased to 28%. Recruitment of young plants remained poor at 1%.

Grass:

- **1986 to 1992 - slightly up (+1):** There was a 16% increase in the sum of nested frequency of perennial grasses with a significant increase in the nested frequency of sand dropseed and needle-and-thread, and a significant decrease in the nested frequency of bottlebrush squirreltail.
- **1992 to 1994 - up (+2):** The sum of nested frequency of perennial grasses increased by 51%, though cover remained similar. There was a significant increase in the nested frequency of bottlebrush squirreltail and needle-and-thread, though there was also a significant increase in the nested frequency of the two annual grasses, cheatgrass and sixweeks fescue (*Vulpia octoflora*).
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial grasses decreased by 58% and cover decreased from 9% to 4%. Cheatgrass increased significantly in nested frequency and cover increased from less than 1% to 12%. Cheatgrass is now the dominant species on the site in cover. There was a significant decrease in the nested frequency of bottlebrush squirreltail and needle-and-thread.
- **1999 to 2004 - slightly up (+1):** There was a 12% increase in the sum of nested frequency of perennial grasses and cover increased to 12%. There was a significant decrease in the nested frequency of cheatgrass and sixweeks fescue, though cover remained high for cheatgrass at 10%.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased by 50%, though cover remained similar. There was a significant decrease in the nested frequency of cheatgrass and cover decreased to 3%. There was a significant increase in the nested frequency of sand dropseed.

Forb:

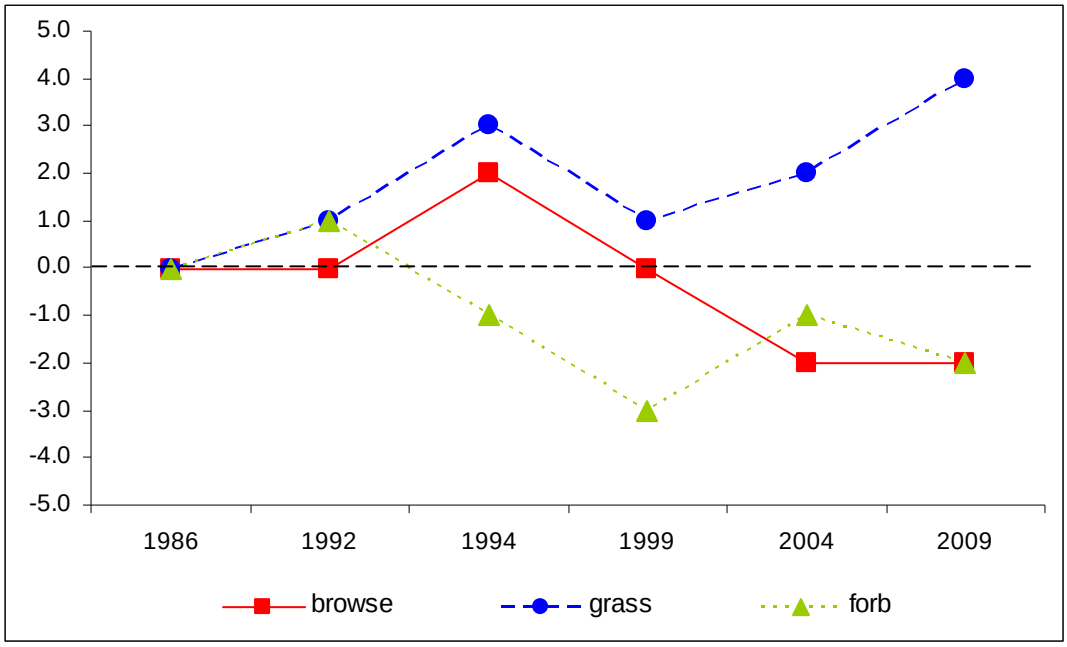
- **1986 to 1992 - up (+2):** The sum of nested frequency of perennial forbs had over a four-fold increase.
- **1992 to 1994 - down (-2):** There was a 46% decrease in the sum of nested frequency of perennial forbs and cover decreased to less than 1%. Perennial forbs are rare with annual forbs producing nearly all of the forb cover on the site.
- **1994 to 1999 - down (-2):** Perennial forb sum of nested frequency and cover continued to decrease. Annual forbs also decreased substantially in nested frequency and cover.
- **1999 to 2004 - up (+2):** There was a substantial increase in the sum of nested frequency of perennial forbs and cover increased to near 1%. Annual forbs also increased substantially.
- **2004 to 2009 - slightly down (-1):** There was a slight decrease in the sum of nested frequency and cover of perennial forbs with little change in annual forbs. Forbs remain rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 14, study no: 13

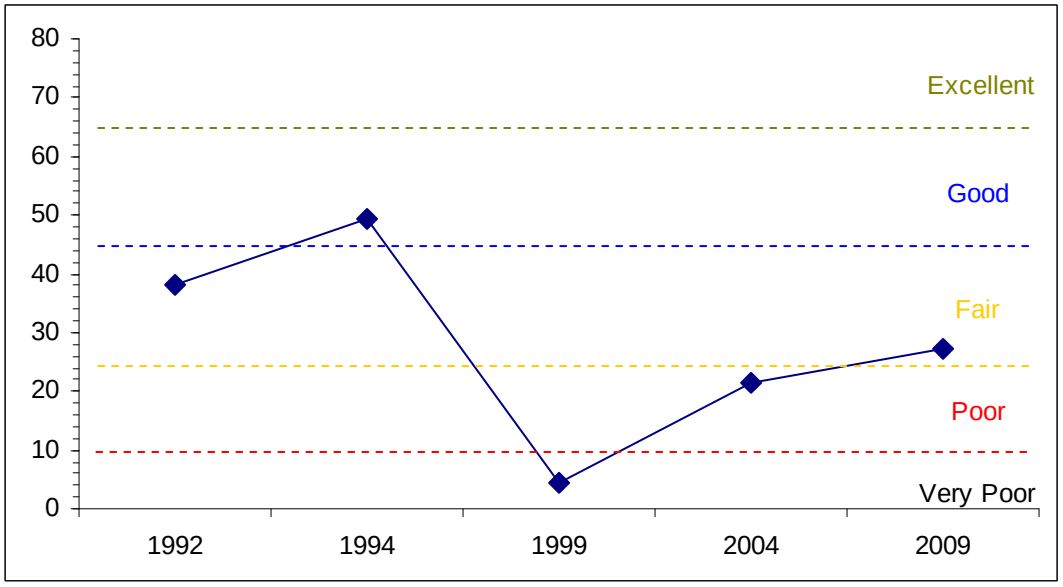
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	9.9	-2.1	9.5	18.8	-0.1	2.3	0.0	**38.3**	Fair
94	15.3	3.3	13.0	17.8	-0.5	0.6	0.0	**49.5**	Good
99	5.9	0.0	0.0	7.6	-9.3	0.3	0.0	**4.5**	Very Poor
04	8.3	-5.7	0.5	24.2	-7.5	1.5	0.0	**21.3**	Poor
09	6.7	-0.3	0.5	21.9	-2.4	1.0	0.0	**27.3**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 13



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 14, Study no: 13



HERBACEOUS TRENDS--
Management unit 14, Study no: 13

Type	Species	Nested Frequency						Average Cover %				
		'86	'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
G	Bromus tectorum (a)	-	a26	b95	e358	d242	c174	.14	.49	12.17	10.00	3.21
G	Hilaria jamesii	a40	ab66	b75	b72	b82	b81	4.26	4.42	3.22	8.26	5.83
G	Oryzopsis hymenoides	-	13	12	2	4	9	.05	.08	.03	.21	.22
G	Sitanion hystrix	c142	b55	c131	a15	ab21	ab26	1.33	2.24	.21	1.35	.45
G	Sporobolus cryptandrus	a-	b27	ab11	a5	ab10	c84	1.74	.39	.01	.36	3.04
G	Stipa comata	a2	b53	c93	b43	b36	ab29	2.02	1.75	.33	1.91	1.39
G	Vulpia octoflora (a)	-	a17	b50	b59	a23	a4	.04	.12	.19	.05	.03
Total for Annual Grasses		0	43	145	417	265	178	0.18	0.61	12.36	10.05	3.24
Total for Perennial Grasses		184	214	322	137	153	229	9.42	8.89	3.81	12.11	10.96
Total for Grasses		184	257	467	554	418	407	9.60	9.51	16.18	22.17	14.21
F	Astragalus convallarius	-	7	5	3	-	-	.09	.04	.03	.00	-
F	Chaenactis stevioides	-	5	-	-	-	-	.01	-	-	-	-
F	Chenopodium album (a)	-	b26	a-	a-	a-	a-	.39	-	-	-	-
F	Comandra pallida	-	13	9	11	6	7	.25	.04	.09	.19	.01
F	Cordylanthus wrightii (a)	-	b58	a-	a-	a3	a2	2.34	-	-	.00	.03
F	Cryptantha sp.	-	-	8	-	-	-	-	.07	-	-	-
F	Descurainia pinnata (a)	-	18	13	3	15	8	.06	.05	.00	.23	.02
F	Draba rectifructa (a)	-	-	b9	a-	a-	a-	-	.05	-	-	-
F	Erigeron sp.	2	-	-	-	-	-	-	-	-	-	-
F	Eriogonum cernuum (a)	-	b22	a2	a-	a-	a-	.13	.01	-	-	-
F	Erodium cicutarium (a)	-	-	-	2	4	-	-	-	.00	.15	-
F	Euphorbia fendleri	a3	a-	a1	a-	a1	b24	-	.00	-	.00	.31
F	Gilia hutchinifolia (a)	-	b109	a5	a14	a12	a4	.38	.02	.22	.08	.06
F	Lactuca serriola	-	-	6	-	-	-	-	.03	-	-	-
F	Lappula occidentalis (a)	-	b28	b11	a-	b16	b22	.30	.02	-	.18	.10
F	Leucelene ericoides	-	-	-	-	-	-	-	-	-	.00	-
F	Lupinus sp.	a-	c92	a-	a-	b29	a-	.68	-	-	.07	-
F	Lygodesmia sp.	-	-	1	-	-	-	-	.00	-	-	-
F	Medicago sativa	2	-	-	-	-	-	-	-	-	-	-
F	Mentzelia albicaulis (a)	-	b39	a-	a-	a1	a-	.47	-	-	.00	-
F	Navarretia intertexta (a)	-	-	3	1	1	-	-	.00	.00	.00	-
F	Phlox longifolia	ab26	b41	b52	a7	b42	b40	.11	.10	.02	.17	.15
F	Sphaeralcea coccinea	a1	a-	a1	a3	b15	a-	.00	.00	.00	.31	-
F	Tragopogon dubius	-	-	-	-	3	-	-	-	-	.00	-
F	Unknown forb-annual (a)	-	b34	a-	a-	a-	a-	.33	-	-	-	-
F	Unknown forb-perennial	-	-	2	-	-	-	-	.00	-	-	-
Total for Annual Forbs		0	334	43	20	52	36	4.42	0.16	0.23	0.67	0.21
Total for Perennial Forbs		34	158	85	24	96	71	1.16	0.31	0.14	0.77	0.48
Total for Forbs		34	492	128	44	148	107	5.59	0.48	0.38	1.44	0.69

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

BROWSE TRENDS--
Management unit 14, Study no: 13

Type	Species	Strip Frequency					Average Cover %				
		'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	57	67	63	47	48	7.89	12.23	4.72	6.65	5.34
B	Ephedra viridis	1	1	1	1	1	.00	.00	.00	.00	.00
B	Gutierrezia sarothrae	51	42	70	72	17	6.96	.57	2.88	6.17	.03
B	Juniperus osteosperma	0	0	0	0	0	-	.85	-	-	-
B	Opuntia sp.	0	1	0	1	1	-	.00	-	.00	.00
B	Yucca sp.	1	0	2	1	1	.63	-	.00	.00	.00
Total for Browse		110	111	136	122	68	15.48	13.66	7.60	12.84	5.38

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 13

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	5.03	6.48
Gutierrezia sarothrae	7.31	.03
Yucca sp.	-	.15

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 13

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.4	1.5

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 13

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	10	<18	24

Average diameter (in)		
'99	'04	'09
6.3	-	7.2

BASIC COVER--
Management unit 14, Study no: 13

Cover Type	Average Cover %					
	'86	'92	'94	'99	'04	'09
Vegetation	3.25	23.40	23.32	25.59	37.04	19.16
Rock	0	.45	.10	.06	.02	0
Pavement	.50	0	.09	.06	.26	.09
Litter	38.50	27.37	29.72	38.25	25.48	35.57
Cryptogams	5.75	.91	.31	.08	.22	.27
Bare Ground	52.00	39.81	46.33	38.41	45.67	53.94

SOIL ANALYSIS DATA --

Management unit 14, Study no: 13, Study Name: Black Mesa

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.7	7.3	60.9	16.6	22.6	1.3	7.5	70.4	0.5

PELLET GROUP DATA--

Management unit 14, Study no: 13

Type	Quadrat Frequency				
	'92	'94	'99	'04	'09
Rabbit	52	39	75	39	61
Elk	-	1	1	-	3
Deer	22	17	34	33	30
Cattle	-	4	10	3	-

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (2)	1 (2)	11 (26)
58 (143)	38 (93)	77 (190)
44 (109)	9 (22)	4 (11)

BROWSE CHARACTERISTICS--

Management unit 14, 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 tridentata wyomingensis									
86	**3265**	16	47	37	466	29	37	20	19/15
92	**2880**	19	24	57	-	50	26	7	-/-
94	**3660**	26	35	39	5740	0	0	22	25/36
99	**2140**	9	31	60	120	36	53	22	23/33
04	**1680**	1	30	69	80	61	14	77	18/25
09	**1600**	1	48	51	40	31	10	28	20/26
Ephedra viridis									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	0	100	-	-	0	0	0	-/-
94	**20**	0	100	-	-	0	0	0	17/19
99	**20**	0	100	-	-	0	0	0	19/15
04	**20**	0	100	-	-	0	0	0	17/17
09	**20**	0	100	-	-	0	0	0	22/6
Gutierrezia sarothrae									
86	**10131**	12	73	14	66	0	0	0	9/9
92	**8320**	2	88	10	80	0	0	0	-/-
94	**2940**	27	59	14	3920	0	0	24	13/13
99	**8900**	18	80	2	40	0	0	1	9/9
04	**24460**	10	89	0	-	0	0	18	7/9
09	**580**	7	38	55	-	0	0	52	5/4

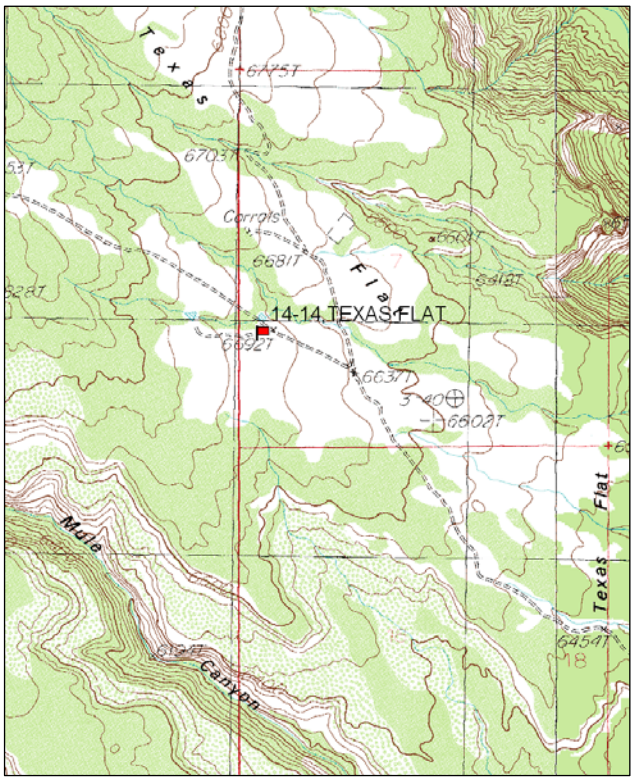
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
94	**20**	100	0	-	-	0	0	0	4/3
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	8/24
09	**20**	0	100	-	-	0	0	0	7/32
Yucca sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	0	100	-	-	100	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**40**	0	100	-	-	0	0	0	14/19
04	**40**	0	100	-	-	0	0	0	20/26
09	**40**	0	100	-	-	0	0	0	22/28

TEXAS FLAT - TREND STUDY NO. 14-14-09

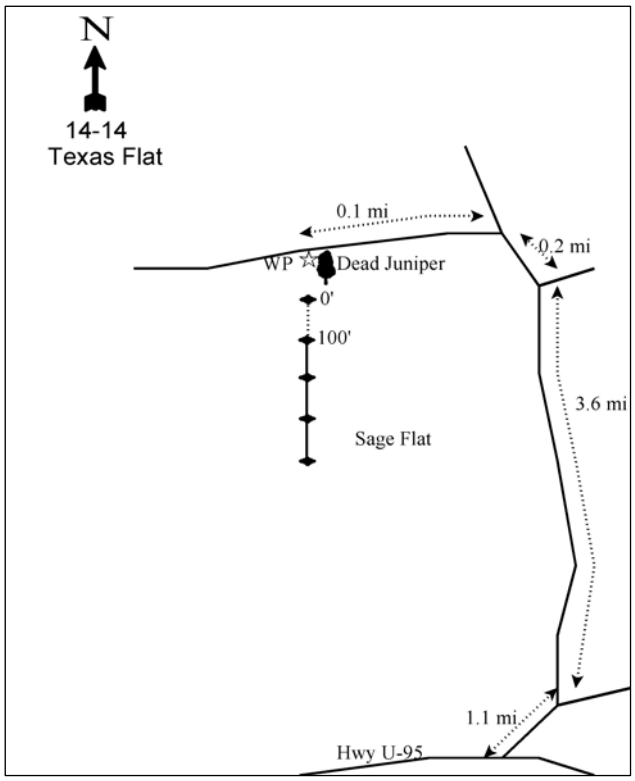
Vegetation Type: Basin Big Sagebrush
Range Type: Crucial Deer Spring/Fall, Crucial Elk Winter
NRCS Ecological Site Description: Upland Loam (Basin Big Sagebrush), R035XY306UT
Land Ownership: BLM
Elevation: 6,700 ft (2,042 m)
Aspect: Southeast
Slope: 2%
Transect bearing: 164 degrees magnetic.
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
Turn north off of Highway U-95 onto San Juan County Road #263 at a point 0.3 miles east of mile marker 102. Proceed north 1.1 miles to a fork. Take the left fork. Go another 3.6 miles and turn left. Go down this road 0.2 miles. Turn left onto a faint two-track road and go 0.1 miles to a witness post located just west of an old dead juniper. The witness post is a 3 1/2 foot tall green fence post on the south (left) side of the road. The 0-foot baseline stake is 100 feet south and is a fence post tagged #7868.

Map Name: Hotel Rock



Diagrammatic Sketch:



Township: 37S, Range: 20E, Section: 7

GPS: NAD 83, UTM 12S 609032 E 4160119 N

TEXAS FLAT - TREND STUDY NO. 14-14

Site Information

Site Description: The study is located on Texas Flat, a large flat south of Elk Ridge, surrounded by deep slickrock canyons. Dense pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) stands are intermixed with large basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) parks. In 1955, the sagebrush was railed and drill-seeded with crested wheatgrass (*Agropyron cristatum*). In October 1986, the area was treated with the herbicide tebuthiuron, a soil activated herbicide that defoliates and eventually kills broad leafed plants. The herbicide treatment was planned to leave edges and drainages for wildlife. The study site is close to the edge of the pinyon-juniper, so it is unknown how much herbicide was actually applied. Historically, the Texas Flat pellet group transect in the area showed the average use by deer to be light from 1982 to 1986 (Jense et al. 1987), from 1987 to 1992 (Jense et al. 1992), and from 1993 and 1997 (Hodson et al. 2000). Pellet group data from the site has also indicated light use by deer and elk since 1999. Estimated cattle use was moderate in 1999 and 2004, but decreased to light use in 2009 (Table - Pellet Group Data).

Browse: The density of basin big sagebrush decreased substantially after the herbicide treatment in the fall of 1986. Some of the decrease in density may be related to the larger sample area used in 1992 since there was no increase in the number of decadent or dead plants sampled between 1986 and 1992. After the treatment, the population was mostly mature with limited recruitment of young sagebrush plants from 1992 to 2004, but recruitment increased substantially in 2009. Health of the sagebrush population has been mostly good with good vigor and decadence over the sample years, though decadence was fairly high in 2004. Utilization of sagebrush has been mostly light with some moderate use over the sample years. Sagebrush also displayed some heavy use in 2004. Other browse species sampled include stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*), white rabbitbrush (*C. nauseosus* ssp. *albicaulis*), slenderbush eriogonum (*Eriogonum microthecum*), and broom snakeweed (*Gutierrezia sarothrae*). White rabbitbrush and slenderbush eriogonum occur in low densities and have received moderate to heavy use in past sample years (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses provide the dominant vegetation component on the site. Almost all of the grass cover is provided by two species, crested wheatgrass and sand dropseed (*Sporobolus cryptandrus*). Initially after the treatment, sand dropseed increased in nested frequency, but has decreased on the site since 1992. Crested wheatgrass has remained relatively similar over the years and was the dominant species on the site in 2009. Forbs were scarce before the treatment and they increased substantially in 1992, after the treatment, however the sum of nested frequency for perennial forbs declined dramatically by 1994 and has remained at a low level since. Common species have included low fleabane (*Erigeron pumilus*), thickleaf peavine (*Lathyrus lanszwertii*), and scarlet globemallow (*Sphaeralcea coccinea*) (Table - Herbaceous Trends).

Soil: Soil on the site is a sandy loam with a neutral pH and a very compact soil with a moderately deep effective rooting depth (Table - Soil Analysis Data). The parent material is sandstone. Bare ground cover was low from 1992 to 1999, but increased substantially in 2004 and remained high in 2009 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1992 - down (-2):** The density of the primary browse species, basin big sagebrush, decreased by 97% from 5,465 plants/acre to 180 plants/acre. The differences in density may be related to the larger sample area used in 1992, but with the herbicide treatment after the 1986 sampling likely reflects a true trend. The recruitment of young and seedling sagebrush plants also decreased substantially.

- **1992 to 1994 - slightly up (+1):** The density of sagebrush increased to 500 plants/acre and cover increased from less than 1% to 2%. However, plants displaying poor vigor increased to 16% and the recruitment of young plants remained low.
- **1994 to 1999 - stable (0):** There was no change in the density of sagebrush, though cover decreased to less than 1%. Sagebrush plants displaying poor vigor decreased to 4%.
- **1999 to 2004 - stable (0):** There was slight increase in the density of sagebrush to 540 plants/acre, though cover is still less than 1%. Decadence of sagebrush increased from 12% to 30% and poor vigor increased to 11%. White rabbitbrush was sampled for the first time in the density strips.
- **2004 to 2009 - up (+2):** The density of sagebrush more than tripled to 1,700 plants/acre and cover increased to 3%. Recruitment of young sagebrush plants contributed to the large increase in density and comprised 40% of the population. Decadence and poor vigor of sagebrush both decreased.

Grass:

- **1986 to 1992 - up (+2):** The sum of nested frequency of perennial grasses increased by 54% with a significant increase in the nested frequency of sand dropseed. There was a significant decrease in the nested frequency of needle-and-thread.
- **1992 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses though cover decreased from 33% to 23%. There was a significant increase in the nested frequency of sand dropseed.
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 10% and cover decreased to 17%. There was a significant decrease in the nested frequency of sand dropseed.
- **1999 to 2004 - slightly down (-1):** There was a 19% decrease in the sum of nested frequency of perennial grasses and cover decreased to 13%. There was a significant decrease in the nested frequency of crested wheatgrass.
- **2004 to 2009 - stable (0):** There was a slight increase in the sum of nested frequency of perennial grasses and cover increased to 18%. There was a significant increase in the nested frequency of crested wheatgrass, but sand dropseed decreased significantly in nested frequency.

Forb:

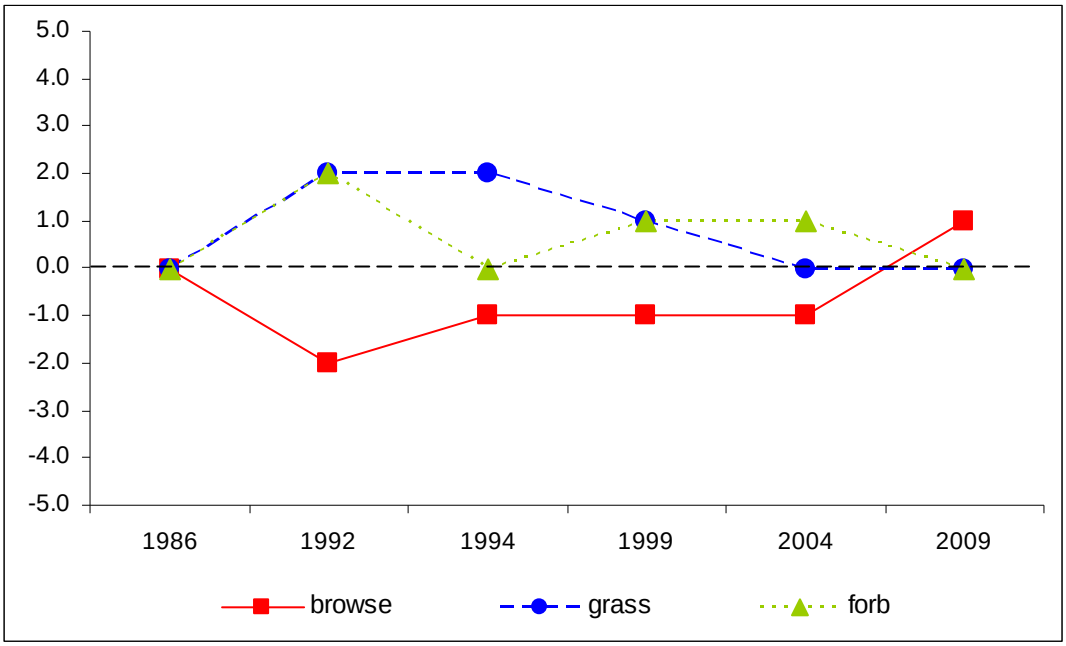
- **1986 to 1992 - up (+2):** There was a substantial increase in the sum of nested frequency of perennial forbs with a significant increase in many important forage species.
- **1992 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased by 71% and cover decreased from 26% to 2%. Many of the perennial forb species that were abundant in 1992 were not sampled or were rare in 1994.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 22% and cover increased to 6%.
- **1999 to 2004 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover decreased slightly to 3%.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 23% and cover decreased to 2%.

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

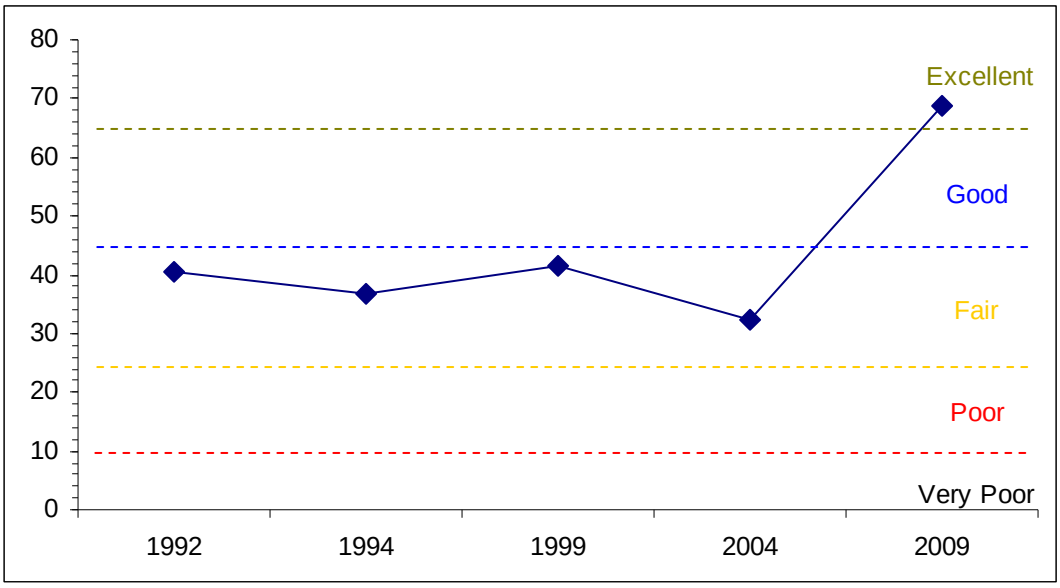
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	0.5	0.0	0.0	30.0	0.0	10.0	0.0	**40.5**	Fair
94	3.0	0.0	0.0	30.0	0.0	3.7	0.0	**36.6**	Fair
99	1.4	0.0	0.0	30.0	0.0	10.0	0.0	**41.4**	Fair
04	1.2	0.0	0.0	25.0	0.0	6.0	0.0	**32.3**	Fair
09	7.6	14.3	11.9	30.0	0.0	4.9	0.0	**68.7**	Excellent

Trend Summary

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



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



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

Type	Species	Nested Frequency						Average Cover %				
		'86	'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
G	Agropyron cristatum	ab252	a235	bc280	c306	a206	bc278	15.33	17.76	15.43	9.51	16.07
G	Bromus tectorum (a)	-	-	-	2	-	-	-	-	.00	-	-
G	Sporobolus cryptandrus	a30	d241	d206	bc124	c142	b101	17.44	4.88	1.80	2.91	1.97
G	Stipa comata	b29	a2	a4	ab11	a11	a-	.03	.06	.08	.09	-
G	Vulpia octoflora (a)	-	-	4	3	-	13	-	.01	.00	-	.02
Total for Annual Grasses		0	0	4	5	0	13	0	0.00	0.00	0	0.02
Total for Perennial Grasses		311	478	490	441	359	379	32.81	22.71	17.31	12.52	18.05
Total for Grasses		311	478	494	446	359	392	32.81	22.72	17.32	12.52	18.07
F	Artemisia dracunculus	-	-	-	6	3	-	-	-	.30	.15	-
F	Astragalus convallarius	ab9	b20	ab14	b31	a2	a5	.46	.07	.83	.00	.03
F	Astragalus sp.	b13	a-	a-	ab6	b14	a-	-	-	.06	.11	-
F	Calochortus nuttallii	-	1	-	-	-	-	.00	-	-	-	-
F	Castilleja sp.	a-	a-	b24	a-	a-	a-	-	.06	-	-	-
F	Chenopodium sp. (a)	-	b17	a-	a-	a-	b28	.65	-	-	-	.07
F	Comandra pallida	-	-	-	-	2	-	-	-	-	.01	-
F	Conyza canadensis (a)	-	10	-	-	-	-	.02	-	-	-	-
F	Cordylanthus wrightii (a)	-	a10	a-	a-	b25	a-	.52	-	-	.20	-
F	Descurainia pinnata (a)	-	-	-	4	3	-	-	-	.01	.00	-
F	Epilobium sp.	a-	b13	a-	a-	a-	a-	.15	-	-	-	-
F	Erigeron pumilus	ab18	ab25	b27	a3	a4	b37	1.72	.52	.01	.03	.83
F	Eriogonum cernuum (a)	-	3	-	-	-	5	.03	-	-	-	.06
F	Euphorbia glyptosperma (a)	-	b19	a-	a-	a-	a-	.04	-	-	-	-
F	Gayophytum ramosissimum(a)	-	-	3	-	-	-	-	.03	-	-	-
F	Gilia sp. (a)	-	-	-	-	7	-	-	-	-	.01	-

Type	Species	Nested Frequency						Average Cover %				
		'86	'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
F	Lactuca serriola	a-	b164	a8	a3	a1	a-	5.43	.02	.00	.00	-
F	Lappula occidentalis (a)	-	-	-	3	7	-	-	-	.00	.16	-
F	Lathyrus lanszwertii	a2	bc38	bc45	c70	ab26	a15	1.43	.77	1.85	.12	.11
F	Leucelene ericoides	a-	a2	a-	ab20	b30	a2	.00	-	1.35	.47	.00
F	Machaeranthera canescens	a-	b262	a-	a3	a15	a2	15.27	-	.01	.19	.01
F	Oenothera sp.	-	-	-	-	1	-	-	-	-	.00	-
F	Penstemon comarrhenus	5	12	8	6	8	-	.12	.03	.07	.04	.03
F	Phlox longifolia	6	4	4	4	5	-	.01	.01	.15	.01	-
F	Plantago patagonica (a)	-	b92	b112	c209	b88	a11	2.24	.64	6.81	.31	.05
F	Polygonum douglasii (a)	-	b19	a-	a-	a1	a2	.69	-	-	.00	.00
F	Portulaca oleracea (a)	-	b99	a-	a-	a-	a-	1.46	-	-	-	-
F	Salsola pestifer (a)	-	b45	a-	a-	a-	a-	.87	-	-	-	-
F	Senecio multilobatus	1	-	-	-	-	-	-	-	-	-	-
F	Sphaeralcea coccinea	ab55	a40	a38	ab54	bc88	c91	1.36	.27	.88	1.83	1.39
F	Streptanthus cordatus	-	-	1	-	-	-	-	.03	-	-	-
F	Tragopogon dubius	a-	b17	b6	ab4	a-	a-	.25	.02	.01	-	-
F	Unknown forb-annual (a)	-	8	-	-	-	-	.18	-	-	-	-
F	Zigadenus paniculatus	-	-	-	3	3	3	-	-	.00	.00	.03
Total for Annual Forbs		0	322	115	216	131	46	6.71	0.66	6.82	0.70	0.19
Total for Perennial Forbs		109	598	175	213	202	155	26.25	1.83	5.55	3.01	2.44
Total for Forbs		109	920	290	429	333	201	32.97	2.50	12.38	3.72	2.64

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

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

Type	Species	Strip Frequency					Average Cover %				
		'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
B	Amelanchier utahensis	0	0	1	0	0	-	-	.53	-	1.70
B	Artemisia tridentata tridentata	7	15	17	18	38	.22	2.38	.48	.90	3.29
B	Chrysothamnus nauseosus albicaulis	0	0	0	5	11	-	.00	-	.00	.69
B	Chrysothamnus viscidiflorus stenophyllus	6	0	6	4	1	.15	-	.38	.78	.00
B	Eriogonum microthecum	6	0	5	7	6	.18	-	.03	.06	.06
B	Gutierrezia sarothrae	51	43	28	34	44	2.94	1.25	.46	.98	1.09
B	Juniperus osteosperma	1	0	1	1	0	2.83	-	2.20	1.70	.63
B	Opuntia fragilis	8	9	25	19	27	.42	.05	.46	.33	1.23
B	Sclerocactus sp.	16	3	0	0	4	-	.03	-	-	-
Total for Browse		95	70	83	88	131	6.76	3.73	4.55	4.76	8.72

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

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	2.28	2.21
Artemisia tridentata tridentata	-	2.81	5.61
Chrysothamnus nauseosus albicaulis	-	-	.38
Eriogonum microthecum	-	.05	-
Gutierrezia sarothrae	-	1.00	.76
Juniperus osteosperma	4.19	4.00	4.51
Opuntia fragilis	-	.16	1.04

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

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata tridentata	2.6	1.0

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

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	10	<18	26
Pinus edulis	9	<18	23

Average diameter (in)		
'99	'04	'09
10.0	-	9.4
4.8	-	6.4

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

Cover Type	Average Cover %					
	'86	'92	'94	'99	'04	'09
Vegetation	1.25	52.89	33.92	37.51	23.71	27.60
Rock	0	0	.03	0	0	0
Pavement	0	0	.39	0	.03	.00
Litter	58.75	29.62	51.50	44.35	32.81	42.24
Cryptogams	0	1.19	.12	.68	.19	.38
Bare Ground	40.00	29.62	22.07	24.50	52.61	43.07

SOIL ANALYSIS DATA --
Management unit 14, Study no: 14, Study Name: Texas Flat

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
7.9	6.9	76.9	8.6	14.6	1.6	12.7	89.6	0.4

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

Type	Quadrat Frequency				
	'92	'94	'99	'04	'09
Rabbit	11	34	48	40	59
Elk	-	-	-	3	3
Deer	7	14	8	33	15
Cattle	6	1	19	18	9

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	2 (5)	7 (17)
19 (47)	17 (41)	9 (22)
46 (114)	30 (73)	12 (29)

BROWSE CHARACTERISTICS--
Management unit 14, 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									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	123/102
99	**20**	0	100	-	-	0	0	0	129/150
04	**0**	0	0	-	-	0	0	0	119/157
09	**0**	0	0	-	-	0	0	0	106/111
Artemisia tridentata tridentata									
86	**5465**	83	13	4	3133	2	0	0	25/24
92	**180**	22	78	0	380	22	0	0	-/-
94	**500**	4	88	8	20	0	0	16	24/23
99	**500**	4	84	12	80	8	0	4	30/31
04	**540**	7	63	30	22400	44	26	11	28/38
09	**1700**	40	56	4	240	6	0	1	28/46
Chrysothamnus nauseosus albicaulis									
86	**0**	0	0	0	-	0	0	0	-/-
92	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	18/21
99	**0**	0	0	0	-	0	0	0	44/32
04	**120**	0	67	33	-	0	33	0	21/28
09	**300**	7	93	0	-	7	0	0	18/23
Chrysothamnus viscidiflorus stenophyllus									
86	**199**	100	0	0	-	0	0	0	-/-
92	**160**	25	75	0	-	50	13	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**140**	14	86	0	-	0	0	0	19/27
04	**100**	0	80	20	-	20	0	20	12/17
09	**20**	100	0	0	-	0	0	0	13/19

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Eriogonum microthecum									
86	**799**	100	0	0	66	0	0	0	-/-
92	**480**	0	96	4	-	8	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**160**	13	88	0	-	75	13	0	12/13
04	**440**	0	91	9	-	9	91	0	7/8
09	**180**	11	89	0	-	0	0	0	10/9
Gutierrezia sarothrae									
86	**2465**	19	68	14	66	0	0	0	9/7
92	**3080**	11	89	0	20	0	0	0	-/-
94	**2340**	7	79	14	20	0	0	3	10/12
99	**2020**	36	64	0	80	0	0	0	8/7
04	**2160**	2	95	3	20	17	.92	0	6/7
09	**2620**	15	84	1	-	0	0	0	8/8
Juniperus osteosperma									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	0	100	-	20	0	100	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Mahonia repens									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	6/24
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia fragilis									
86	**1799**	85	15	0	-	0	0	0	4/8
92	**220**	45	45	9	-	9	0	9	-/-
94	**340**	24	71	6	-	0	0	12	6/13
99	**680**	38	47	15	60	0	0	26	5/18
04	**540**	11	78	11	20	0	0	11	5/17
09	**720**	17	83	0	-	0	0	0	6/19
Sclerocactus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**720**	64	36	-	-	3	0	0	-/-
94	**60**	67	33	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**80**	75	25	-	-	0	0	0	3/8

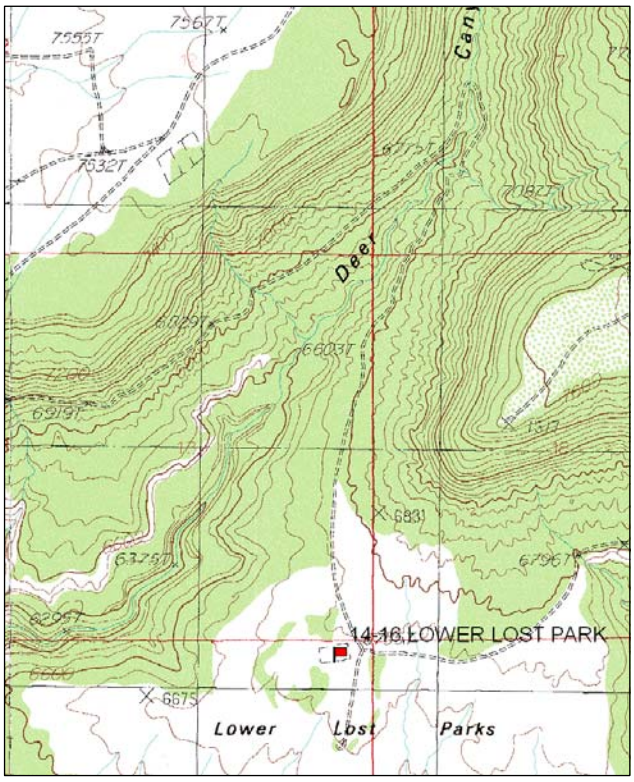
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Yucca sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	16/39
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-

LOWER LOST PARK - TREND STUDY 14-16-09

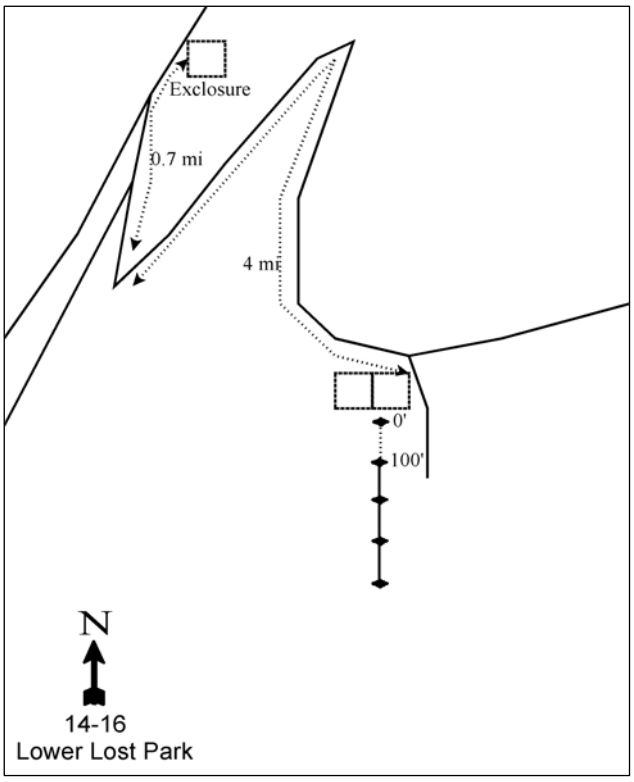
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper), R035XY315UT
Land Ownership: BLM
Elevation: 6,700 ft (2,042 m)
Aspect: Flat
Slope: 0%-2%
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
From the turnoff to the Kigalia Guard Station, proceed 2.4 miles southwest towards the Bears Ears. At the intersection, turn right and go west 2.1 miles. Go straight over the cattleguard, past a corral and continue 1.7 miles to a fork. Stay left and continue 1.5 miles to the FS/BLM boundary. Cross the cattleguard and go 2.45 miles to a fork by a stock pond. Stay right and go 0.6 miles. Stay left at this fork and continue 0.6 miles to another fork. Stay left and go 1.85 miles to an exclosure (Deer Flat exclosure and transect). Stay left at the fork by the exclosure and proceed 0.7 miles. Stay left at the forks, then drop off the rim down a tight switchback. Go just under 4 miles to an exclosure. Turn right on the road just east of the exclosure and stop after 100 feet. The transect begins 50 feet south of the center of the exclosure. All transect stakes are green fence posts. The 0-foot baseline post is tagged #7884.

Map Name: Woodenshoe Butte



Diagrammatic Sketch:



Township: 36S, Range: 18E, Section: 19

GPS: NAD 83, UTM 12S 589510 E 4167314 N

LOWER LOST PARK - TREND STUDY NO. 14-16

Site Information

Site Description: The study is in a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), pinyon pine (*Pinus edulis*), and Utah juniper (*Juniperus osteosperma*) flat south of the mouth of Deer Canyon. This area is on the southwest side of Elk Ridge. The area was originally chained in 1969 and crested wheatgrass (*Agropyron cristatum*) and four-wing saltbush (*Atriplex canescens*) were seeded. In October 1986, following the establishment of this study, a herbicide treatment of tebuthiuron was applied. Edges and drainages were supposedly left untreated for wildlife use. By 1992, it appeared that the herbicide treatment was either ineffective or was not done at all because the sagebrush and juniper showed no effects of being chemically treated. The DWR pellet group transect in the area indicated light deer use averaged from 1981-86 (Jense et al. 1987), and moderate use from 1987-1992 (Jense et al. 1992) and from 1993 to 1997 (Hodson et al. 2000). Pellet group data taken on the site has indicated moderately heavy use by deer in 1999 with a decrease to light use in 2004 and 2009. Estimated elk use has been minimal since 1999 and estimated cattle use has been light since 1999 (Table - Pellet Group Data).

Browse: A moderately dense and highly decadent stand of Wyoming big sagebrush dominates the site. The density of sagebrush has steadily decreased since 1992. Decadence of sagebrush has been over 40% in every sample year with a high of 80% in 2004. The number of sagebrush plants displaying poor vigor has been over 20% in all sample years with a high of 57% in 2004. Recruitment of young sagebrush plants has been minimal over the duration of the study. As the primary browse species on the site, utilization has been moderate to heavy on sagebrush since 1986 (Table - Browse Characteristics). There is a tall, mature stand of pinyon pine and Utah juniper on the site. There was little change in the point-quarter density estimate or average diameter of either species from 2004 to 2009 (Table - Point-Quarter Tree Data).

Herbaceous Understory: The planned herbicide treatment had the objective to kill the Wyoming big sagebrush and pinyon-juniper trees in order to release the understory grasses, but the treatment apparently never took place. Grasses have decreased substantially since the outset of the study in 1986 and were rare on the site in 2009. Cheatgrass (*Bromus tectorum*) has been common during some samplings, but was not sampled in 2009. Forbs are also lacking and few species are common. Longleaf phlox (*Phlox longifolia*) is the only common perennial forb (Table - Herbaceous Trends).

Soil: The soil is a light orange loam soil with a neutral pH and a moderately deep effective rooting depth. Phosphorus and potassium have limited availability for plant growth and development at 3.3 ppm and 44.8 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Vegetation cover is scattered, leaving large bare interspaces that are very susceptible to erosion. The average bare ground cover is high and has been increasing since 1992 (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 primarily due to pedestaling of plants and gullies. The erosion condition was classified as moderate in 2009 due to pedestaling, gullies, and flow patterns and litter and soil movement from a recent storm.

Trend Assessments

Browse:

- **1986 to 1992 - stable (0):** Differences in density may be related to the larger sample area used in 1992; therefore, trend was determined using other parameters. Decadence and recruitment of young plants of the primary browse species, Wyoming big sagebrush, increased slightly.
- **1992 to 1999 - down (-2):** The density of sagebrush decreased by 45% from 8,600 plants/acre to 4,740 plants/acre and cover decreased from 18% to 15%. Decadence decreased from 69% to 47%, but poor vigor increased from 24% to 33%. Recruitment of young sagebrush plants remains poor.
- **1999 to 2004 - down (-2):** Density of sagebrush decreased only slightly to 4,560 plants/acre and cover remained similar. However, decadence of sagebrush increased to 80% and poor vigor increased to 57%. There was no new recruitment of young sagebrush plants in 2004.

- **2004 to 2009 - stable (0):** There was a 10% decrease in the density of sagebrush to 4,100 plants/acre, though decadence decreased substantially to 42% and poor vigor decreased to 22%.

Grass:

- **1986 to 1992 - down (-2):** There was a 42% decrease in the sum of nested frequency of perennial grasses with a significant decrease in bottlebrush squirreltail (*Sitanion hystrix*) and mutton bluegrass (*Poa fendleriana*).
- **1992 to 1999 - stable (0):** There was a slight increase in the sum of nested frequency and cover of perennial grasses. However, there was a significant increase in the nested frequency of the annual grasses, sixweeks fescue (*Vulpia octoflora*) and cheatgrass, and cover increased from less than 1% to 2%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 68% and cover decreased to less than 1%. There was a significant decrease in bottlebrush squirreltail and needle-and-thread (*Stipa comata*) nested frequency. The nested frequency of the two annual species, cheatgrass and sixweeks fescue, also decreased significantly.
- **2004 to 2009 - down (-2):** There was a substantial decrease in the sum of nested frequency of perennial grasses and cover decreased to around 0.1%. Only two species, Indian ricegrass (*Oryzopsis hymenoides*) and bottlebrush squirreltail, provided any measurable cover. Neither of the two annual species was sampled.

Forb:

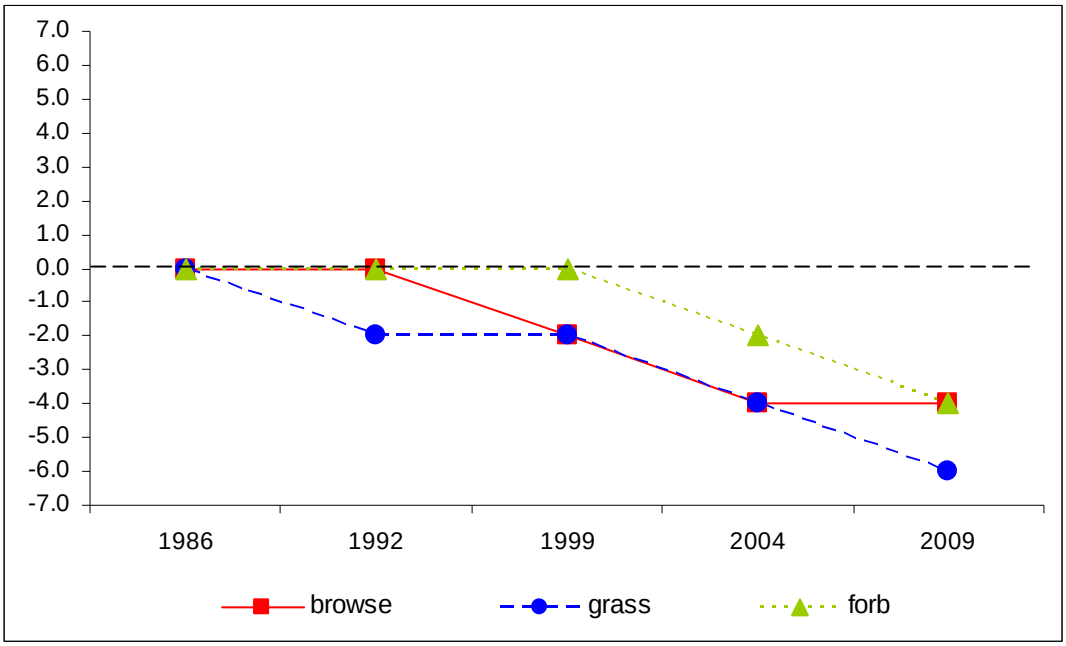
- **1986 to 1992 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, but composition changed slightly with a significant decrease in the nested frequency of hoary aster (*Machaeranthera canescens*) and a significant increase in longleaf phlox.
- **1992 to 1999 - stable (0):** The sum of nested frequency and cover of perennial forbs changed little.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 41% and cover decreased from 3% to 1%. There was a significant decrease in the nested frequency of longleaf phlox and low fleabane (*Erigeron pumilus*).
- **2004 to 2009 - down (-2):** There was a 28% decrease in the sum of nested frequency of perennial forbs, though cover increased to 3%. The increase in cover came from a large increase of timber poisonvetch (*Astragalus convallarius*).

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 14, study no: 16

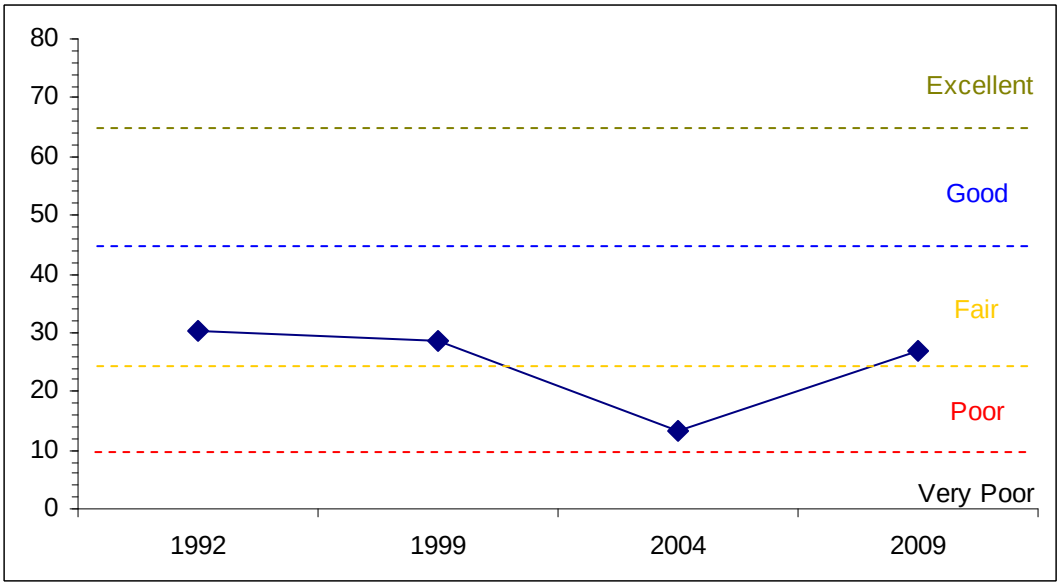
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	22.5	-5.4	0.9	3.3	-0.2	9.2	0.0	**30.3**	Fair
99	18.9	1.2	0.0	3.6	-1.6	6.6	0.0	**28.7**	Fair
04	18.8	-9.0	0.0	1.3	-0.6	2.8	0.0	**13.3**	Poor
09	16.9	2.4	0.5	0.2	0.0	6.9	0.0	**27.0**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 16



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 14, Study no: 16



HERBACEOUS TRENDS--
Management unit 14, Study no: 16

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron cristatum	11	2	10	1	2	.01	.10	.00	.00
G	Bouteloua gracilis	$_{a}$-	$_{b}$16	$_{b}$18	$_{ab}$9	$_{a}$-	.22	.12	.01	-
G	Bromus tectorum (a)	-	-	$_{c}$116	$_{b}$21	$_{a}$-	-	.86	.19	-
G	Oryzopsis hymenoides	$_{ab}$26	$_{b}$41	$_{a}$14	$_{ab}$28	$_{a}$11	.35	.09	.52	.07
G	Poa fendleriana	$_{b}$47	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
G	Sitanion hystrix	$_{c}$157	$_{b}$72	$_{b}$89	$_{a}$7	$_{a}$3	.78	1.28	.06	.03
G	Sporobolus cryptandrus	-	-	-	-	3	-	-	-	.00
G	Stipa comata	$_{ab}$18	$_{ab}$20	$_{b}$34	$_{a}$8	$_{a}$2	.26	.22	.04	.00
G	Vulpia octoflora (a)	-	$_{b}$70	$_{c}$135	$_{b}$47	$_{a}$-	.21	1.26	.61	-
Total for Annual Grasses		0	70	251	68	0	0.20	2.13	0.80	0
Total for Perennial Grasses		259	151	165	53	21	1.64	1.82	0.64	0.12
Total for Grasses		259	221	416	121	21	1.85	3.96	1.44	0.12
F	Arabis sp.	-	-	4	-	-	-	.01	-	-
F	Astragalus convallarius	95	87	75	60	81	.96	.79	.39	2.91
F	Calochortus nuttallii	-	11	-	-	-	.02	-	-	-
F	Cordylanthus wrightii (a)	$_{a}$13	$_{c}$157	$_{a}$1	$_{a}$2	$_{b}$63	6.91	.00	.01	1.11
F	Descurainia pinnata (a)	-	-	2	-	-	-	.00	-	-
F	Erigeron pumilus	$_{b}$25	$_{ab}$19	$_{c}$52	$_{a}$5	$_{a}$5	.16	.77	.04	.01
F	Eriogonum racemosum	-	-	2	-	1	-	.00	-	.00
F	Lesquerella sp.	-	2	-	-	-	.00	-	-	-
F	Machaeranthera canescens	$_{c}$36	$_{a}$6	$_{a}$3	$_{a}$10	$_{a}$-	.02	.00	.05	-
F	Madia glomerata (a)	-	-	1	5	-	-	.00	.04	-
F	Microsteris gracilis (a)	-	-	-	3	-	-	-	.03	-
F	Penstemon comarrhenus	$_{c}$53	$_{bc}$36	$_{ab}$19	$_{a}$4	$_{a}$5	1.29	.12	.01	.04
F	Phlox hoodii	-	-	-	-	1	-	-	-	.00
F	Phlox longifolia	$_{c}$207	$_{d}$259	$_{d}$253	$_{c}$157	$_{a}$86	2.03	1.49	.79	.47
F	Sphaeralcea coccinea	$_{b}$33	$_{ab}$12	$_{ab}$19	$_{ab}$22	$_{a}$7	.11	.08	.13	.02
F	Townsendia sp.	-	4	2	-	-	.01	.00	-	-
F	Unknown forb-annual (a)	-	2	-	-	-	.00	-	-	-
F	Unknown forb-perennial	2	-	-	-	-	-	-	-	-
Total for Annual Forbs		13	159	4	10	63	6.92	0.01	0.08	1.11
Total for Perennial Forbs		451	436	429	258	186	4.62	3.28	1.41	3.47
Total for Forbs		464	595	433	268	249	11.54	3.30	1.50	4.59

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

BROWSE TRENDS--
Management unit 14, Study no: 16

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Artemisia tridentata wyomingensis	95	93	87	88	17.77	14.76	15.07	13.56
B	Chrysothamnus depressus	11	3	3	1	.04	.30	.00	.00
B	Chrysothamnus viscidiflorus	0	3	0	1	-	.00	-	.00
B	Eriogonum microthecum	4	4	1	0	.18	.03	.00	-
B	Gutierrezia sarothrae	0	0	2	2	-	.00	.03	.15
B	Juniperus osteosperma	4	5	5	5	.56	.33	.74	.71
B	Opuntia sp.	1	3	1	4	.00	.00	.01	.01
B	Pinus edulis	10	6	5	6	6.81	7.19	5.65	4.15
Total for Browse		125	117	104	107	25.37	22.63	21.52	18.59

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 16

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata wyomingensis	-	10.78	15.51
Chrysothamnus depressus	-	.13	-
Gutierrezia sarothrae	-	-	.10
Juniperus osteosperma	-	2.86	1.96
Opuntia sp.	-	.11	-
Pinus edulis	6.00	10.16	9.08

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 16

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.3	1.5

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 16

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	36	37	35	2.8	3.3	3.1
Pinus edulis	80	78	84	3.0	4.4	4.0

BASIC COVER--
Management unit 14, Study no: 16

Cover Type	Average Cover %				
	'86	'92	'99	'04	'09
Vegetation	3.25	32.20	27.01	22.48	23.39
Rock	0	.01	.00	0	.03
Pavement	0	0	0	.01	0
Litter	28.25	29.35	31.84	31.78	26.19
Cryptogams	2.00	2.19	3.28	3.55	4.27
Bare Ground	66.50	46.18	48.67	53.32	58.07

SOIL ANALYSIS DATA --
Management unit 14, Study no: 16, Study Name: Lower Lost Park

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.5	6.9	44	32.2	23.8	1	3.3	44.8	0.5

PELLET GROUP DATA--
Management unit 14, Study no: 16

Type	Quadrat Frequency			
	'92	'99	'04	'09
Rabbit	44	60	34	31
Elk	-	1	-	-
Deer	49	39	15	5
Cattle	3	-	-	2

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (2)	2 (5)	1 (2)
56 (138)	23 (58)	16 (40)
7 (17)	8 (20)	8 (20)

BROWSE CHARACTERISTICS--
Management unit 14, 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	**7399**	0	37	63	-	35	49	24	20/19
92	**8600**	1	30	69	20	42	25	24	-/-
99	**4740**	0	53	47	-	38	38	33	19/29
04	**4560**	0	20	80	-	57	2	57	18/28
09	**4100**	1	57	42	40	59	15	22	18/26
Chrysothamnus depressus									
86	**265**	25	75	0	-	0	0	0	6/6
92	**260**	31	69	0	-	62	8	0	-/-
99	**80**	0	100	0	-	0	50	0	8/11
04	**60**	0	33	67	-	33	33	33	2/7
09	**40**	0	50	50	-	0	0	50	5/7

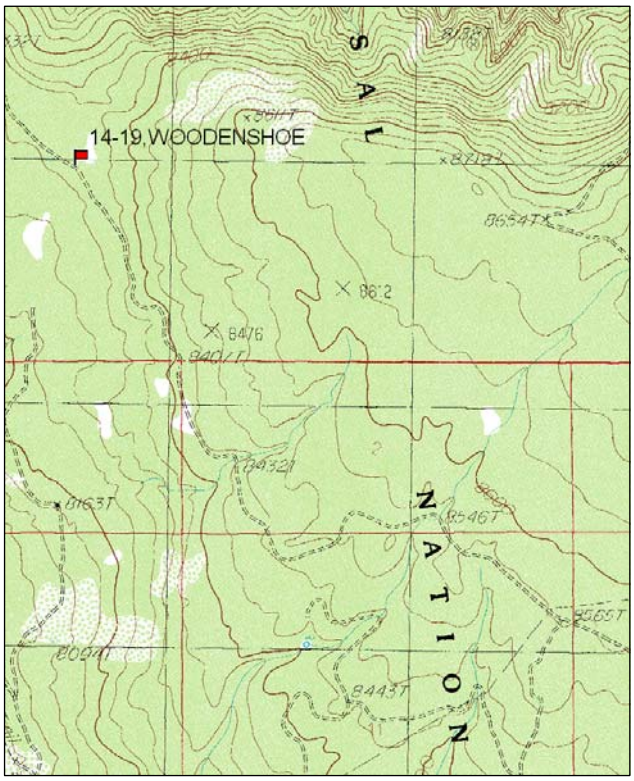
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus									
86	**0**	0	0	0	-	0	0	0	-/-
92	**0**	0	0	0	-	0	0	0	-/-
99	**60**	0	67	33	-	0	0	33	13/15
04	**0**	0	0	0	-	0	0	0	11/8
09	**40**	50	50	0	-	0	0	0	9/4
Eriogonum microthecum									
86	**0**	0	0	-	-	0	0	0	-/-
92	**120**	67	33	-	20	0	0	0	-/-
99	**80**	0	100	-	-	25	0	0	3/7
04	**20**	0	100	-	-	0	100	0	2/2
09	**0**	0	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	40	0	0	0	-/-
04	**80**	25	75	-	-	0	0	0	6/6
09	**100**	0	100	-	-	0	0	0	8/9
Juniperus osteosperma									
86	**0**	0	0	0	-	0	0	0	-/-
92	**80**	50	50	0	-	0	0	0	-/-
99	**100**	80	20	0	-	0	0	0	-/-
04	**100**	60	20	20	-	0	0	0	-/-
09	**100**	40	60	0	-	0	0	0	-/-
Opuntia sp.									
86	**66**	0	100	-	-	0	0	0	8/12
92	**20**	0	100	-	-	0	0	0	-/-
99	**80**	25	75	-	-	0	0	0	9/27
04	**20**	0	100	-	-	0	0	0	7/33
09	**120**	50	50	-	-	0	0	0	3/3
Pinus edulis									
86	**0**	0	0	0	-	0	0	0	-/-
92	**200**	50	40	10	-	0	0	0	-/-
99	**120**	33	67	0	20	0	0	0	-/-
04	**100**	20	80	0	20	0	0	0	-/-
09	**120**	50	50	0	20	0	0	0	-/-

WOODENSHOE - TREND STUDY NO. 14-19-09

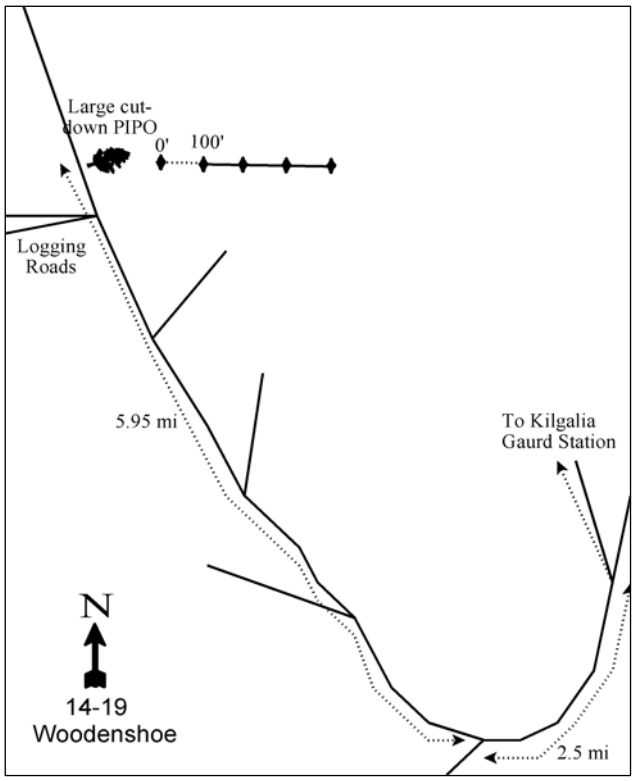
Vegetation Type: Logged Ponderosa Pine
Range Type: Crucial Deer Summer, Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,400 ft (2,560 m)
Aspect: Southwest
Slope: 2%
Transect bearing: 64 degrees magnetic.
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
From the Kigalia Guard Station turnoff, go 2.5 miles southwest towards the Bears Ears. Turn right at the fork and proceed 2.05 miles to fork located just west of a cattleguard and opposite a corral. Turn right, and go north 1.05 mile to another fork (County Road #271a). Turn left toward Woodenshoe Point and go 1.35 miles to a fork. Stay left and continue 1.45 miles. At this point there are two overgrown, impassable logging roads taking off to the left. Go 0.05 miles (about 210 feet) past the logging roads to a moderately large, cut-down ponderosa on the right and a small clump of tall oak on the left. The transect starting point is about 10 feet east of the pine. The baseline is marked by the 1981 line-intercept red and green steel fence posts 16 inches tall. The 0-foot stake has browse tag #482 attached.

Map Name: Woodenshoe Butte



Diagrammatic Sketch:



Township: 35S, Range: 18E, Section: 34

GPS: NAD 83, UTM 12S 595546 E 4172181 N

Site Information

Site Description: The study is located on summer range on a plateau on the southwest portion of Elk Ridge. The plateau drains west into the steep slickrock of Woodenshoe Canyon and is managed by the Forest Service as part of the Twin Springs allotment. The area was burned in the summer of 2003 as part of the Woodenshoe wildfire caused by a campfire that burned 2,710 acres. Prior to burning the vegetation was dense and dominated mainly by ponderosa pine (*Pinus ponderosa*), Gambel oak (*Quercus gambelii*), snowberry (*Symphoricarpos oreophilus*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and various perennial grasses. The area appears to be drier than the other summer range studies, which explains the lack of aspen (*Populus tremuloides*). The study baseline samples some open meadow areas along with the ponderosa pine forest. There has been selective removal of ponderosa pines, but no large scale logging has taken place on the site. The numerous roads traversing the plateau facilitate logging, grazing management, and easy access to mining claims. There has been geophysical exploration, heavy uranium drilling, and oil-gas leasing in the general area. Pellet group data has indicated light use on the site by deer and elk with more moderate use by cattle since 1999 (Table - Pellet Group Data).

Browse: The fire burned mostly as an understory fire, although a few ponderosa pines did completely burn. Ponderosa pine is the dominant tree species. Many trees are large (75-100 ft.) and they visually dominate the area. The overhead canopy cover was reduced in 2004, after the fire, but increased to pre-fire levels in 2009 (Table - Canopy Cover). Gambel oak and mountain big sagebrush cover and density decreased in 2004, after the fire, but also returned to pre-fire levels in 2009 (Table - Browse Trends, Table Browse Characteristics). Other palatable shrubs that are less common include chokecherry (*Prunus virginiana*) and bitterbrush (*Purshia tridentata*).

Herbaceous Understory: Grasses are diverse and fairly abundant on the site. The small openings in the overstory support a good, dry meadow-like stand of grasses. Common species are mutton bluegrass (*Poa fendleriana*), Kentucky bluegrass (*P. pratensis*), bottlebrush squirreltail (*Sitanion hystrix*), Letterman needlegrass (*Stipa lettermani*), and sedge (*Carex sp.*). Kentucky bluegrass was more common in the openings and has become the dominant grass species in cover on the site. Forbs are also very diverse and have increased substantially since the fire. Some of the more common species include trailing fleabane (*Erigeron flagellaris*), western yarrow (*Achillea millefolium*), and silky lupine (*Lupinus sericeus*). Nested frequency of grasses and forbs was lower in 2004, probably due to the fire, but increased to greater than pre-fire values in 2009 (Table - Herbaceous Trends).

Soil: The soil is a loam with a slightly acid pH and moderately deep effective rooting depth (Table - Soil Analysis Data). Parent material of the soil is granite, with bedrock near the surface in some places. The average bare ground cover increased in 2004, after the fire, but has been low in all sample years due to a high amount of vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1992 - stable (0):** Differences in density may be related to the larger sample area used in 1992; therefore trend was determined using other parameters. Decadence decreased in mountain big sagebrush from 63% to 30% and poor vigor of snowberry decreased from 29% to 3%.
- **1992 to 1999 - stable (0):** Density of mountain big sagebrush decreased slightly, but decadence decreased from 30% to 8% as well. Cover remained similar for the preferred browse species sampled.
- **1999 to 2004 - down (-2):** The fire decreased the cover and density of most of the browse species on the site.

- **2004 to 2009 - up (+2):** Most browse species increased in cover and density to pre-fire levels. Chokecherry density and cover increased substantially. There was increased recruitment of young mountain big sagebrush plants.

Grass:

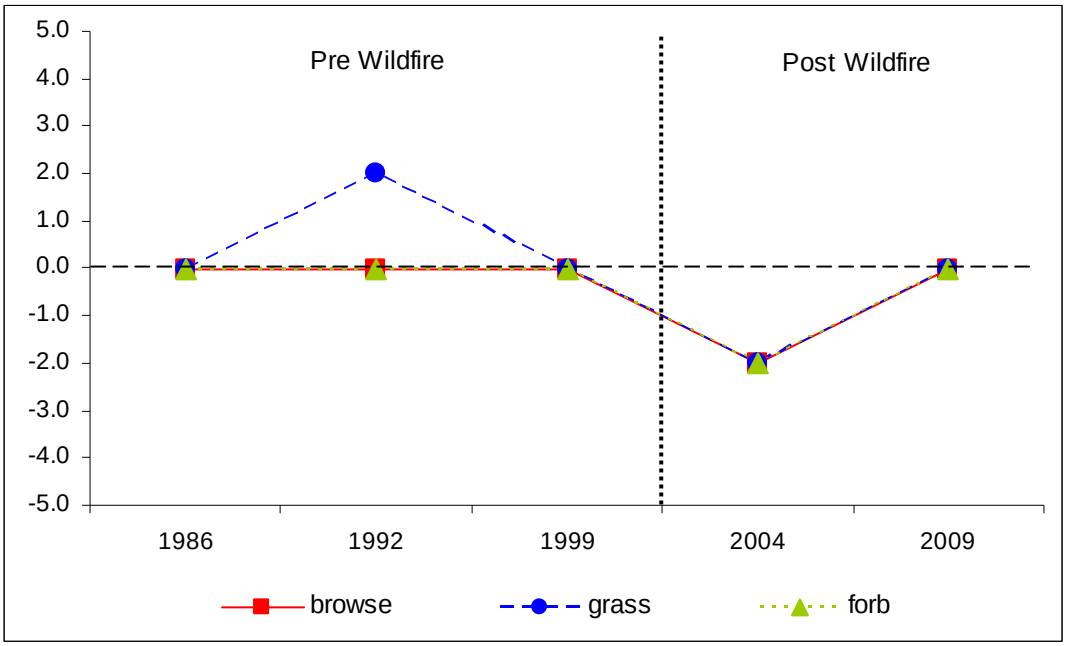
- **1986 to 1992 - up (+2):** There was a two-fold increase in the sum of nested frequency of perennial grasses with a significant increase in the nested frequency of slender wheatgrass (*Agropyron trachycaulum*), Kentucky bluegrass, subalpine needlegrass (*Stipa columbiana*), and Letterman needlegrass.
- **1992 to 1999 - down (-2):** There was a 35% decrease in the sum of nested frequency of perennial grasses and cover decreased from 15% to 10%. There was a significant decrease in the nested frequency of mutton bluegrass and Letterman needlegrass. There was a significant increase in the nested frequency of Kentucky bluegrass.
- **1999 to 2004 - down (-2):** After the fire in 2003 the sum of nested frequency of perennial grasses decreased 34% and cover decreased to 6%. There was a significant decrease in nested frequency of Kentucky bluegrass and slender wheatgrass, and a significant increase in nested frequency of Letterman needlegrass.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased 63% and cover increased to 12%. There was a significant increase in the nested frequency of mutton bluegrass and slender wheatgrass.

Forb:

- **1986 to 1992 - stable (0):** There was little change in the sum of nested frequency of perennial forbs.
- **1992 to 1999 - stable (0):** The sum of nested frequency and cover of perennial forbs changed little.
- **1999 to 2004 - down (-2):** After the fire in 2003, the sum of nested frequency of perennial forbs decreased by 31%, and the cover and sum of nested frequency of annual forbs increased substantially. Several palatable species including thickleaf peavine (*Lathyrus lanszwertii*) and trailing fleabane decreased significantly in nested frequency.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased to higher than pre-fire levels and cover increased from 7% to 16%. Annual forbs sum of nested frequency and cover decreased substantially as well.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14 Study no: 19



HERBACEOUS TRENDS--
Management unit 14, Study no: 19

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron trachycaulum	a-	b29	b43	a-	b32	.41	.55	-	.51
G	Bouteloua gracilis	-	7	-	-	-	.06	-	-	-
G	Bromus anomalus	5	12	16	11	6	.29	.13	.34	.09
G	Bromus tectorum (a)	-	-	-	-	11	-	-	-	.33
G	Carex sp.	44	32	23	38	38	2.24	.93	2.08	2.09
G	Koeleria cristata	-	2	-	-	-	.03	-	-	-
G	Muhlenbergia montana	-	8	7	6	8	.45	.06	.03	.76
G	Poa fendleriana	bc54	c99	ab36	a7	b41	1.75	.70	.05	1.13
G	Poa pratensis	a-	b82	c126	b58	bc101	3.87	7.08	1.25	4.93
G	Sitanion hystrix	bc63	c92	a10	ab30	ab42	3.43	.18	1.17	.83
G	Stipa columbiana	a-	b22	ab9	ab6	b15	.73	.12	.10	.38
G	Stipa comata	b30	ab12	a8	a1	a1	.39	.07	.03	.03
G	Stipa lettermani	a-	c40	b8	c33	bc26	1.21	.27	1.03	1.18
Total for Annual Grasses		0	0	0	0	11	0	0	0	0.33
Total for Perennial Grasses		196	437	286	190	310	14.90	10.13	6.11	11.96
Total for Grasses		196	437	286	190	321	14.90	10.13	6.11	12.30
F	Achillea millefolium	26	32	40	23	36	.89	1.39	.81	1.89
F	Agoseris glauca	a-	a-	b6	b11	b17	-	.02	.08	.13
F	Androsace septentrionalis (a)	-	-	-	-	2	-	-	-	.00
F	Arabis sp.	-	-	-	-	3	-	-	-	.00

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
F	Arenaria congesta	$_{a}$1	$_{a}$3	$_{a}$6	$_{a}$3	$_{b}$36	.03	.12	.15	.63
F	Artemisia ludoviciana	8	-	-	-	-	-	-	-	-
F	Aster chilensis	$_{a}$-	$_{ab}$5	$_{b}$14	$_{ab}$3	$_{b}$14	.06	.06	.03	.37
F	Astragalus sp.	-	-	-	4	1	-	-	.03	.00
F	Calochortus nuttallii	-	-	3	-	4	-	.00	-	.15
F	Castilleja linariaefolia	$_{b}$25	$_{a}$2	$_{a}$-	$_{a}$-	$_{a}$-	.00	-	-	-
F	Chenopodium album (a)	-	-	-	-	5	-	-	-	.01
F	Chenopodium sp. (a)	-	5	-	2	-	.01	-	.00	-
F	Collinsia parviflora (a)	-	-	$_{a}$3	$_{b}$130	$_{a}$15	-	.01	2.06	.05
F	Collomia linearis (a)	-	-	$_{a}$-	$_{a}$2	$_{b}$13	-	-	.01	.37
F	Comandra pallida	2	-	1	-	-	-	.00	-	-
F	Crepis acuminata	-	-	-	4	8	-	-	.03	.04
F	Delphinium nuttallianum	-	-	-	3	1	-	-	.00	.00
F	Epilobium brachycarpum (a)	-	8	-	-	-	.04	-	-	-
F	Erigeron divergens	$_{a}$10	$_{b}$23	$_{a}$1	$_{a}$-	$_{a}$-	.30	.00	-	-
F	Erigeron eatonii	$_{a}$-	$_{a}$3	$_{a}$-	$_{a}$3	$_{b}$44	.03	-	.03	1.19
F	Erigeron flagellaris	$_{ab}$57	$_{b}$92	$_{b}$94	$_{a}$52	$_{c}$137	2.71	2.15	1.78	6.63
F	Eriogonum racemosum	21	5	14	6	12	.05	.08	.07	.08
F	Gayophytum ramosissimum(a)	-	-	-	12	8	-	-	.45	.01
F	Heterotheca villosa	-	3	-	-	-	.63	-	-	-
F	Ipomopsis aggregata	-	4	4	3	4	.03	.04	.00	.03
F	Lappula occidentalis (a)	-	-	-	2	5	-	-	.03	.01
F	Lathyrus lanszwertii	$_{b}$77	$_{b}$49	$_{b}$58	$_{a}$18	$_{a}$18	.93	1.61	.38	.41
F	Lupinus sericeus	$_{ab}$28	$_{a}$13	$_{ab}$31	$_{a}$17	$_{b}$45	.14	.91	2.14	3.05
F	Lychnis drummondii	-	-	-	-	-	-	-	.00	-
F	Microsteris gracilis (a)	-	$_{a}$3	$_{b}$35	$_{b}$30	$_{b}$28	.00	.18	.36	.13
F	Navarretia breweri (a)	-	-	$_{a}$-	$_{b}$14	$_{b}$13	-	-	.09	.03
F	Oenothera sp.	-	2	-	-	-	.03	-	-	-
F	Penstemon strictus	$_{b}$35	$_{a}$16	$_{a}$5	$_{a}$6	$_{a}$9	.10	.07	.07	.13
F	Phacelia sp.	-	4	-	-	-	.01	.03	-	-
F	Phlox longifolia	$_{b}$41	$_{b}$60	$_{b}$46	$_{b}$61	$_{a}$8	.43	.11	1.00	.05
F	Polygonum douglasii (a)	-	$_{c}$74	$_{ab}$18	$_{b}$37	$_{a}$11	.42	.04	.33	.02
F	Senecio canus	$_{b}$28	$_{a}$4	$_{a}$7	$_{a}$9	$_{a}$3	.01	.01	.09	.16
F	Senecio multilobatus	-	-	2	3	1	.00	.00	.00	.00
F	Stellaria jamesiana	-	1	4	1	4	.03	.03	.03	.03
F	Taraxacum officinale	$_{a}$-	$_{b}$26	$_{bc}$27	$_{a}$-	$_{c}$46	.49	.29	-	.93
F	Tragopogon dubius	-	8	3	4	13	.20	.03	.03	.08
F	Trifolium sp.	-	-	-	-	6	-	-	-	.09
F	Unknown forb-annual (a)	-	8	-	-	-	.07	-	-	-
F	Unknown forb-perennial	2	12	-	-	-	.02	-	-	-
Total for Annual Forbs		0	98	56	229	100	0.55	0.23	3.36	0.64
Total for Perennial Forbs		361	367	366	234	470	7.18	7.00	6.79	16.15
Total for Forbs		361	465	422	463	570	7.73	7.24	10.15	16.80

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

BROWSE TRENDS--
Management unit 14, Study no: 19

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Artemisia tridentata vaseyana	44	41	11	22	3.44	2.59	.71	2.83
B	Chrysothamnus depressus	1	1	0	0	.00	.00	-	-
B	Mahonia repens	30	29	27	30	.71	1.04	1.23	1.35
B	Pinus ponderosa	8	8	7	8	19.45	1.32	1.48	.31
B	Prunus virginiana	1	0	1	6	.00	-	.00	1.12
B	Purshia tridentata	8	9	2	2	.97	.21	.06	.18
B	Quercus gambelii	36	37	26	30	5.79	6.10	1.96	6.50
B	Rosa woodsii	2	1	0	0	.00	.00	-	-
B	Symphoricarpos oreophilus	58	53	38	41	12.09	11.84	4.14	6.91
Total for Browse		188	179	112	139	42.47	23.13	9.60	19.22

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 19

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata vaseyana	-	1.48	2.18
Mahonia repens	-	.60	.93
Pinus ponderosa	21.39	5.84	21.79
Purshia tridentata	-	.06	.13
Quercus gambelii	3.00	1.04	9.05
Symphoricarpos oreophilus	-	5.46	10.76

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 19

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.7	2.0
Purshia tridentata	3.3	2.0

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 19

Species	Trees per Acre		
	'99	'04	09
Pinus ponderosa	52	-	33
Quercus gambelii	100	-	72

Average diameter (in)		
'99	'04	'09
12.8	-	12.4
2.7	-	1.9

BASIC COVER--
Management unit 14, Study no: 19

Cover Type	Average Cover %				
	'86	'92	'99	'04	'09
Vegetation	8.75	54.92	40.18	27.22	44.67
Rock	3.50	2.12	1.31	2.61	2.68
Pavement	0	0	.16	.18	.31
Litter	79.25	61.79	62.31	54.27	54.84
Cryptogams	0	.92	.07	1.48	.38
Bare Ground	8.50	14.34	11.56	23.31	13.93

SOIL ANALYSIS DATA --
Management unit 14, Study no: 19, Study Name: Woodenshoe

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.9	6.5	48.4	31.1	20.6	3.8	7.6	204.8	0.4

PELLET GROUP DATA--
Management unit 14, Study no: 19

Type	Quadrat Frequency			
	'92	'99	'04	'09
Rabbit	11	3	2	4
Grouse	4	-	-	-
Elk	4	1	-	2
Deer	11	8	4	3
Cattle	4	8	3	15

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	-	-
3 (7)	7 (17)	1 (3)
7 (17)	13 (31)	5 (12)
26 (65)	26 (65)	22 (54)

BROWSE CHARACTERISTICS--
Management unit 14, 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)
Artemisia tridentata vaseyana									
86	**1998**	3	33	63	266	33	7	20	26/18
92	**1660**	39	31	30	460	17	2	7	-/-
99	**1500**	31	61	8	80	15	3	1	25/35
04	**800**	65	33	3	60	60	0	3	16/23
09	**1280**	28	72	0	400	0	0	0	16/21
Ceanothus fendleri									
86	**132**	50	50	-	-	0	0	0	7/20
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**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)
Chrysothamnus depressus									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	0	100	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	100	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	9/14
Mahonia repens									
86	**4599**	3	97	-	266	0	0	0	6/6
92	**4600**	56	44	-	120	2	0	0	-/-
99	**3640**	31	69	-	80	0	0	0	4/8
04	**3660**	19	81	-	-	.54	0	0	4/6
09	**6680**	56	44	-	120	0	0	0	4/6
Pinus edulis									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	20	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Pinus ponderosa									
86	**133**	100	0	0	-	0	0	0	-/-
92	**180**	22	78	0	60	0	0	0	-/-
99	**160**	13	88	0	-	0	0	0	-/-
04	**160**	0	75	25	-	0	0	13	-/-
09	**160**	0	88	13	40	0	0	0	-/-
Populus tremuloides									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	20	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Prunus virginiana									
86	**199**	100	0	-	-	0	0	0	-/-
92	**40**	0	100	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**40**	50	50	-	-	0	0	0	25/13
09	**300**	67	33	-	-	0	0	0	19/10
Purshia tridentata									
86	**66**	0	100	0	-	100	0	0	19/13
92	**200**	60	30	10	-	50	30	0	-/-
99	**200**	10	70	20	-	70	20	10	11/23
04	**40**	50	50	0	-	0	50	0	6/13
09	**40**	50	50	0	-	50	50	0	7/19

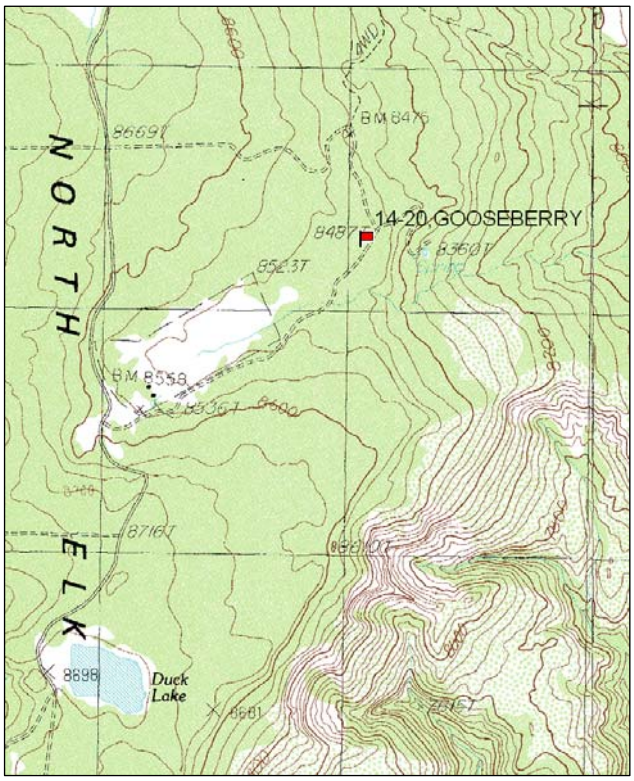
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Quercus gambelii									
86	**2665**	75	25	0	2733	3	0	0	77/44
92	**4000**	77	21	3	9420	22	.50	.50	-/-
99	**3580**	73	25	2	1220	.55	0	1	49/44
04	**2300**	87	13	0	20	2	0	0	20/14
09	**3120**	29	71	0	2920	0	0	0	26/35
Rosa woodsii									
86	**532**	63	37	-	-	0	0	13	24/17
92	**80**	100	0	-	-	0	0	0	-/-
99	**40**	0	100	-	-	0	0	0	11/15
04	**0**	0	0	-	-	0	0	0	13/7
09	**0**	0	0	-	20	0	0	0	10/9
Symphoricarpos oreophilus									
86	**15065**	40	60	0	2399	4	0	29	26/16
92	**4320**	31	66	2	460	13	2	3	-/-
99	**3280**	36	64	0	240	0	0	0	31/50
04	**2400**	35	65	0	-	3	7	0	16/30
09	**3160**	23	77	0	180	0	16	0	17/26

GOOSEBERRY - TREND STUDY NO. 14-20-09

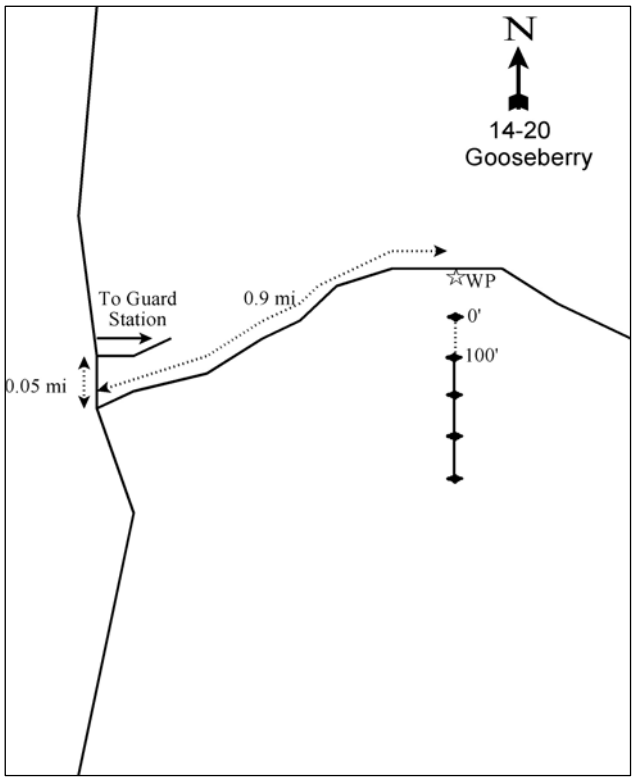
Vegetation Type: Logged Ponderosa Pine
Range Type: Crucial Deer Summer, Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,500 ft (2,591 m)
Aspect: Northeast
Slope: 2%
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
Drive 0.05 miles south past the turnoff to the Gooseberry Guard Station on Elk Ridge to a road turning off to the left (east). Proceed down this road past the guard station, corral and water troughs for 0.9 miles and stop at a witness post on the right side of the road. (If you go to far, the road starts to drop down 150 feet past this point). The 0-foot baseline stake is 100 feet south, and is marked by a green full-high fence post tagged with browse tag #7878. Fence posts were used to mark all the transect plots.

Map Name: Poison Canyon



Diagrammatic Sketch:



Township: 34S, Range: 20E, Section: 18

GPS: NAD 83, UTM 12S 608994 E 4187470 N

GOOSEBERRY - TREND STUDY NO. 14-20

Site Information

Site Description: The study samples a mixed ponderosa pine (*Pinus ponderosa*) and aspen (*Populus tremuloides*) summer range on the northwest rim of Elk Ridge just north of the Gooseberry guard station. The area is managed by the Forest Service as part of the Gooseberry allotment. Thick aspen groves dominate below the rim, but on top aspen clumps are scattered through the predominately ponderosa pine forest. Old growth pines were removed with a selective over story harvest in 1963. The area was scheduled for a shelter-wood cut in 1993 or 1994. Some logging activities were evident during the 1999 reading. Slash was common on the site and logs were piled up on the nearby road. Several small aspen along with study site fence posts were bent over by logging equipment. Pellet group data indicates light use by deer and elk since 1999. Estimated cattle use was moderate in 1999, but has been light since 2004 (Table - Pellet Group Data).

Browse: The transect runs through the edge of an aspen grove, but aspen is less prevalent in surrounding areas where ponderosa pine predominate. The population of ponderosa pine has remained similar in point-quarter density and average diameter since 1999. Point quarter data has indicated an increase in aspen density and a decrease in average basal diameter since 1999 indicating a younger population (Table - Point-Quarter Tree Data). The increase in young aspen plants was also noted in the shrub strip frequency data (Table - Browse Characteristics).

The most abundant and available browse is mountain snowberry (*Symphoricarpos oreophilus*), which provides most of the available browse cover on the site (Table - Browse Trends). A variety of other palatable browse species also occur including myrtle pachystima (*Pachystima myrsinites*), Utah serviceberry (*Amelanchier utahensis*), Woods rose (*Rosa woodsii*), and scattered Gambel oak (*Quercus gambelii*).

Herbaceous Understory: The herbaceous understory is diverse and quite abundant considering the amount of litter cover and shade from tree canopy. Common grasses include Kentucky bluegrass (*Poa pratensis*), sedge (*Carex sp.*), bottlebrush squirreltail (*Sitanion hystrix*), and subalpine needlegrass (*Stipa columbiana*). Diversity of forbs is also high. The dominant species in cover was thickleaf peavine (*Lathyrus lanszwertii*), which showed light use. Low growing forbs like western yarrow (*Achillea millefolium*) and tuber starwort (*Stellaria jamesiana*) are abundant.

Soil: The soil is a loam with a slightly acid pH and a highly variable effective rooting depth with some areas of exposed bedrock. Soil phosphorus has a low availability for plant growth and development just 4 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). There are some bare soils in the open, but overall there is excellent litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1992 - stable (0):** Differences in density may be related to the larger sample area used in 1992; therefore, trend was determined using other parameters. There was little change in any of the preferred browse populations. Aspen showed an increase in decadence and poor vigor, though there was an increase in the recruitment of young aspen plants.
- **1992 to 1999 - down (-2):** There was a decrease in density of serviceberry, Gambel oak, and Woods rose, as well as a slight decrease in cover. Density of aspen also decreased, though there was a decrease in decadence and poor vigor.
- **1999 to 2004 - slightly up (+1):** There was an increase in the density of serviceberry and Woods rose, though Gambel oak density continued to decrease. None of these species provides much cover. The density of aspen increased markedly with a substantial increase in the recruitment of young plants. The overhead canopy cover of aspen decreased from 13% to 7%.

- **2004 to 2009 - stable (0):** Density and cover of preferred browse species remained similar. The overhead canopy cover of aspen decreased to 6%.

Grass:

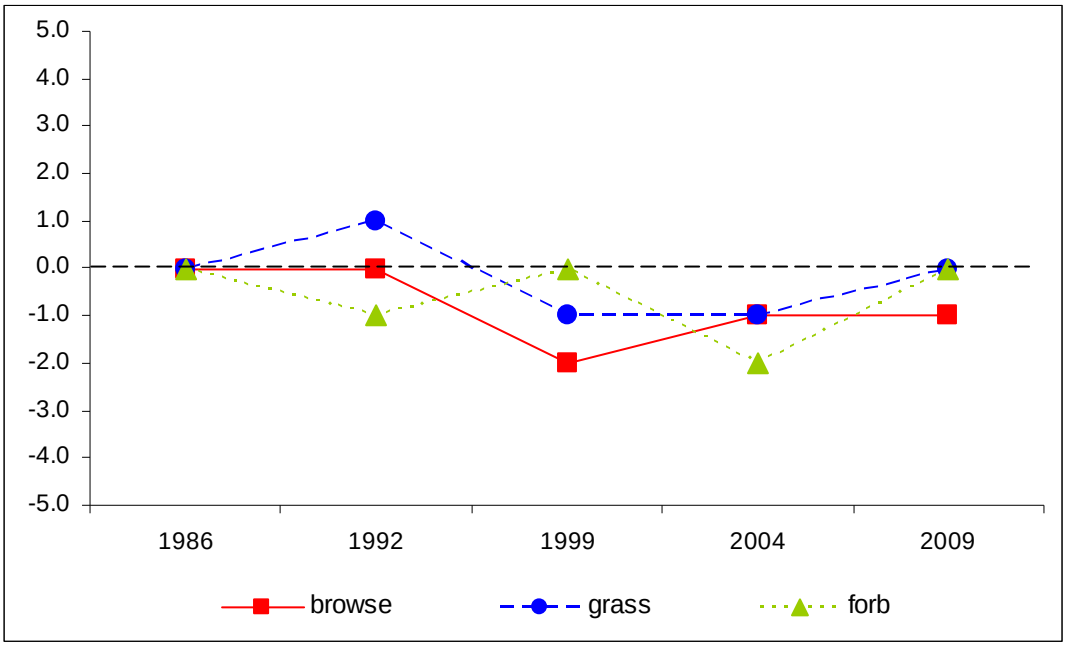
- **1986 to 1992 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 13% with a significant increase in the nested frequency of slender wheatgrass (*Agropyron trachycaulum*), sedge, and bottlebrush squirreltail.
- **1992 to 1999 - down (-2):** The sum of nested frequency of perennial grasses decreased y 24% and cover decreased from 24% to 7%. There was a significant decrease in the nested frequency of bottlebrush squirreltail and a significant increase in the nested frequency of slender wheatgrass.
- **1999 to 2004 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though there was a slight increase in cover. There was a significant increase in the nested frequency of bottlebrush squirreltail and a significant decrease in the nested frequency of slender wheatgrass.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 13% and cover increased to 15%. Mutton bluegrass (*Poa fendleriana*) increased significantly in nested frequency and bottlebrush squirreltail decreased significantly. Bulbous bluegrass (*Poa bulbosa*) was sampled in low frequency for the first time in 2009.

Forb:

- **1986 to 1992 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 17% with a significant decrease in yarrow, longleaf phlox (*Phlox longifolia*), and lambstongue groundsel (*Senecio integerrimus*). There was a significant increase in the nested frequency of tuber starwort.
- **1992 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 15% and cover increased from 8% to 12%. Tuber starwort increased significantly in nested frequency and yarrow decreased significantly.
- **1999 to 2004 - down (-2):** There was a 21% decrease in the sum of nested frequency of perennial forbs and cover decreased to 8%. There was a significant decrease in the nested frequency of dandelion (*Taraxacum officinale*).
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased 27% and cover increased to 13%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 20



HERBACEOUS TRENDS--
Management unit 14, Study no: 20

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron intermedium	$_{ab}$13	$_{a}$-	$_{a}$3	$_{ab}$17	$_{b}$48	-	.03	.11	.29
G	Agropyron scribneri	$_{a}$-	$_{b}$22	$_{a}$-	$_{a}$-	$_{a}$-	1.42	-	-	-
G	Agropyron spicatum	3	-	-	-	-	-	-	-	-
G	Agropyron trachycaulum	$_{a}$-	$_{b}$44	$_{c}$101	$_{b}$32	$_{b}$14	1.59	.96	.63	.11
G	Bromus anomalus	$_{b}$50	$_{b}$68	$_{a}$19	$_{a}$19	$_{a}$13	5.02	.11	.36	.43
G	Bromus inermis	18	25	25	24	28	.31	.52	.43	.91
G	Bromus tectorum (a)	-	-	-	-	2	-	-	-	.38
G	Carex sp.	$_{a}$-	$_{b}$64	$_{b}$47	$_{b}$41	$_{b}$69	1.70	.91	.89	1.34
G	Dactylis glomerata	$_{ab}$10	$_{a}$-	$_{a}$1	$_{b}$18	$_{ab}$6	-	.00	.26	.18
G	Festuca ovina	-	10	4	-	-	.33	.31	-	-
G	Festuca thurberi	-	-	-	-	-	-	-	.00	-
G	Koeleria cristata	$_{b}$12	$_{b}$14	$_{a}$-	$_{ab}$3	$_{a}$-	.08	-	.01	-
G	Muhlenbergia montana	$_{b}$46	$_{a}$5	$_{a}$4	$_{a}$-	$_{a}$-	.06	.03	-	-
G	Phleum pratense	$_{b}$19	$_{b}$16	$_{a}$-	$_{b}$21	$_{b}$11	.45	-	.24	.63
G	Poa bulbosa	-	-	-	-	2	-	-	-	.01
G	Poa fendleriana	$_{a}$16	$_{a}$17	$_{a}$5	$_{a}$17	$_{b}$57	.09	.01	.17	2.15
G	Poa pratensis	182	161	194	158	170	7.88	3.19	4.44	5.75
G	Sitanion hystrix	$_{b}$69	$_{c}$105	$_{a}$14	$_{bc}$75	$_{a}$29	3.54	.10	1.06	.61
G	Stipa columbiana	$_{c}$83	$_{ab}$39	$_{ab}$31	$_{a}$22	$_{bc}$55	1.07	.53	.97	2.33
G	Stipa comata	-	-	-	-	3	-	-	-	.15
Total for Annual Grasses		0	0	0	0	2	0	0	0	0.37

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
Total for Perennial Grasses		521	590	448	447	505	23.59	6.74	9.61	14.92
Total for Grasses		521	590	448	447	507	23.59	6.74	9.61	15.30
F	Achillea millefolium	$_{c}$171	$_{b}$111	$_{a}$76	$_{ab}$90	$_{ab}$101	1.43	.99	.53	1.86
F	Antennaria rosea	$_{a}$-	$_{b}$11	$_{b}$10	$_{b}$10	$_{b}$12	.63	.36	.48	.63
F	Arenaria congesta	-	3	3	-	2	.00	.03	-	.03
F	Aster chilensis	6	6	2	-	3	.15	.06	-	.15
F	Astragalus consobrinus	-	-	-	4	-	-	-	.06	-
F	Calochortus nuttallii	-	2	4	-	5	.01	.01	-	.06
F	Collinsia parviflora (a)	-	-	21	9	7	-	.04	.02	.01
F	Crepis acuminata	-	-	3	-	2	-	.00	-	.00
F	Cymopterus sp.	-	-	-	-	3	-	-	-	.03
F	Delphinium nuttallianum	$_{a}$-	$_{a}$-	$_{b}$26	$_{a}$-	$_{a}$5	-	.06	-	.01
F	Erigeron flagellaris	$_{b}$37	$_{ab}$26	$_{ab}$17	$_{a}$13	$_{ab}$18	.61	.13	.10	.28
F	Eriogonum sp.	-	-	-	-	3	-	-	-	.03
F	Geranium sp.	2	-	-	-	-	-	-	-	-
F	Lathyrus lanszwertii	132	106	138	102	115	2.11	4.80	2.76	4.36
F	Lomatium sp.	-	4	5	-	3	.03	.04	-	.00
F	Lychnis drummondii drummondii	4	-	-	-	-	-	-	-	-
F	Microsteris gracilis (a)	-	-	$_{a}$5	$_{b}$21	$_{b}$36	-	.03	.04	.09
F	Osmorhiza occidentalis	-	-	-	6	2	-	-	.06	.00
F	Penstemon sp.	-	4	1	-	7	.02	.00	-	.06
F	Phlox longifolia	$_{c}$97	$_{b}$36	$_{ab}$17	$_{a}$10	$_{ab}$30	.76	.06	.02	.25
F	Polygonum douglasii (a)	-	$_{a}$2	$_{ab}$13	$_{b}$16	$_{b}$17	.01	.05	.04	.06
F	Pterospora andromedea	-	-	3	-	-	-	.04	-	-
F	Senecio integerrimus	$_{c}$61	$_{ab}$12	$_{a}$9	$_{ab}$14	$_{b}$37	.17	.05	.04	.34
F	Sisymbrium altissimum (a)	-	-	2	-	-	-	.00	-	-
F	Smilacina stellata	1	-	-	-	-	-	-	-	-
F	Stellaria jamesiana	$_{a}$2	$_{b}$81	$_{c}$168	$_{c}$145	$_{c}$164	.55	3.21	2.85	2.82
F	Taraxacum officinale	$_{c}$59	$_{c}$64	$_{bc}$56	$_{a}$25	$_{ab}$37	.57	.96	.16	.72
F	Thalictrum fendleri	-	-	4	-	-	-	.03	-	-
F	Thlaspi sp.	-	11	10	14	5	.03	.02	.02	.01
F	Trifolium repens	49	42	45	41	49	.42	1.30	.71	1.62
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	2	41	46	60	0.00	0.13	0.09	0.17
Total for Perennial Forbs		622	519	597	474	603	7.55	12.21	7.82	13.33
Total for Forbs		622	521	638	520	663	7.56	12.35	7.92	13.51

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

BROWSE TRENDS--
Management unit 14, Study no: 20

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Amelanchier utahensis	13	9	13	9	.13	.07	.09	.23
B	Mahonia repens	68	62	63	67	3.37	1.80	3.06	3.05
B	Pachistima myrsinites	19	4	4	13	.50	.06	.03	.04
B	Pinus ponderosa	13	16	14	14	30.55	.98	1.06	2.62
B	Populus tremuloides	13	5	14	13	10.94	.03	.13	.21
B	Purshia tridentata	0	0	0	0	.03	-	-	-
B	Quercus gambelii	5	3	3	5	1.37	.06	.15	.38
B	Rosa woodsii	22	7	8	11	.05	.03	.00	.30
B	Symphoricarpos oreophilus	90	89	85	87	20.68	15.04	14.82	16.77
Total for Browse		243	195	204	219	67.66	18.07	19.37	23.62

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 20

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	.11	.35
Mahonia repens	-	2.03	2.11
Pachistima myrsinites	-	.23	.30
Pinus ponderosa	34.79	32.23	50.75
Populus tremuloides	13.19	7.44	5.59
Quercus gambelii	-	.08	.41
Rosa woodsii	-	.08	.28
Symphoricarpos oreophilus	-	23.46	26.45

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 20

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Pinus ponderosa	157	166	140	5.7	4.3	6.3
Populus tremuloides	48	53	69	5.1	3.9	2.9
Quercus gambelii	25	-	25	2.8	-	1.6

BASIC COVER--
Management unit 14, Study no: 20

Cover Type	Average Cover %				
	'86	'92	'99	'04	'09
Vegetation	9.25	64.87	37.21	38.58	44.20
Rock	0	.37	.09	.73	.04
Pavement	0	0	.01	.01	.07
Litter	81.25	84.88	93.13	74.26	87.32
Cryptogams	.50	.76	.12	.39	.25
Bare Ground	9.00	1.52	1.28	2.42	3.64

SOIL ANALYSIS DATA --
Management unit 14, Study no: 20, Study Name: Gooseberry

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
20.8	6.1	45.4	34	20.6	3	4	89.6	0.4

PELLET GROUP DATA--
Management unit 14, Study no: 20

Type	Quadrat Frequency			
	'92	'99	'04	'09
Rabbit	4	1	-	-
Elk	6	2	3	3
Deer	8	-	3	1
Cattle	3	1	-	-

Days use per acre (ha)		
'99	'04	'09
-	-	-
11 (27)	14 (35)	5 (12)
11 (27)	3 (7)	5 (13)
26 (64)	2 (5)	3 (7)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 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)
Amelanchier utahensis									
86	**766**	57	43	0	233	13	4	0	11/5
92	**680**	91	0	9	20	59	41	0	-/-
99	**220**	100	0	0	200	0	0	0	-/-
04	**460**	83	17	0	-	17	9	0	7/9
09	**300**	67	33	0	200	0	0	0	13/14
Mahonia repens									
86	**4198**	33	58	10	699	0	0	10	6/6
92	**15300**	51	48	1	1080	1	0	6	-/-
99	**6060**	12	88	1	-	0	0	.66	4/7
04	**7820**	5	94	1	-	2	0	.51	4/6
09	**10440**	46	53	0	120	0	0	0	4/7
Pachistima myrsinites									
86	**1132**	41	59	-	1199	0	6	0	5/6
92	**2380**	78	22	-	240	61	0	0	-/-
99	**180**	56	44	-	20	0	0	0	5/18
04	**280**	0	100	-	-	0	0	0	4/5
09	**800**	43	58	-	-	0	0	0	4/5
Pinus ponderosa									
86	**166**	100	0	0	-	0	0	0	-/-
92	**280**	50	50	0	380	0	0	0	-/-
99	**340**	59	35	6	60	0	6	6	-/-
04	**300**	67	33	0	20	0	0	7	-/-
09	**380**	53	47	0	400	0	0	11	-/-

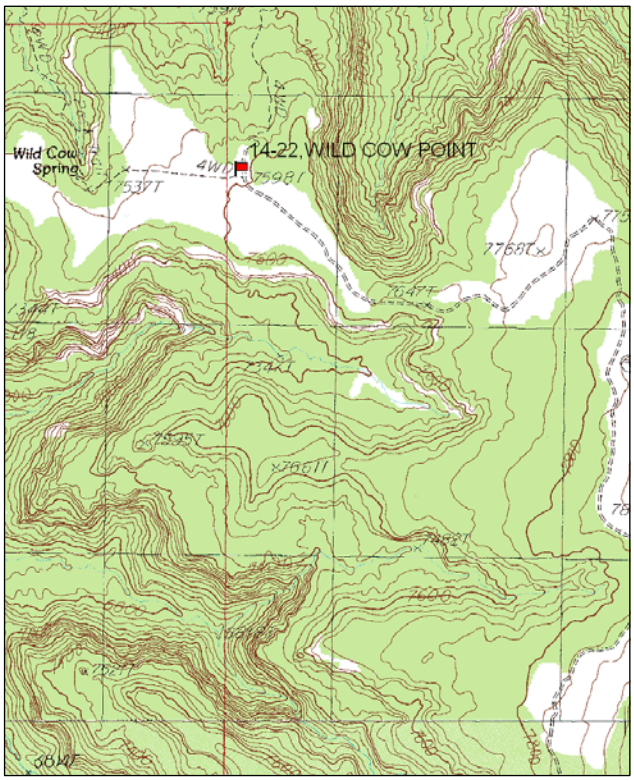
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Populus tremuloides									
86	**33**	100	0	0	33	0	0	0	-/-
92	**400**	50	25	25	560	35	20	35	-/-
99	**160**	63	38	0	80	0	0	0	-/-
04	**580**	90	10	0	-	3	0	0	-/-
09	**620**	87	10	3	280	0	0	0	-/-
Quercus gambelii									
86	**0**	0	0	0	66	0	0	0	-/-
92	**640**	78	0	22	60	0	25	3	-/-
99	**280**	100	0	0	-	0	0	0	-/-
04	**100**	80	20	0	-	0	0	0	8/10
09	**180**	100	0	0	-	0	0	0	9/11
Rosa woodsii									
86	**765**	65	30	4	99	13	0	0	10/8
92	**900**	82	13	4	260	18	2	2	-/-
99	**160**	100	0	0	-	0	0	0	-/-
04	**340**	47	53	0	-	0	0	0	5/4
09	**400**	25	75	0	-	0	0	0	8/7
Symphoricarpos oreophilus									
86	**7898**	55	44	1	1466	42	5	0	22/20
92	**13200**	52	46	2	1880	33	4	2	-/-
99	**7840**	24	74	2	660	0	0	0	19/24
04	**6500**	9	88	2	-	10	.30	.61	18/24
09	**10680**	15	85	0	160	.56	0	.18	18/23

WILD COW POINT - TREND STUDY NO. 14-22-09

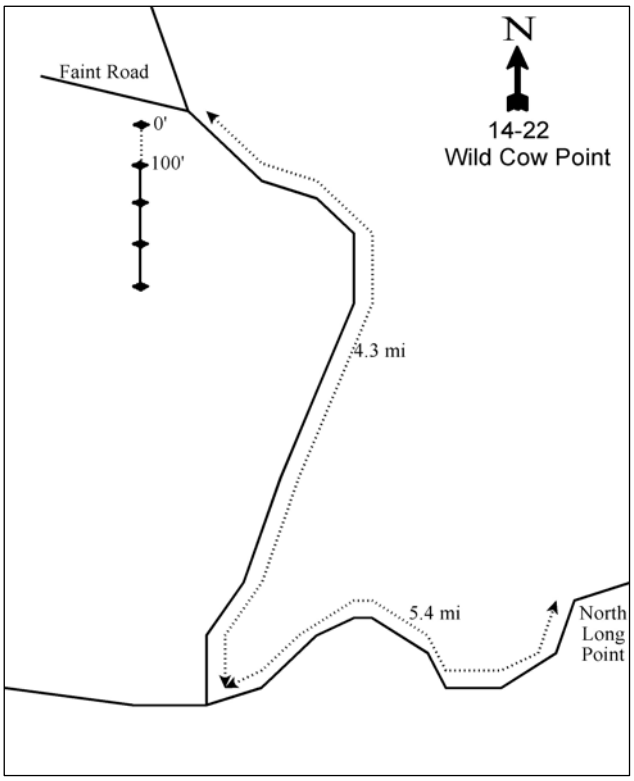
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Yearlong, Crucial Elk Winter
NRCS Ecological Site Description: Mountain Shallow Loam (Ponderosa Pine), R048AY439UT
Land Ownership: BLM
Elevation: 7,600 ft (2,316 m)
Aspect: Northwest
Slope: 0%-2%
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
Drive to North Long Point. From the west rim of North Long Point, proceed west down the dugway on the Dark Canyon Plateau Road for 5.4 miles. Turn north on the Wild Cow Point Road and go 4.3 miles to a chaining and a faint road to the left (west). The zero foot stake is 10 feet south of the faint road on the west side of the Wild Cow Point Road about 100 hundred feet into the chaining, with the 0-foot stake having browse tag #481 attached. All stakes are 3 ½ foot tall green fence posts.

Map Name: Fable Valley



Diagrammatic Sketch:



Township: 33S, Range: 18E, Section: 22

GPS: NAD 83, UTM 12S 593494 E 4194850 N

WILD COW POINT - TREND STUDY NO. 14-22

Site Information

Site Description: The study samples a chained and seeded area northwest of Elk Ridge. The narrow plateau is cut back by numerous canyons, which flow south into Fable Valley or north into Beef Basin. The study area is located on the higher, southwest end of Wild Cow Point. A large area was chained and seeded to crested wheatgrass (*Agropyron cristatum*) in the early 1960's. Pellet group data from the site has indicated moderate use by deer and light to minimal use from elk and cattle since 1999 (Table - Pellet Group Data).

Browse: The sagebrush community is composed of black sagebrush (*Artemisia nova*) in association with Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*). Both sagebrush populations are mostly mature with decreasing recruitment of young plants since 1992. Density of both Wyoming big sagebrush and black sagebrush has declined since 1992. Decadence has been normal in most sample years, but was high for both sagebrush populations in 1986 and 2004. Utilization has been heavier on Wyoming sagebrush with heavy use noted in all sample years. Utilization of black sagebrush has been mostly light to moderate. Another preferred browse species, dwarf rabbitbrush (*Chrysothamnus depressus*), has also decreased in density since 1992 and has shown signs of moderate to heavy hedging in past readings (Table - Browse Characteristics).

Surviving pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have regained their dominance since the chaining. They dominate much of the landscape, although the larger openings support good stands of sagebrush. The pinyon and juniper were on average about 7 feet tall in 1986, with some producing seed. Point quarter data has indicated little change in the density or average diameter of pinyon or juniper since 1999 (Table - Point-Quarter Data). Many of the juniper trees were knocked over in the chaining, but have survived.

Herbaceous Understory: Crested wheatgrass is the dominant species in cover on the site and has provided an increasing proportion of the grass cover since 1992. The large patches of crested wheatgrass form a dense stand over much of the area. Mutton bluegrass (*Poa fendleriana*) is also common, but has declined since 1992. Blue grama (*Bouteloua gracilis*) was common in 1992, but declined significantly in 1999 and remains rare on the site. Forbs are not very common or of real importance on this range. The more common and possibly utilized species include redroot buckwheat (*Eriogonum racemosum*), desert phlox (*Phlox austromontana*), low fleabane (*Erigeron pumilus*), and hoary aster (*Machaeranthera canescens*).

Soil: The soil is a reddish sandy loam with a slightly alkaline pH derived from a hematite sandstone parent material. The upper horizon contains very little organic matter and phosphorus has limited availability for plant growth and development at 4.8 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The average litter cover is good, especially where the wheatgrass is dense, keeping bare ground cover moderate (Table - Basic Cover). The soil erosion condition was classified as stable in 2004, but was slight in 2009 due to pedestaling of plants, flow patterns, and surface litter and soil movement.

Trend Assessments

Browse:

- **1986 to 1992 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1992; therefore, trend was determined using other parameters. The decadence of the primary browse species, black sagebrush and Wyoming big sagebrush, both decreased markedly. Recruitment of young plants also increased for both species.
- **1992 to 1999 - down (-2):** The density of both sagebrush species decreased markedly and density of the other preferred browse species, dwarf rabbitbrush, decreased by 62% to 880 plants/acre. Recruitment of young sagebrush plants decreased substantially for both species.
- **1999 to 2004 - down (-2):** The density of black sagebrush decreased by 31% to 2,260 plants/acre and the density of Wyoming big sagebrush decreased by 10% to 1,660 plants/acre. Decadence of both sagebrush species increased markedly and recruitment of young sagebrush plants decreased.

- **2004 to 2009 - stable (0):** The density of black sagebrush increased slightly to 2,700 plants/acre, but the density of Wyoming big sagebrush decreased slightly to 1,400 plants/acre. Decadence of both sagebrush species decreased to more moderate levels. Recruitment of young plants decreased in the Wyoming big sagebrush population and increased slightly in the black sagebrush population, but is still low.

Grass:

- **1986 to 1992 - slightly up (+1):** There was a 10% increase in the sum of nested frequency of perennial grasses and crested wheatgrass increased significantly in nested frequency.
- **1992 to 1999 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased 17% with a significant decrease in the nested frequency of blue grama and bottlebrush squirreltail (*Sitanion hystrix*).
- **1999 to 2004 - down (-2):** There was a 22% decrease in the sum of nested frequency of perennial grasses and cover of decreased from 17% to 10%. There was a significant increase in the nested frequency of the annual grass cheatgrass (*Bromus tectorum*).
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased by 37% and cover increased to 18%. There was a significant increase in the nested frequency of crested wheatgrass and a significant decrease in the nested frequency of cheatgrass.

Forb:

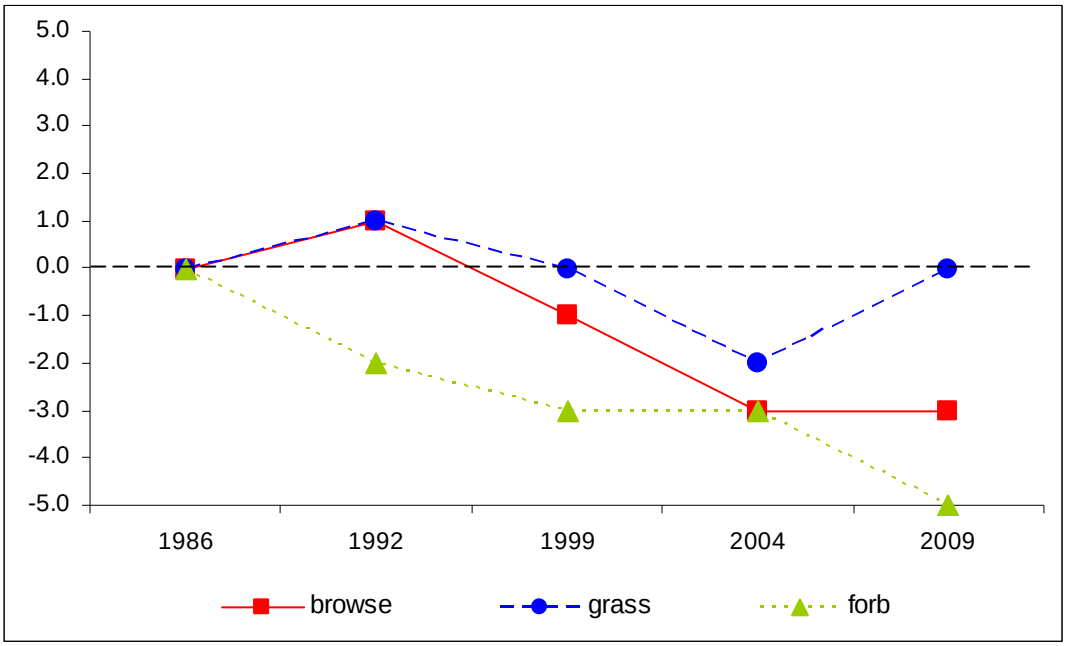
- **1986 to 1992 - down (-2):** The sum of nested frequency of perennial forbs decreased by 50% with a significant decrease in the nested frequency of redroot buckwheat, low fleabane, and timber poisonvetch (*Astragalus convallarius*).
- **1992 to 1999 - slightly down (-1):** There was a 19% decrease in the sum of nested frequency of perennial grasses and cover decreased from 3% to 2%.
- **1999 to 2004 - stable (0):** There was no change in the sum of nested frequency of perennial forbs, though cover decreased to 1%. Hoary aster increased significantly in nested frequency.
- **2004 to 2009 - down (-2):** The sum of nested frequency of perennial forbs decreased by 57% and cover decreased to less than 1%. There was a significant decrease in the nested frequency of hoary aster.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 14, study no: 22

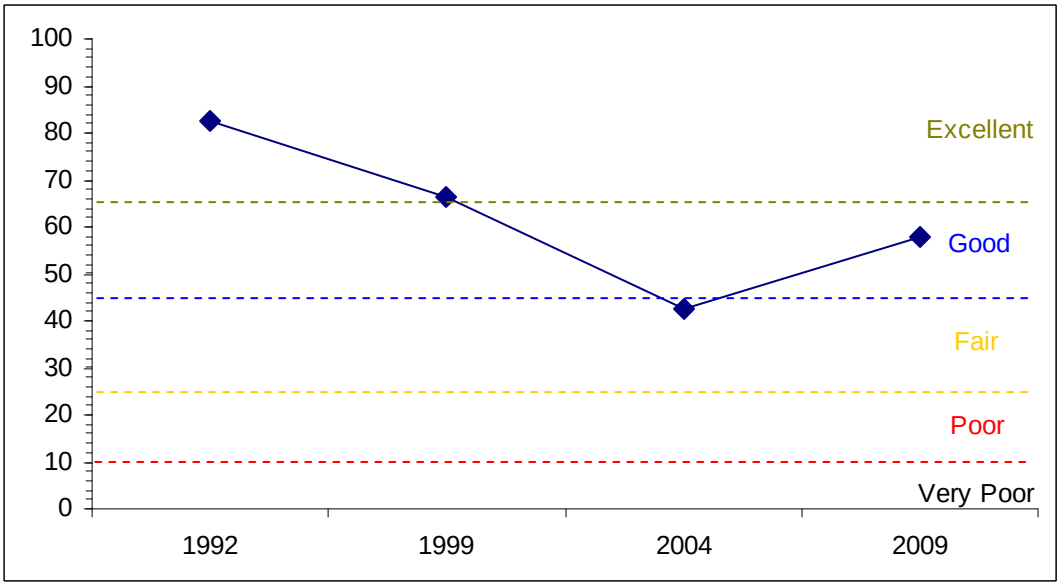
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	24.3	10.0	12.3	30.0	0.0	5.9	0.0	**82.5**	Excellent
99	18.0	10.5	4.4	30.0	0.0	3.8	0.0	**66.5**	Good-Excellent
04	15.3	4.0	1.4	19.6	0.0	2.3	0.0	**42.6**	Fair
09	15.3	9.6	1.7	30.0	0.0	1.3	0.0	**57.8**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 22



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 14, Study no: 22



HERBACEOUS TRENDS--
Management unit 14, Study no: 22

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron cristatum	$_{a}$108	$_{b}$181	$_{b}$194	$_{b}$157	$_{c}$240	8.47	10.26	7.28	14.38
G	Bouteloua gracilis	$_{b}$57	$_{b}$49	$_{a}$18	$_{a}$17	$_{a}$16	2.04	.14	.11	.42
G	Bromus tectorum (a)	-	-	$_{a}$8	$_{b}$20	$_{a}$-	-	.01	.05	-
G	Poa fendleriana	$_{c}$168	$_{bc}$129	$_{ab}$119	$_{a}$87	$_{ab}$94	6.62	6.46	2.42	2.53
G	Sitanion hystrix	$_{bc}$33	$_{c}$42	$_{a}$4	$_{a}$2	$_{ab}$10	.29	.04	.00	.25
Total for Annual Grasses		0	0	8	20	0	0	0.01	0.05	0
Total for Perennial Grasses		366	401	335	263	360	17.42	16.91	9.82	17.58
Total for Grasses		366	401	343	283	360	17.42	16.93	9.87	17.58
F	Allium sp.	2	6	12	10	2	.01	.11	.03	.01
F	Antennaria neglecta	$_{b}$8	$_{ab}$6	$_{a}$1	$_{a}$-	$_{a}$-	.53	.00	-	-
F	Arabis sp.	3	-	3	-	1	-	.18	.00	.03
F	Astragalus convallarius	$_{b}$41	$_{a}$7	$_{a}$2	$_{a}$-	$_{a}$-	.19	.01	-	-
F	Astragalus sp.	-	-	-	-	2	-	-	-	.15
F	Calochortus nuttallii	1	-	-	-	-	-	-	-	-
F	Castilleja linariaefolia	-	3	2	-	-	.00	.00	-	-
F	Cordylanthus kingii (a)	$_{a}$5	$_{a}$26	$_{a}$9	$_{b}$94	$_{a}$15	.89	.07	1.36	.09
F	Cryptantha flavoculata	2	-	-	-	-	-	-	-	-
F	Erigeron flagellaris	-	1	2	-	-	.03	.03	-	-
F	Erigeron pumilus	$_{b}$32	$_{a}$3	$_{a}$1	$_{a}$3	$_{a}$6	.01	.00	.00	.16
F	Eriogonum racemosum	$_{c}$60	$_{b}$22	$_{ab}$8	$_{ab}$15	$_{a}$2	.20	.10	.11	.01
F	Eriogonum umbellatum	12	8	10	4	3	.10	.10	.03	.04
F	Heterotheca villosa	-	2	-	-	-	.00	-	-	-
F	Lesquerella rectipes	16	9	15	8	3	.20	.58	.05	.01
F	Machaeranthera canescens	$_{a}$-	$_{a}$6	$_{a}$13	$_{b}$36	$_{a}$4	.02	.10	.62	.02
F	Oenothera caespitosa	-	-	-	2	3	-	-	.00	.03
F	Penstemon lentus	10	3	3	1	-	.01	.03	.00	-
F	Phlox austromontana	$_{b}$46	$_{b}$41	$_{ab}$24	$_{a}$19	$_{a}$7	1.54	.60	.22	.07
F	Phlox longifolia	-	-	-	-	3	-	-	-	.00
F	Polygonum douglasii (a)	-	11	1	2	4	.03	.00	.01	.01
F	Senecio multilobatus	15	4	3	5	9	.03	.01	.07	.07
F	Thlaspi montanum	9	-	-	-	-	-	-	-	-
F	Townsendia incana	-	8	5	1	-	.06	.01	.00	-
Total for Annual Forbs		5	37	10	96	19	0.91	0.08	1.37	0.09
Total for Perennial Forbs		257	129	104	104	45	2.96	1.88	1.17	0.63
Total for Forbs		262	166	114	200	64	3.88	1.97	2.54	0.73

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

BROWSE TRENDS--
Management unit 14, Study no: 22

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Artemisia nova	47	43	44	46	9.66	6.71	4.63	7.27
B	Artemisia tridentata wyomingensis	36	43	36	34	7.38	6.64	6.94	4.75
B	Chrysothamnus depressus	41	22	17	8	2.36	1.02	.64	.21
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	0	2	-	.00	-	.00
B	Echinocereus sp.	1	0	0	0	.00	-	-	-
B	Gutierrezia sarothrae	1	4	1	0	.00	.03	.00	-
B	Juniperus osteosperma	5	4	3	2	3.31	2.82	4.53	5.05
B	Opuntia sp.	4	3	2	1	.00	.03	.03	.03
B	Pinus edulis	9	8	10	5	4.99	6.15	5.93	3.75
B	Sclerocactus sp.	0	0	1	0	-	-	.00	-
Total for Browse		144	128	114	98	27.73	23.43	22.73	21.07

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 22

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	5.63	9.35
Artemisia tridentata wyomingensis	-	7.23	5.61
Chrysothamnus depressus	-	.25	.18
Juniperus osteosperma	4.40	6.73	6.86
Pinus edulis	7.40	12.94	8.08

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 22

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	1.0	0.5
Artemisia tridentata wyomingensis	1.5	1.0

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 22

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	40	41	37
Pinus edulis	59	62	38

Average diameter (in)		
'99	'04	'09
11.5	9.3	8.8
4.2	5.5	4.5

BASIC COVER--
Management unit 14, Study no: 22

Cover Type	Average Cover %				
	'86	'92	'99	'04	'09
Vegetation	12.25	43.56	38.62	35.64	38.97
Rock	.25	1.17	1.22	.66	1.23
Pavement	.25	0	.06	.00	.18
Litter	65.50	46.42	50.02	48.98	51.72
Cryptogams	.50	5.09	2.24	2.09	.58
Bare Ground	21.25	15.97	24.81	34.81	31.29

SOIL ANALYSIS DATA --
Management unit 14, Study no: 22, Study Name: Wild Cow Point

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.5	7.4	72.4	15.1	12.6	1.6	4.8	60.8	0.5

PELLET GROUP DATA--
Management unit 14, Study no: 22

Type	Quadrat Frequency			
	'92	'99	'04	'09
Rabbit	49	39	38	31
Elk	1	2	2	1
Deer	29	18	19	19
Cattle	1	-	2	1

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (2)	11 (27)	2 (5)
38 (94)	27 (68)	24 (60)
3 (7)	-	3 (7)

BROWSE CHARACTERISTICS--
Management unit 14, 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)
Artemisia nova									
86	**5098**	12	45	42	33	29	45	10	8/13
92	**5160**	17	71	11	240	45	13	10	-/-
99	**3260**	9	74	18	120	15	4	4	11/18
04	**2260**	1	57	42	1540	21	3	29	11/21
09	**2700**	5	74	21	100	4	0	14	12/28
Artemisia tridentata wyomingensis									
86	**398**	17	33	50	66	42	50	8	16/15
92	**2560**	38	43	20	40	30	56	6	-/-
99	**1840**	9	79	12	-	26	27	2	20/33
04	**1660**	4	63	34	12860	18	70	12	17/26
09	**1400**	1	86	13	-	56	30	1	18/33

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus									
86	**2365**	11	82	7	33	31	4	4	4/6
92	**2320**	14	56	30	60	34	32	16	-/-
99	**880**	5	80	16	-	14	30	7	5/10
04	**680**	3	71	26	20	41	21	9	6/11
09	**240**	0	75	25	-	0	0	0	4/7
Chrysothamnus nauseosus graveolens									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	29/36
09	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus viscidiflorus									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	35/53
04	**0**	0	0	-	-	0	0	0	9/10
09	**40**	0	100	-	-	0	0	0	10/20
Echinocereus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	0	100	-	20	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
86	**33**	0	100	0	-	0	0	0	4/3
92	**60**	67	33	0	-	0	0	0	-/-
99	**100**	40	40	20	40	0	20	0	7/11
04	**20**	0	100	0	-	0	0	0	7/9
09	**0**	0	0	0	-	0	0	0	-/-
Juniperus osteosperma									
86	**165**	60	40	-	-	0	0	0	93/89
92	**140**	57	43	-	20	0	0	0	-/-
99	**80**	0	100	-	20	0	0	0	61/63
04	**60**	0	100	-	-	0	0	0	-/-
09	**40**	0	100	-	-	0	0	0	-/-
Opuntia sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**80**	0	100	-	20	0	0	50	-/-
99	**60**	0	100	-	-	0	0	0	4/8
04	**40**	0	100	-	-	0	0	0	2/6
09	**20**	0	100	-	-	0	0	0	2/4

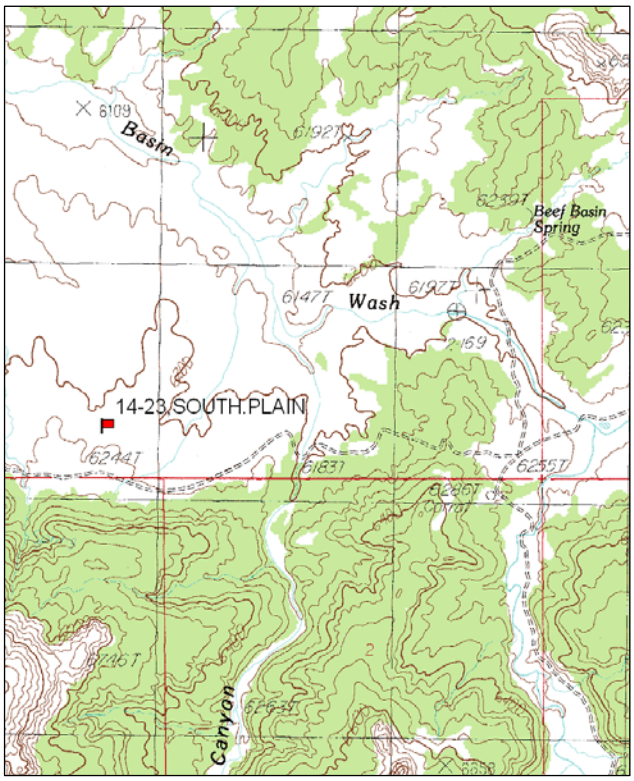
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pinus edulis									
86	**233**	100	0	-	-	0	0	0	-/-
92	**180**	56	44	-	-	0	0	0	-/-
99	**160**	38	63	-	-	0	0	0	-/-
04	**200**	10	90	-	-	0	0	0	-/-
09	**100**	0	100	-	-	0	0	0	-/-
Sclerocactus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	4/4
09	**0**	0	0	-	-	0	0	0	5/5

SOUTH PLAIN - TREND STUDY NO. 14-23-09

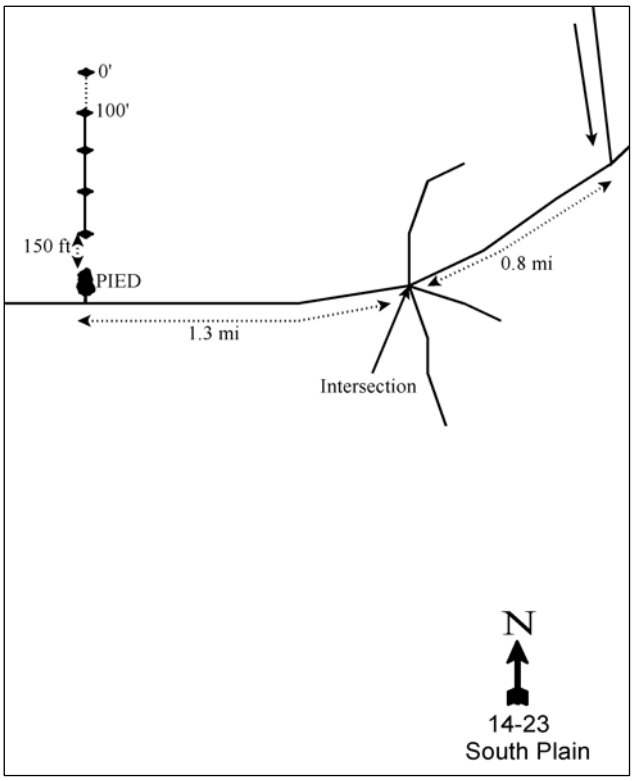
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Yearlong
NRCS Ecological Site Description: Upland Loam (Basin Big Sagebrush), R035XY306UT
Land Ownership: BLM
Elevation: 6,300 ft (1,920 m)
Aspect: North
Slope: 5%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
At the junction of the Elk Ridge-Salt Creek Mesa-Beef Basin Roads, go north down into the Beef Basin area. Follow the main road for 9.1 miles, passing the FS/BLM boundary down to an intersection where there is a BLM register box. Stay left on County Road #104 and proceed 1.45 miles to the turnoff to an exclosure. Stay left for 0.45 miles to a fork. Stay right again and go 0.4 miles to a fork. Go right at the intersection with the Beef Basin Canyon Road and go 0.8 miles to a 5-way intersection. Take west fork straight through the intersection (left fork goes to Indian ruins) and continue 1.3 miles to a large pinyon pine on the right. Stop here. The 400-stake of the transect starts 150 feet north of the pinyon.

Map Name: Warren Canyon



Diagrammatic Sketch:



Township: 32S, Range: 18E, Section: 34

GPS: NAD 83, UTM 12S 594698 E 4200481 N

SOUTH PLAIN - TREND STUDY NO. 14-23

Site Information

Site Description: The study is located in the southern part of Beef Basin, in an area known as South Plain. The whole flat is surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) covered hills and slickrock. There is very little vegetation cover over two feet in height out in the flat. Besides heavy winter-spring use by deer, Beef Basin also receives heavy grazing pressure from cattle. There are plans for additional water developments to help distribute livestock use to the north part of the basin. Deer pellet groups were numerous in 1986 with no elk sign observed. A DWR pellet group transect in the area shows years of continuous high use by deer (Jense et al. 1987, Jense et al. 1992, Hodson 2000). Pellet group data taken along the study site baseline estimated heavy use by deer in 1999, but decreased to more moderate use since 2004. Estimated cattle use was light in 1999 and 2004, but increased to heavy use in 2009. Elk use was sampled for the first time at light use in 2009 (Table - Pellet Group Data).

Browse: A moderately dense stand of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated the area at the outset of the study in 1986. However, the stand was overly mature, heavily hedged and in poor vigor, and has decreased in cover (Table - Browse Trends) and density since 1992. Decadence and poor vigor have remained high in the population in all sample years. Recruitment of young sagebrush plants decreased markedly between 1992 and 1999, and has remained low. Utilization of sagebrush has been very heavy in all sample years (Table - Browse Characteristics). The livestock exclosure in Beef Basin is a dramatic example of overuse and subsequent decline of sagebrush compared to a protected stand in the total exclosure.

Other preferred browse species on the study site are winterfat (*Ceratoides lanata*) and fourwing saltbush (*Atriplex canescens*). Winterfat is selected by both cattle and deer, and both winterfat and fourwing saltbush show signs of heavy hedging but still maintain good vigor and low decadence (Table - Browse Characteristics). Narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) is also common. There are also a few scattered pinyon pine and juniper throughout the site and into the flat.

Herbaceous Understory: Grasses are an important part of the community, providing more than twice as much ground cover as the shrubs. The most abundant perennial include blue gramma (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*), and sand dropseed (*Sporobolus cryptandrus*). The annual species cheatgrass (*Bromus tectorum*) is abundant on the site, though nested frequency and cover of cheatgrass have fluctuated with precipitation patterns. Cheatgrass provided 88% of the grass cover in 1999, but both cover and nested frequency have decreased steadily since then. Perennial forbs are relatively scarce and provide little forage on the site (Table - Herbaceous Trends).

Soil: The soil is a light red sandy loam with a slightly alkaline pH and deep effective rooting depth. Phosphorus has limited availability for plant growth and development at 5.3 (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Litter and soil are building under plants, however, the average bare ground cover increased in 2004 and is fairly high (Table - Basic Cover). The soil erosion condition was classified as moderate in 2009 due to pedestaling of plants, gullies, flow patterns, and surface litter and soil movement.

Trend Assessments

Browse:

- **1986 to 1992 - slightly down (-1):** Differences in density may be related to the larger sample area used in 1992; therefore, trend was determined using other parameters. Decadence of sagebrush increased from 47% to 81% and poor vigor increased from 36% to 61%.
- **1992 to 1999 - down (-2):** The density of the primary browse species, Wyoming big sagebrush, decreased by 67% from 3,520 plants/acre to 1,160 plants/acre, and cover decreased from 5% to 2%. Decadence and poor vigor remained very high, and recruitment of young sagebrush decreased.

- **1999 to 2004 - down (-2):** The density of sagebrush decreased 48% to 600 plants/acre and cover decreased to 1%. Decadence of sagebrush decreased slightly, but decadence and poor vigor remained high. There was no new recruitment of young sagebrush plants.
- **2004 to 2009 - stable (0):** There was a slight decrease in the density of sagebrush, though cover remained similar. Decadence of sagebrush decreased from 77% to 67%, but poor vigor increased from 60% to 67%. There was no recruitment of young sagebrush plants.

Grass:

- **1986 to 1992 - up (+2):** The sum of nested frequency of perennial grasses increased 28% with a significant increase in the nested frequency of blue grama and bottlebrush squirreltail (*Sitanion hystrix*).
- **1992 to 1999 - down (-2):** There was a 54% decrease in the sum of nested frequency of perennial grasses and cover decreased from 26% to 4%. There was a significant increase in the nested frequency of cheatgrass and cover increased from 2% to 26%. Bottlebrush squirreltail, sand dropseed, and blue grama all had a significant decrease in nested frequency.
- **1999 to 2004 - up (+2):** The sum of nested frequency of perennial grasses increased 44% and cover increased to 11%. Cheatgrass decreased significantly in nested frequency and cover decreased to 10%. There was a significant increase in the nested frequency of blue grama.
- **2004 to 2009 - up (+2):** There was a 29% increase in the sum of nested frequency of perennial grasses and cover increased to 19%. Cheatgrass decreased significantly in nested frequency and cover continued to decrease to 1%. There was a significant increase in the nested frequency of needle-and-thread.

Forb:

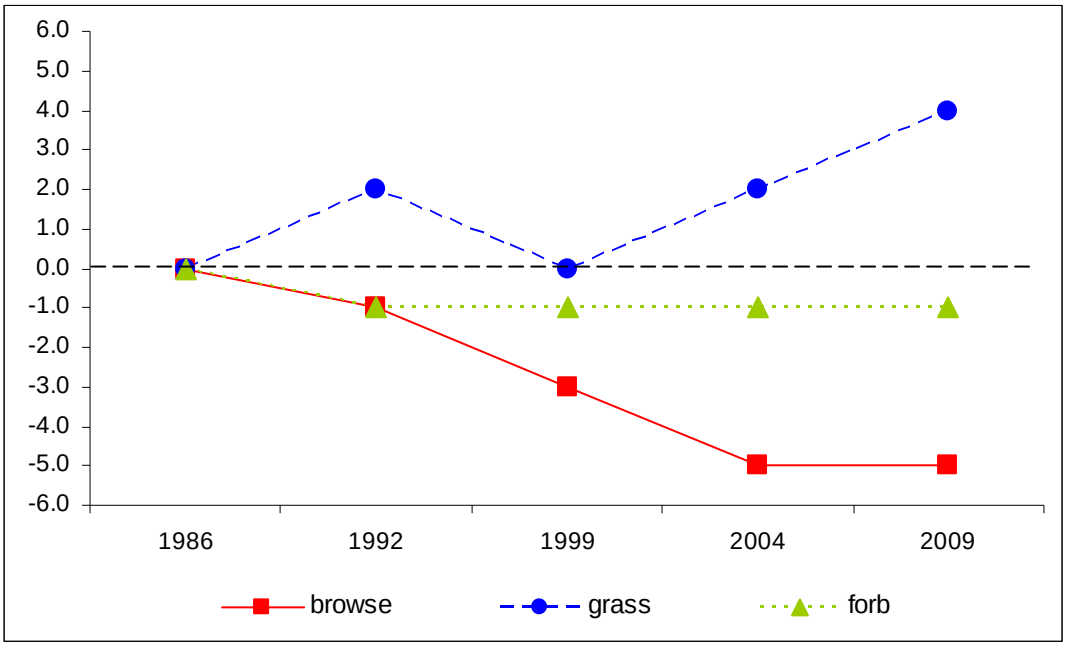
- **1986 to 1992 - slightly down (-1):** There was a slight decrease in the sum of nested frequency of perennial forbs due to a significant decrease in the nested frequency of low fleabane (*Erigeron pumilus*). Forbs are extremely rare on the site.
- **1992 to 1999 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs.
- **1999 to 2004 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs. There was a significant decrease in the nested frequency of woolly milkvetch (*Astragalus mollissimus*)
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs. There was a significant increase in the nested frequency of woolly milkvetch.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 14, study no: 23

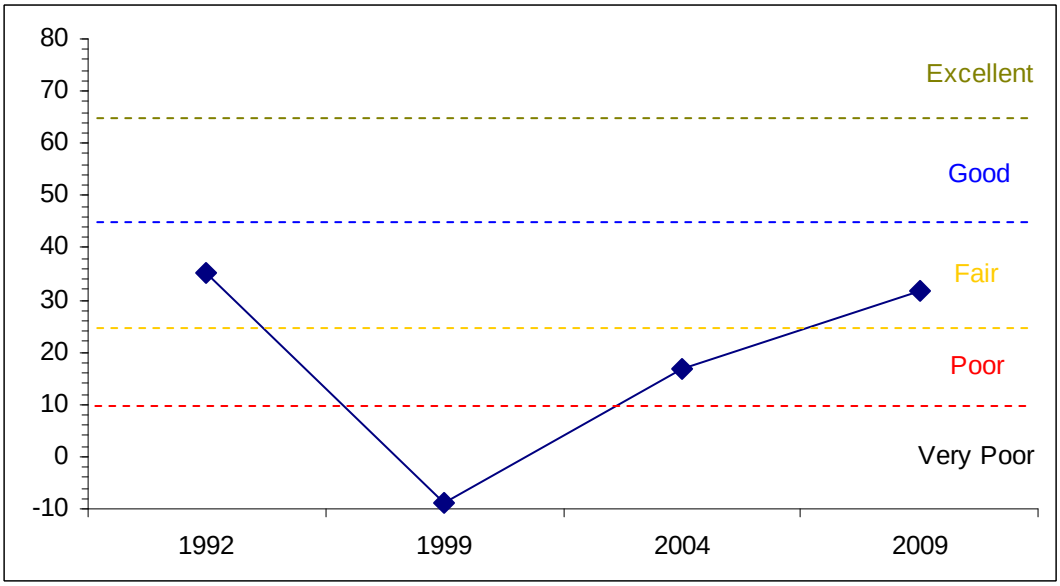
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	6.2	0.0	0.0	30.0	-1.5	0.5	0.0	**35.2**	Fair
99	3.4	0.0	0.0	7.2	-19.9	0.4	0.0	**-8.9**	Very Poor
04	1.8	0.0	0.0	21.6	-7.2	0.4	0.0	**16.7**	Poor
09	2.0	0.0	0.0	30.0	-0.9	0.7	0.0	**31.7**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 23



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 14, Study no: 23



HERBACEOUS TRENDS--
Management unit 14, Study no: 23

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
G	Bouteloua gracilis	$_{b}$141	$_{c}$192	$_{a}$58	$_{b}$100	$_{b}$132	18.76	1.20	5.47	7.96
G	Bromus tectorum (a)	-	$_{a}$27	$_{d}$336	$_{c}$268	$_{b}$146	1.95	26.46	9.62	1.24
G	Oryzopsis hymenoides	-	7	2	12	11	.21	.03	.16	.34
G	Sitanion hystrix	$_{b}$42	$_{c}$96	$_{b}$48	$_{ab}$36	$_{a}$11	1.10	.46	.41	.16
G	Sporobolus cryptandrus	$_{c}$95	$_{c}$92	$_{a}$20	$_{ab}$42	$_{bc}$66	4.32	.32	2.07	2.98
G	Stipa comata	$_{ab}$67	$_{a}$54	$_{ab}$74	$_{b}$100	$_{c}$153	1.50	1.57	2.70	7.08
G	Vulpia octoflora (a)	-	$_{b}$21	$_{a}$5	$_{a}$1	$_{a}$-	.10	.01	.00	-
Total for Annual Grasses		0	48	341	269	146	2.06	26.47	9.63	1.24
Total for Perennial Grasses		345	441	202	290	373	25.90	3.60	10.82	18.54
Total for Grasses		345	489	543	559	519	27.97	30.07	20.45	19.78
F	Antennaria rosea	-	-	-	1	-	-	-	.00	-
F	Astragalus mollissimus	$_{b}$9	$_{b}$18	$_{b}$12	$_{a}$-	$_{b}$10	.06	.06	-	.03
F	Calochortus nuttallii	-	1	-	-	-	.00	-	-	-
F	Chenopodium leptophyllum(a)	-	11	-	1	1	.03	-	.00	.00
F	Collinsia parviflora (a)	-	-	-	10	-	-	-	.02	-
F	Descurainia pinnata (a)	-	-	1	5	-	-	.00	.02	-
F	Erigeron pumilus	$_{b}$35	$_{a}$7	$_{a}$2	$_{a}$2	$_{a}$3	.06	.06	.03	.00
F	Eriogonum cernuum (a)	-	4	-	-	-	.01	-	-	-
F	Gayophytum ramosissimum(a)	-	-	5	-	-	-	.01	-	-
F	Lappula occidentalis (a)	-	-	-	4	-	-	-	.04	-
F	Machaeranthera canescens	12	8	7	1	-	.07	.09	.00	-
F	Phlox austromontana	-	3	-	3	6	.03	-	.15	.30
F	Phlox longifolia	-	-	2	5	-	-	.00	.01	-
F	Plantago patagonica (a)	-	$_{ab}$18	$_{bc}$28	$_{c}$35	$_{a}$1	.03	.16	.45	.00
F	Sphaeralcea coccinea	2	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	33	34	55	2	0.07	0.18	0.53	0.00
Total for Perennial Forbs		58	37	23	12	19	0.24	0.21	0.20	0.34
Total for Forbs		58	70	57	67	21	0.31	0.40	0.74	0.35

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

BROWSE TRENDS--
Management unit 14, Study no: 23

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Artemisia tridentata wyomingensis	60	38	22	21	4.69	2.00	.99	.91
B	Atriplex canescens	3	2	3	4	.00	.15	.15	.33
B	Ceratoides lanata	10	7	5	5	.30	.53	.33	.33
B	Chrysothamnus viscidiflorus stenophyllus	47	51	42	45	3.82	4.67	4.76	6.00
B	Gutierrezia sarothrae	0	1	0	0	-	.00	-	-
B	Juniperus osteosperma	0	1	0	0	-	.03	-	-
B	Opuntia sp.	6	4	6	6	.15	.15	.06	.04
B	Pinus edulis	0	2	1	1	.85	.63	.85	.38
B	Sclerocactus whipplei	5	8	6	5	.04	.12	.12	.06
Total for Browse		131	114	85	87	9.87	8.31	7.27	8.06

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 23

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	.68	.50
Atriplex canescens	.90	.88
Ceratoides lanata	.66	.40
Chrysothamnus viscidiflorus stenophyllus	5.31	7.53
Opuntia sp.	.06	-
Pinus edulis	1.04	1.93
Sclerocactus whipplei	.05	.13

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 23

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.4	1.3
Atriplex canescens	2.2	1.9
Ceratoides lanata	3.4	1.6

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 23

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	10	<18	23
Pinus edulis	11	<18	29

Average diameter (in)		
'99	'04	'09
6.8	-	2.0
7.7	-	4.7

BASIC COVER--
Management unit 14, Study no: 23

Cover Type	Average Cover %				
	'86	'92	'99	'04	'09
Vegetation	9.50	39.09	37.93	32.02	29.15
Rock	0	1.76	.06	.00	0
Pavement	0	0	.65	.33	.75
Litter	52.75	30.99	34.20	24.15	41.15
Cryptogams	0	.68	.33	.38	.11
Bare Ground	37.75	33.59	33.42	52.01	51.55

SOIL ANALYSIS DATA --
Management unit 14, Study no: 23, Study Name: South Plain

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
19.8	7.6	60	23.4	16.6	0.8	5.3	67.2	0.4

PELLET GROUP DATA--
Management unit 14, Study no: 23

Type	Quadrat Frequency			
	'92	'99	'04	'09
Rabbit	25	28	9	21
Elk	-	-	2	-
Deer	47	47	32	17
Cattle	1	6	17	11

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	1 (2)	3 (8)
76 (188)	40 (99)	32 (79)
13 (32)	17 (43)	52 (129)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 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)
Artemisia tridentata wyomingensis									
86	**2998**	0	53	47	-	0	96	36	19/23
92	**3520**	18	2	81	20	19	77	61	-/-
99	**1160**	2	7	91	140	22	66	52	18/23
04	**600**	7	17	77	-	0	93	60	17/24
09	**540**	0	33	67	-	15	52	67	12/19
Atriplex canescens									
86	**0**	0	0	0	-	0	0	0	-/-
92	**60**	0	100	0	-	67	0	0	-/-
99	**40**	0	100	0	-	0	0	0	39/58
04	**60**	0	100	0	20	67	33	0	41/59
09	**100**	0	80	20	-	20	40	0	34/46

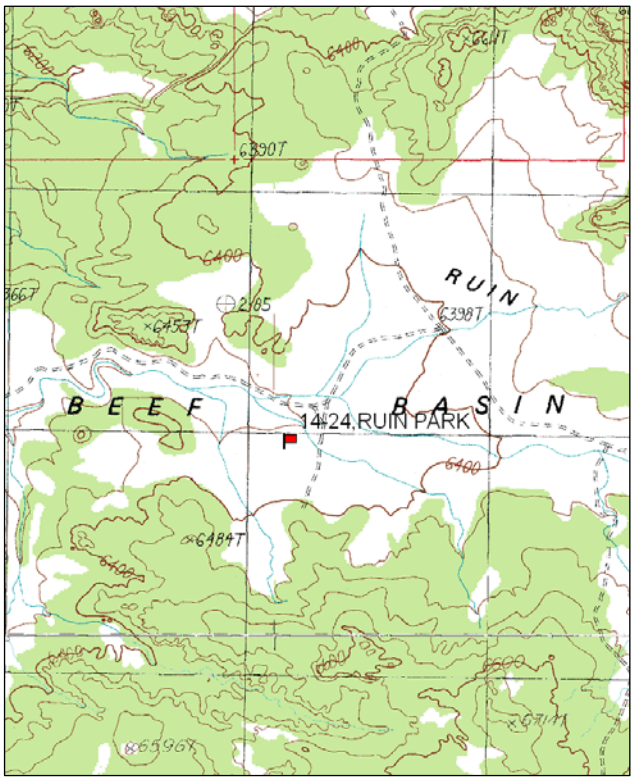
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Ceratoides lanata									
86	**932**	0	36	64	-	36	64	0	11/8
92	**640**	66	6	28	20	25	53	13	-/-
99	**400**	0	95	5	-	0	100	5	16/12
04	**440**	18	82	0	20	18	64	0	11/11
09	**540**	19	74	7	20	11	22	7	9/14
Chrysothamnus viscidiflorus stenophyllus									
86	**2331**	23	17	60	199	17	6	23	12/14
92	**2320**	31	52	17	-	9	0	22	-/-
99	**1920**	4	77	19	-	13	2	3	18/28
04	**1500**	0	80	20	-	0	0	16	16/27
09	**1600**	1	78	21	-	0	0	15	15/28
Gutierrezia sarothrae									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	100	0	0	9/10
04	**0**	0	0	-	-	0	0	0	7/7
09	**0**	0	0	-	-	0	0	0	7/9
Juniperus osteosperma									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**20**	100	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
92	**200**	100	0	0	60	0	0	30	-/-
99	**80**	25	75	0	20	0	0	0	6/13
04	**220**	0	91	9	-	0	0	9	4/12
09	**260**	23	69	8	-	0	0	8	4/13
Pinus edulis									
86	**0**	0	0	-	66	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**40**	0	100	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-
Sclerocactus whipplei									
86	**0**	0	0	-	-	0	0	0	-/-
92	**100**	60	40	-	20	0	0	0	-/-
99	**160**	0	100	-	-	0	0	0	4/6
04	**120**	0	100	-	-	0	0	0	5/6
09	**100**	0	100	-	-	0	0	0	5/6

RUIN PARK - TREND STUDY NO. 14-24-09

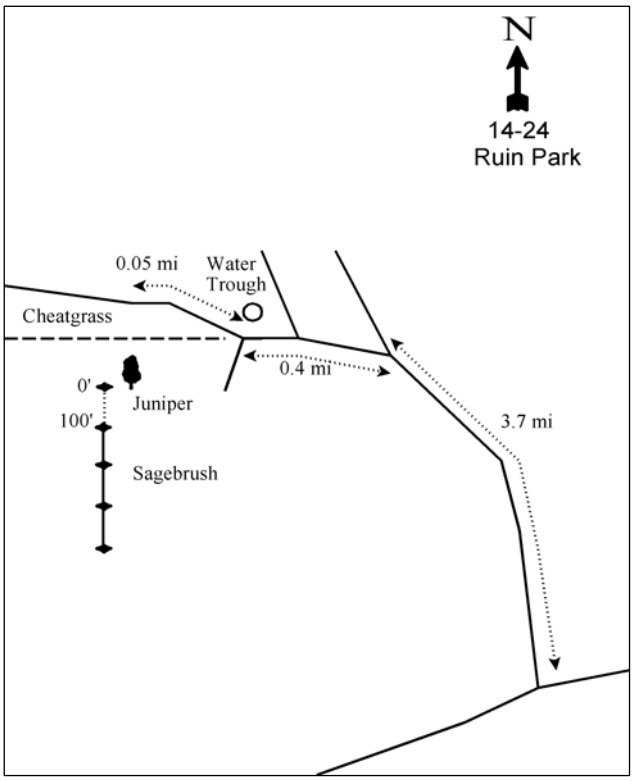
Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Yearlong
NRCS Ecological Site Description: Semidesert Sandy Loam (Fourwing Saltbush), R035XY215UT
Land Ownership: BLM
Elevation: 6,400 ft (1,951 m)
Aspect: Flat
Slope: 0%-4%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
At the junction of the Elk Ridge-Salt Creek Mesa-Beef Basin Roads, go north down into the Beef Basin area. Follow the main road for 9.1 miles, passing the FS/BLM boundary, down to an intersection where there is a BLM register box. Bear right and go 3.7 miles on the main road disregarding all forks until you come to a fork at this mileage. Stay left and continue 0.3 miles to a right turnoff to a ruin. Continue left 0.1 miles to a water trough by a fork. Turn right for approximately 0.05 miles before turning south and driving southwest across the cheatgrass flat (no road). Stop at the sagebrush border and look out in the sagebrush flat for a small lone juniper near a shallow gully. The frequency baseline starts by this juniper and runs south towards the P-J covered hills. All stakes are 3 1/2 foot tall green steel fence posts.

Map Name: Cross Canyon



Diagrammatic Sketch:



Township: 32S, Range: 18E, Section: 11

GPS: NAD 83, UTM 12S 595094 E 4207141 N

RUIN PARK - TREND STUDY NO. 14-24

Site Information

Site Description: The study samples an open park in Beef Basin surrounded by rocky, pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) covered hills. Numerous Anasazi Indian ruins are found in the hills near the study, therefore the name Ruin Park for the large open flat. A water development for cattle is located just northeast of the study transect. Cattle distribution is controlled mainly by water and there are few fences. Pellet group data from the site has estimated fluctuating deer use on the site with heavy use in 1999, light use in 2004, and moderate use in 2009. Estimated cattle use has been light to lightly moderate since 1999 (Table - Pellet Group Data).

Browse: Browse species are rare on the site. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) was the primary browse species at the outset of the study in 1986, but the population was overly mature and decadent. The density of sagebrush steadily decreased from 1986 to 2004, when no live sagebrush plants were sampled. No live sagebrush plants have been sampled since 1999 (Table - Browse Characteristics). The decline of sagebrush on the site is likely due to a combination of heavy use, competition with the annual grass cheatgrass (*Bromus tectorum*), and periods of low precipitation. Small populations of fringed sagebrush (*Artemisia frigida*), winterfat (*Ceratoides lanata*), and white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *albicaulis*) have also been sampled on the site.

Herbaceous Understory: Perennial grasses provide important ground cover and soil protection, as well as some of the only forage on the site. The most abundant perennial species are needle-and-thread (*Stipa comata*), blue grama (*Bouteloua gracilis*), and Indian ricegrass (*Oryzopsis hymenoides*). Cheatgrass occurred on the site in 1992 in small numbers, but by 1999 cheatgrass frequency and cover exploded dominated the site. Drought conditions prior to the 2004 reading caused cheatgrass to decline significantly. Although several species of forbs were encountered on the study transect over the sample years, perennial forbs have steadily declined in nested frequency since 1992. Forb species now occur only rarely (Table - Herbaceous Trends).

Soil: The reddish sandy loam soil has a moderately alkaline pH and a fairly deep effective rooting depth. Phosphorus has low availability for plant growth and development at 5.9 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). A buildup of litter and soil, along with some cryptogamic development, is found at the base of sagebrush. The average bare ground cover increased markedly in 2004 and remained high in 2009 (table - Basic Cover). The soil erosion condition was classified as slight in 2009 due to a gully that runs parallel to the baseline, and surface litter and soil movement.

Trend Assessments

Browse:

- **1986 to 1992 - down (-2):** Differences in density may be related to the larger sample area used in 1992; therefore, trend was determined using other parameters. Decadence of the primary browse species, Wyoming big sagebrush, increased from 58% to 76% and plants displaying poor vigor increased from none to 24% of the population. Recruitment of young sagebrush plants decreased from 12% to 5% of the population.
- **1992 to 1999 - down (-2):** Density of Wyoming big sagebrush decreased by 58% from 1,520 plants/acre to 640 plants/acre and cover decreased from 4% to 2%. Decadence of sagebrush increased to 91% and poor vigor increased to 50% of the population. There was no new recruitment of young sagebrush plants. There was also a decrease in the winterfat density and increase in decadence.
- **1999 to 2004 - down (-2):** There were no Wyoming big sagebrush plants sampled on the site in 2004. The density of winterfat decreased 47% from 300 plants/acre to 160 plants/acre.
- **2004 to 2009 - stable (0):** The browse is in very poor condition on this site. No Wyoming big sagebrush plants were sampled in the density strips. There was a slight increase in the density of winterfat.

Grass:

- **1986 to 1992 - stable (0):** There was little change in the sum of nested frequency of perennial grasses. There was a slight change in composition as blue grama increased significantly in nested frequency, and bottlebrush squirreltail (*Sitanion hystrix*) decreased significantly in nested frequency.
- **1992 to 1999 - down (-2):** The sum of nested frequency of perennial grasses decreased by 32% and cover decreased from 28% to 10%. There was a significant increase in the nested frequency of cheatgrass and cover increased from less than 1% to 21%. Blue grama and needle-and-thread decreased significantly in nested frequency.
- **1999 to 2004 - slightly up (+1):** There was a slight increase in the nested frequency of perennial grasses and cover increased to 23%. Cheatgrass decreased significantly in nested frequency and provided no cover in 2004. There was a significant increase in the nested frequency of needle-and-thread.
- **2004 to 2009 - stable (0):** The sum of nested frequency and cover of perennial grasses changed little. There was a significant increase in the nested frequency of cheatgrass, but cover is still less than 1%.

Forb:

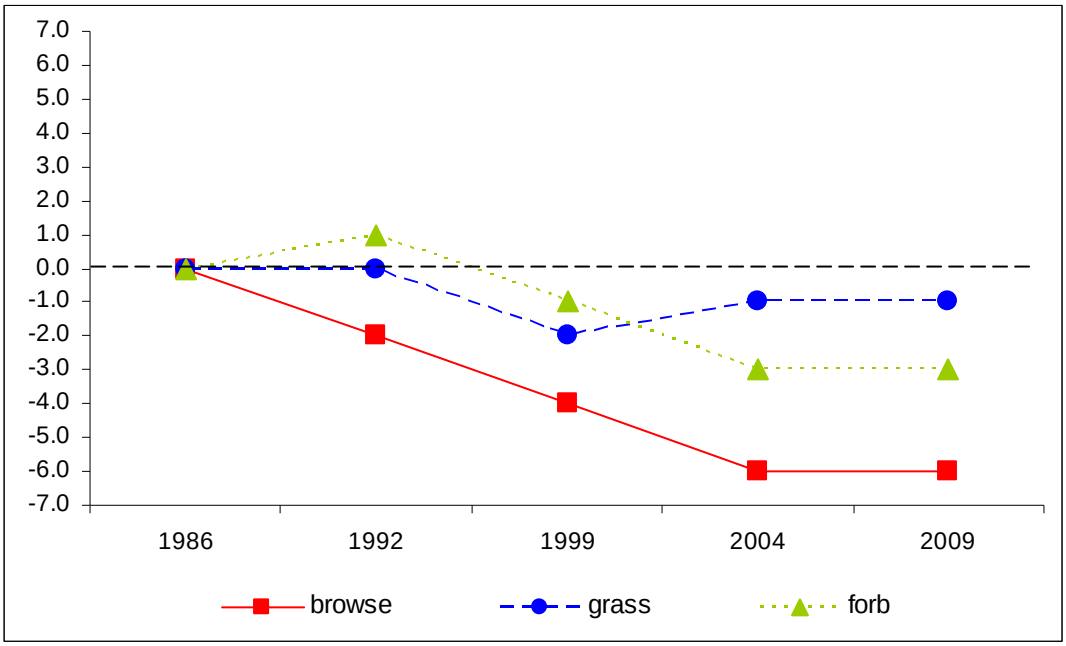
- **1986 to 1992 - slightly up (+1):** There was a slight increase in the sum of nested frequency of perennial forbs due to a significant increase in the nested frequency of hoary aster (*Machaeranthera canescens*).
- **1992 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased 59% and cover decreased from 2% to less than 1%. Hoary aster and longleaf phlox (*Phlox longifolia*) decreased significantly in nested frequency.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased a further 65% and cover continued to decrease. Annual forbs increased in sum of nested frequency and cover. Forbs are very rare on the site.
- **2004 to 2009 - stable (0):** There was a slight decrease in the sum of nested frequency and cover of perennial forbs, but forbs are so rare this decrease had little change on the community.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 14, study no: 24

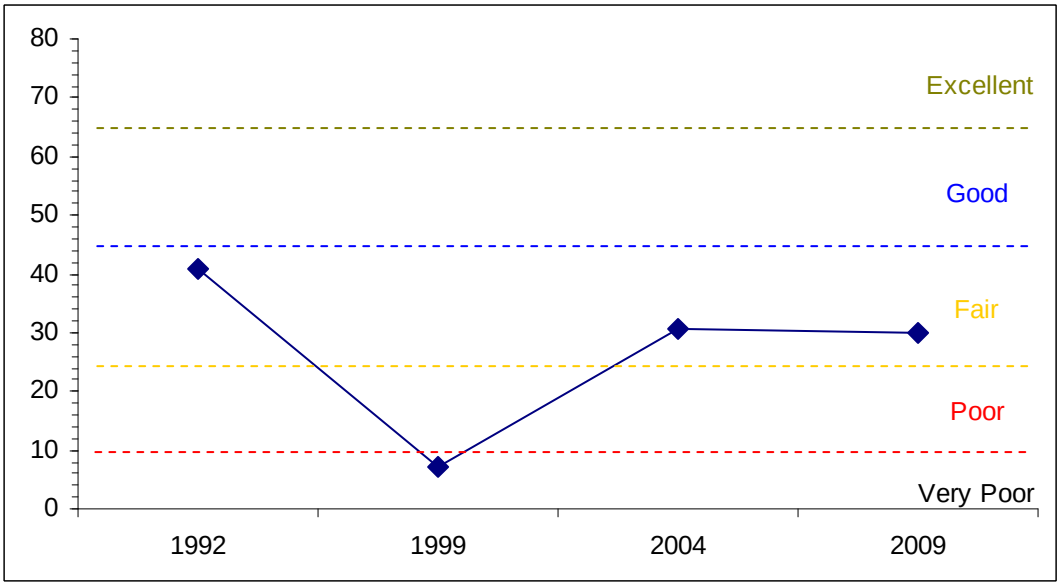
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	5.9	0.0	0.0	30.0	0.0	4.9	0.0	**40.7**	Fair
99	2.4	0.0	0.0	19.5	-16.0	1.1	0.0	**7.1**	Very Poor
04	0.2	0.0	0.0	30.0	0.0	0.3	0.0	**30.6**	Fair
09	0.2	0.0	0.0	30.0	-0.5	0.2	0.0	**29.9**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 24



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 14, Study no: 24



HERBACEOUS TRENDS--
Management unit 14, Study no: 24

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
G	Bouteloua gracilis	$_{a}$95	$_{b}$146	$_{a}$58	$_{a}$62	$_{a}$80	9.26	.80	3.37	4.96
G	Bromus tectorum (a)	-	$_{a}$5	$_{c}$336	$_{a}$1	$_{b}$89	.04	21.28	.00	.62
G	Oryzopsis hymenoides	$_{a}$56	$_{ab}$61	$_{b}$96	$_{a}$47	$_{a}$52	1.40	2.20	1.82	3.45
G	Sitanion hystrix	$_{b}$47	$_{a}$11	$_{a}$3	$_{a}$9	$_{a}$3	.07	.00	.33	.00
G	Sporobolus cryptandrus	10	12	1	-	8	.15	.00	-	.42
G	Stipa comata	$_{c}$278	$_{bc}$262	$_{a}$176	$_{bc}$244	$_{b}$219	16.82	6.71	17.45	13.21
G	Vulpia octoflora (a)	-	9	5	-	1	.02	.01	-	.00
Total for Annual Grasses		0	14	341	1	90	0.05	21.30	0.00	0.62
Total for Perennial Grasses		486	492	334	362	362	27.72	9.74	22.98	22.05
Total for Grasses		486	506	675	363	452	27.78	31.04	22.99	22.68
F	Astragalus mollissimus	7	8	6	-	-	.04	.02	-	-
F	Calochortus nuttallii	-	-	-	-	-	-	-	.00	-
F	Chenopodium leptophyllum(a)	$_{a}$8	$_{b}$68	$_{a}$-	$_{b}$54	$_{a}$-	1.44	-	1.36	-
F	Descurainia pinnata (a)	-	-	-	7	1	-	-	.04	.00
F	Erigeron pumilus	4	7	2	-	-	.06	.00	-	-
F	Eriogonum sp.	-	2	-	-	-	.03	-	-	-
F	Euphorbia fendleri	11	3	10	8	3	.06	.24	.07	.03
F	Helianthus annuus (a)	-	2	-	-	-	.00	-	-	-
F	Lappula occidentalis (a)	-	-	6	11	-	-	.06	.10	-
F	Machaeranthera canescens	$_{a}$4	$_{b}$40	$_{a}$7	$_{a}$-	$_{a}$-	1.79	.02	-	-
F	Microsteris gracilis (a)	-	-	1	-	-	-	.00	-	-
F	Navarretia intertexta (a)	-	-	-	1	6	-	-	.00	.07
F	Penstemon sp.	-	1	-	-	-	.03	-	-	-
F	Phlox hoodii	3	20	14	-	4	.17	.28	-	.06
F	Phlox longifolia	$_{c}$32	$_{bc}$23	$_{a}$2	$_{ab}$6	$_{a}$-	.10	.00	.06	-
F	Plantago patagonica (a)	-	$_{a}$-	$_{b}$28	$_{a}$6	$_{a}$-	-	.06	.01	-
F	Ranunculus testiculatus (a)	-	-	3	-	-	-	.00	-	-
F	Salsola iberica (a)	-	3	-	5	-	.15	-	.01	-
F	Senecio multilobatus	4	-	-	-	-	-	-	-	-
F	Sphaeralcea coccinea	$_{b}$15	$_{a}$2	$_{a}$-	$_{a}$1	$_{a}$-	.16	-	.03	-
F	Tragopogon dubius	-	-	2	-	-	-	.00	-	-
F	Unknown forb-annual (a)	-	2	-	-	-	.01	-	-	-
Total for Annual Forbs		8	75	38	84	7	1.61	0.13	1.53	0.08
Total for Perennial Forbs		80	106	43	15	7	2.45	0.57	0.17	0.09
Total for Forbs		88	181	81	99	14	4.06	0.71	1.71	0.17

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

BROWSE TRENDS--
Management unit 14, Study no: 24

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Artemisia frigida	4	2	2	0	.03	.00	.06	.00
B	Artemisia tridentata wyomingensis	43	23	0	0	4.15	1.77	-	-
B	Ceratoides lanata	13	8	4	5	.51	.18	.15	.15
B	Chrysothamnus nauseosus albicaulis	1	1	0	1	.00	.00	-	.00
B	Chrysothamnus viscidiflorus stenophyllus	25	28	11	12	1.24	1.43	.31	.74
B	Opuntia sp.	1	0	0	0	.00	-	-	-
B	Sclerocactus sp.	0	0	0	1	-	-	-	.00
Total for Browse		87	62	17	19	5.93	3.39	0.51	0.89

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 24

Species	Percent Cover	
	'04	'09
Ceratoides lanata	.30	.18
Chrysothamnus viscidiflorus stenophyllus	1.79	.88

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 24

Species	Average leader growth (in)	
	'04	'09
Ceratoides lanata	1.8	2.2

BASIC COVER--
Management unit 14, Study no: 24

Cover Type	Average Cover %				
	'86	'92	'99	'04	'09
Vegetation	6.50	36.31	36.66	27.64	22.83
Rock	0	.83	0	.01	.01
Pavement	0	0	.30	.26	.19
Litter	41.00	22.78	34.33	24.71	40.30
Cryptogams	2.50	.55	.24	.18	.05
Bare Ground	50.00	33.97	34.17	55.52	54.28

SOIL ANALYSIS DATA --
Management unit 14, Study no: 24, Study Name: Ruin Park

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.1	7.9	60	21.8	16.6	0.6	5.9	80	0.4

PELLET GROUP DATA--
Management unit 14, Study no: 24

Type	Quadrat Frequency			
	'92	'99	'04	'09
Rabbit	17	19	10	39
Elk	1	-	-	2
Deer	57	40	16	11
Cattle	10	12	2	6

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	-	-
70 (173)	13 (31)	24 (60)
26 (64)	11 (27)	17 (41)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 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)
Artemisia frigida									
86	**0**	0	0	-	-	0	0	0	-/-
92	**140**	0	100	-	-	0	0	0	-/-
99	**60**	33	67	-	-	67	0	0	7/7
04	**40**	0	100	-	-	0	0	0	2/4
09	**0**	0	0	-	-	0	0	0	4/13
Artemisia tridentata wyomingensis									
86	**2198**	12	30	58	-	15	85	0	24/27
92	**1520**	5	18	76	-	43	38	24	-/-
99	**640**	0	9	91	-	9	88	50	21/29
04	**0**	0	0	0	-	0	0	0	-/-
09	**0**	0	0	0	-	0	0	0	5/7
Atriplex canescens									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	44/50
Ceratoides lanata									
86	**1732**	19	27	54	133	73	23	0	8/9
92	**640**	34	59	6	-	13	6	0	-/-
99	**300**	47	27	27	-	13	40	7	13/13
04	**160**	0	100	0	-	13	0	0	14/16
09	**240**	42	58	0	120	0	0	0	11/13
Chrysothamnus nauseosus albicaulis									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	0	100	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	100	0	14/19
04	**0**	0	0	-	-	0	0	0	-/-
09	**60**	0	100	-	-	0	0	0	16/26

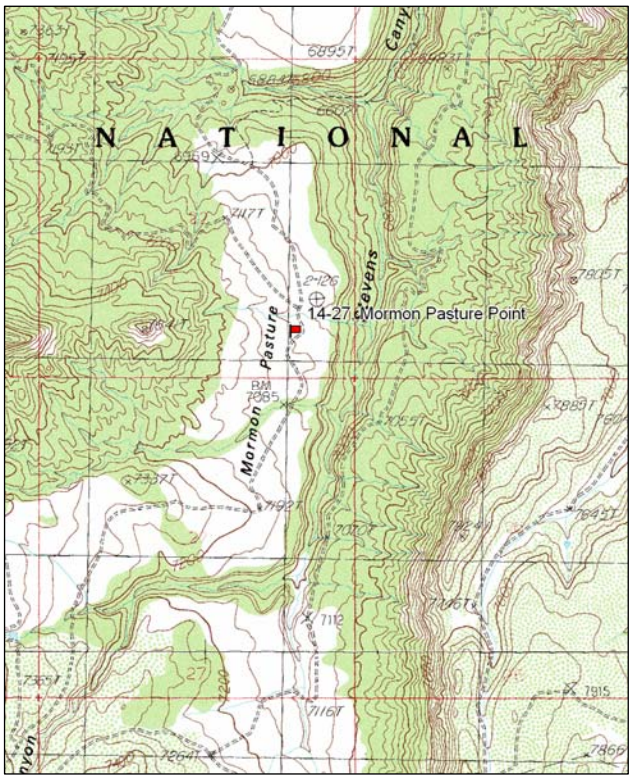
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus stenophyllus									
86	**0**	0	0	0	-	0	0	0	-/-
92	**900**	24	76	0	40	0	0	0	-/-
99	**1000**	6	68	26	-	4	0	8	12/21
04	**460**	0	83	17	-	0	0	13	9/15
09	**440**	0	86	14	-	0	5	5	9/21
Gutierrezia sarothrae									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	4/9
Opuntia sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**40**	100	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	6/24
04	**0**	0	0	-	-	0	0	0	7/21
09	**0**	0	0	-	-	0	0	0	-/-
Sclerocactus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	4/6
04	**0**	0	0	-	-	0	0	0	-/-
09	**20**	100	0	-	-	0	0	0	-/-

MORMON PASTURE POINT - TREND STUDY NO. 14-27-09

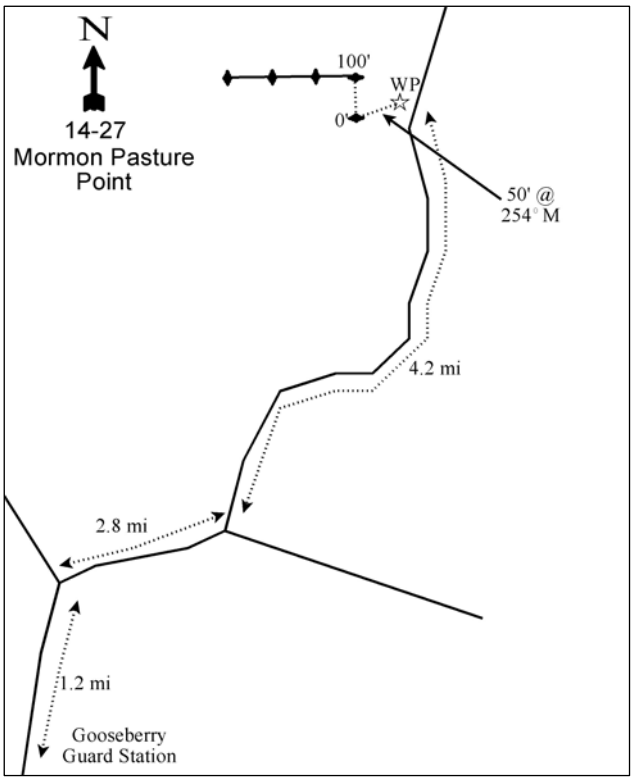
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Spring/Fall, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 7,100 ft (2,164 m)
Aspect: East
Slope: 8%-10%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
From the Gooseberry Guard Station, go 1.2 miles to the Causeway to a fork. Turn right and go 2.8 miles to a fork. Turn left towards Mormon Pasture and drive 1.2 miles to two mining cabins. Stay right, pass the uranium quarry, and go 0.9 miles to a fork. Stay left for 2.1 miles to the transect. There is a witness post (3 foot tall green fence post) on the left side of the road. The 0-foot end of the baseline is 50 feet west of the witness post (@ 254°M) and is marked with browse tag #7883.

Map Name: Cathedral Butte



Diagrammatic Sketch:



Township: 33S, Range: 20E, Section: 22

GPS: NAD 83, UTM 12S 613952 E 4194321 N

MORMON PASTURE POINT - TREND STUDY NO. 14-27

Site Information

Site Description: The study is located in an open rolling valley between high red cliffs and the head Steven's Canyon. The site once supported a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland, but approximately 900 acres were chained and seeded in the early 1970's. An herbicide treatment of Tordon was also done in 1985 on 200 acres at the north end of the chaining. The Forest Service manages the area as part of the Cottonwood allotment. Pellet group data on the site has estimated light use by deer since 1999. Estimated elk use has fluctuated more with moderate use in 1999, light use in 2004 and moderately heavy use in 2009. Estimated cattle use was moderately high in 1999 and 2009, but was light in 2004 (Table - Pellet Group Data).

Browse: This chained site is dominated by mixed browse in association with a dense perennial grass understory. The preferred browse cover is comprised mainly of clumps of Gambel oak (*Quercus gambelii*) and scattered Utah serviceberry (*Amelanchier utahensis*). Both species have increased steadily in cover since 1992 (Table - Browse Trends). Antelope bitterbrush (*Purshia tridentata*) is the most heavily used preferred browse species on the site with very heavy use in all sample years. Decadence and poor vigor have also been fairly high in the bitterbrush population since 1999. Other important preferred brows include true mountain mahogany (*Cercocarpus montanus*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). All of the preferred browse species other than bitterbrush have had low decadence and good vigor over the sample years. Utilization of browse species other than bitterbrush has been light to moderate (Table - Browse Characteristics).

Pinyon and juniper trees have reestablished on the site and are moderately dense. Point quarter data has estimated little change in the density or basal diameter of pinyon or juniper populations since 1999 (Table - Point-Quarter Tree Data). However, the overhead canopy cover of both pinyon and juniper has steadily increased since 1999 (Table - Canopy Cover) indicating that the trees are filling in.

Herbaceous Understory: Perennial grasses are abundant and provide valuable forage. The introduced perennial grass intermediate wheatgrass (*Agropyron intermedium*) is the dominant species in cover on the site. Intermediate wheatgrass and another introduced perennial grass, crested wheatgrass (*A. cristatum*), provide nearly all of the grass cover on the site. Native perennial species that are not as common include Indian ricegrass (*Oryzopsis hymenoides*), mutton bluegrass (*Poa fendleriana*), and a sedge (*Carex sp.*). Forbs are somewhat diverse on the site, but none are especially abundant. Rock goldenrod (*Petradoria pumila*), looseflower milkvetch (*Astragalus tenellus*), a bladderpod (*Lesquerella rectipes*), and scarlet globemallow (*Sphaeralcea coccinea*) are the most abundant forbs.

Soil: The soil is a light tan sandy clay loam with a slightly alkaline pH and moderately deep effective rooting depth. Phosphorus has limited availability for plant growth and development at just 3.8 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Protective ground cover is moderately high leaving only isolated areas of moderately high exposed bare ground cover (Table - Basic Cover). There is still a lot of litter from the chaining on the site. There are some gullies on the site, although they appear to be healing. The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1992 - stable (0):** Differences in density may be related to the larger sample area used in 1992; therefore, trend was determined using other parameters. There was little change in the decadence or vigor of any of the preferred browse species. Serviceberry was sampled for the first time in 1992 with the larger sample area.

- **1992 to 1999 - slightly up (+1):** The density of bitterbrush and Gambel oak both increased and mountain big sagebrush was sampled for the first time. Decadence of and poor vigor of bitterbrush both increased to 38%.
- **1999 to 2004 - slightly up (+1):** The density of bitterbrush and serviceberry increased slightly and cover of serviceberry and Gambel oak increased slightly. Decadence and poor vigor of bitterbrush decreased to 30%.
- **2004 to 2009 - stable (0):** The density and cover of mountain big sagebrush increased slightly and cover of serviceberry increased slightly. Decadence and poor vigor of bitterbrush decreased to 25% and 13%, respectively. The overhead canopy cover of pinyon and juniper has steadily increased on the site since 1999.

Grass:

- **1986 to 1992 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 14% with a significant decrease in the native perennial grasses Indian ricegrass and bottlebrush squirreltail (*Sitanion hystrix*).
- **1992 to 1999 - slightly down (-1):** There was a 10% decrease in the sum of nested frequency of perennial grasses and cover decreased from 25% to 17%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 18% and cover decreased to 16%. Intermediate wheatgrass has decreased significantly in nested frequency since 1992.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased slightly to 18%.

Forb:

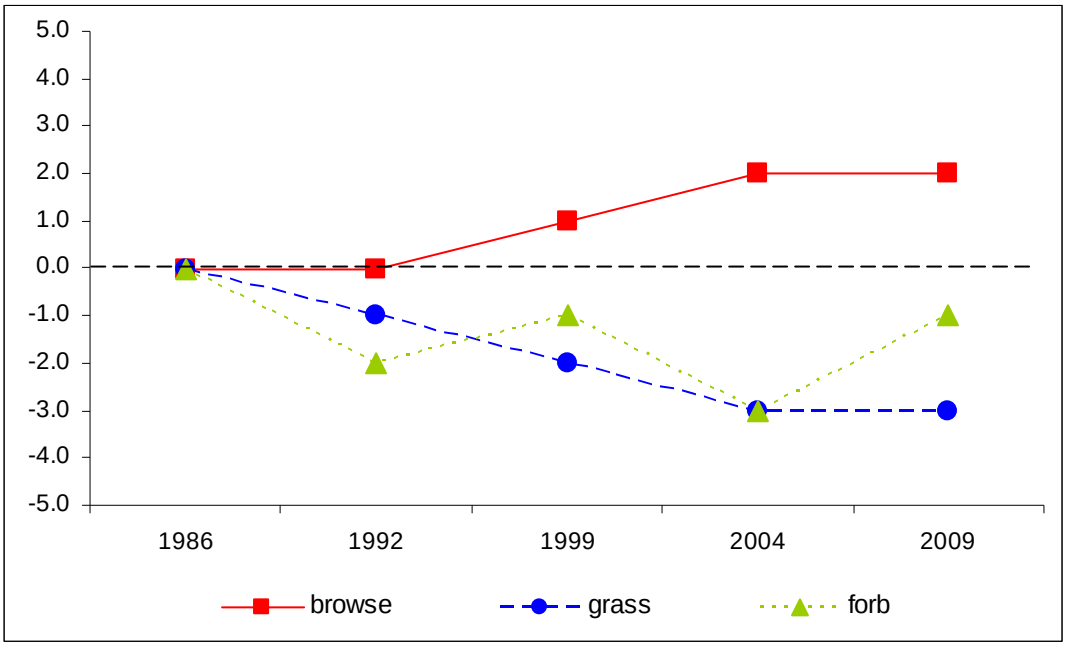
- **1986 to 1992 - down (-2):** There was a 32% decrease in the sum of nested frequency of perennial forbs with a significant decrease in the nested frequency of looseflower milkvetch and western salsify (*Tragopogon dubius*).
- **1992 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased 11%, but cover decreased from 3% to 2%.
- **1999 to 2004 - down (-2):** There was a 27% decrease in the nested frequency of perennial forbs, though cover increased to 4%.
- **2004 to 2009 - up (+2):** There was a 22% increase in the sum of nested frequency of perennial forbs and cover increased to 5%. Most of the increase in cover came from an increase in rock goldenrod.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 14, study no: 27

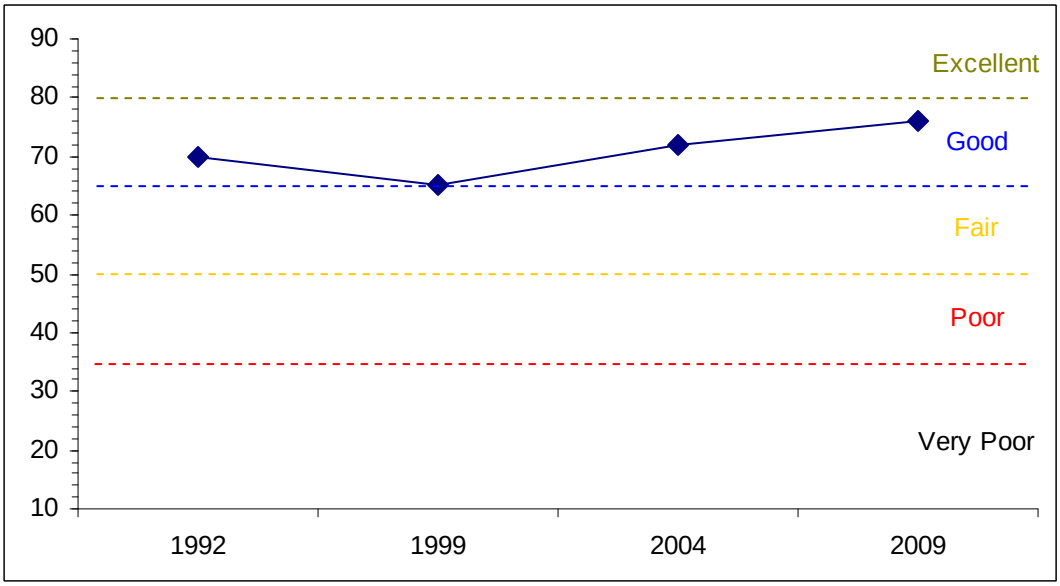
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	5.5	12.8	15.0	30.0	0.0	7.0	0.0	**70.3**	Good
99	7.2	13.0	10.3	30.0	0.0	4.5	0.0	**64.9**	Fair-Good
04	8.6	13.9	12.2	30.0	0.0	7.6	0.0	**72.3**	Good
09	12.4	13.4	9.8	30.0	0.0	10.0	0.0	**75.6**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 27



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 14, Study no: 27



HERBACEOUS TRENDS--
Management unit 14, Study no: 27

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron cristatum	$_{a}$32	$_{b}$88	$_{b}$80	$_{ab}$57	$_{ab}$68	4.67	2.90	4.52	3.82

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron dasystachyum	$_{b}$218	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
G	Agropyron intermedium	$_{a}$157	$_{c}$316	$_{bc}$270	$_{b}$227	$_{b}$236	19.59	13.35	10.83	12.94
G	Carex sp.	12	9	14	15	6	.46	.16	.28	.18
G	Oryzopsis hymenoides	$_{b}$36	$_{a}$16	$_{ab}$19	$_{ab}$15	$_{ab}$15	.28	.26	.16	.28
G	Poa fendleriana	$_{a}$1	$_{b}$25	$_{b}$22	$_{ab}$16	$_{ab}$18	.23	.29	.43	.40
G	Poa pratensis	7	-	-	-	-	-	-	-	-
G	Sitanion hystrix	$_{b}$63	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-	-
G	Stipa comata	-	-	3	3	3	-	.03	.04	.41
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		526	454	408	333	346	25.26	17.00	16.28	18.04
Total for Grasses		526	454	408	333	346	25.26	17.00	16.28	18.04
F	Antennaria rosea	-	-	-	-	5	-	-	-	.03
F	Arabis sp.	-	-	6	-	-	-	.01	-	-
F	Aster sp.	-	-	-	-	-	-	-	-	.00
F	Astragalus sp.	-	-	-	-	-	-	-	-	.00
F	Astragalus tenellus	$_{b}$68	$_{a}$29	$_{a}$9	$_{a}$12	$_{a}$22	.85	.49	.98	1.36
F	Calochortus nuttallii	3	-	7	-	6	-	.01	-	.01
F	Cirsium sp.	3	6	5	3	-	.18	.01	.03	-
F	Cymopterus sp.	$_{a}$5	$_{a}$-	$_{a}$7	$_{a}$8	$_{b}$19	-	.04	.02	.32
F	Descurainia pinnata (a)	-	-	1	-	-	-	.00	-	-
F	Eriogonum racemosum	2	-	-	3	1	-	-	.00	.00
F	Hedysarum boreale	-	-	-	8	-	-	-	.63	-
F	Heterotheca villosa	-	3	-	-	-	.03	.00	.00	-
F	Hymenoxys acaulis	$_{b}$22	$_{a}$-	$_{ab}$12	$_{ab}$6	$_{b}$15	-	.09	.21	.32
F	Ipomopsis aggregata	3	3	-	-	-	.01	.00	-	-
F	Lappula occidentalis (a)	-	-	-	8	3	-	-	.04	.00
F	Lesquerella rectipes	$_{a}$17	$_{b}$42	$_{ab}$30	$_{ab}$25	$_{a}$6	.28	.16	.11	.04
F	Lomatium sp.	-	-	6	-	-	-	.02	-	-
F	Machaeranthera canescens	3	3	1	-	2	.00	.00	-	.03
F	Pedicularis centranthera	-	-	4	-	-	-	.00	-	-
F	Penstemon lentus	$_{b}$26	$_{ab}$20	$_{ab}$18	$_{a}$4	$_{b}$30	.59	.20	.07	.65
F	Petradoria pumila	3	8	14	18	21	.66	.66	.90	2.03
F	Phlox longifolia	11	11	25	7	4	.04	.07	.04	.01
F	Polygonum douglasii (a)	-	-	1	-	-	-	.00	-	-
F	Senecio multilobatus	2	-	3	4	-	-	.00	.01	-
F	Sphaeralcea coccinea	$_{b}$70	$_{ab}$45	$_{ab}$38	$_{a}$38	$_{a}$35	.76	.35	.72	.39
F	Taraxacum officinale	1	1	-	-	-	.03	-	-	-
F	Tragopogon dubius	$_{b}$22	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	.00	-
F	Trifolium sp.	-	7	12	7	8	.04	.07	.02	.02
Total for Annual Forbs		0	0	2	8	3	0	0.00	0.04	0.00
Total for Perennial Forbs		261	178	197	143	174	3.49	2.23	3.78	5.26
Total for Forbs		261	178	199	151	177	3.49	2.24	3.83	5.27

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

BROWSE TRENDS--
Management unit 14, Study no: 27

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Amelanchier utahensis	5	4	5	6	1.33	1.97	2.14	3.51
B	Artemisia tridentata vaseyana	0	5	4	10	-	.01	.15	.86
B	Cercocarpus montanus	1	0	0	0	.00	.15	.38	.63
B	Gutierrezia sarothrae	8	1	7	8	.00	.15	.36	.33
B	Juniperus osteosperma	5	2	1	2	1.67	1.38	.68	2.21
B	Juniperus scopulorum	1	0	0	0	.00	-	-	-
B	Opuntia sp.	5	6	6	9	.04	.03	.18	.30
B	Pinus edulis	0	2	3	4	3.08	.88	3.07	2.86
B	Purshia tridentata	2	7	8	6	1.00	.93	.33	.66
B	Quercus gambelii	4	13	19	17	2.00	2.59	4.13	4.15
B	Ribes sp.	1	0	0	0	.00	-	-	-
B	Symphoricarpos oreophilus	1	0	0	0	.00	-	-	-
Total for Browse		33	40	53	62	9.17	8.13	11.43	15.54

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 27

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	.40	6.84	4.26
Artemisia tridentata vaseyana	-	.23	.60
Cercocarpus montanus	-	-	.80
Gutierrezia sarothrae	-	.31	.15
Juniperus osteosperma	.80	1.76	2.20
Opuntia sp.	-	-	.05
Pinus edulis	2.40	3.16	4.13
Purshia tridentata	-	.55	.46
Quercus gambelii	4.59	8.88	8.98

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 27

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	1.3	1.8
Artemisia tridentata vaseyana	2.2	3.0
Cercocarpus montanus	3.9	2.8
Purshia tridentata	2.6	1.7

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 27

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	52	54	53
Pinus edulis	41	43	39
Quercus gambelii	31	-	-

Average diameter (in)		
'99	'04	'09
3.5	6.7	4.0
3.1	3.2	3.2
1.1	-	-

BASIC COVER--
Management unit 14, Study no: 27

Cover Type	Average Cover %				
	'86	'92	'99	'04	'09
Vegetation	2.50	39.79	29.47	30.57	36.35
Rock	0	2.72	.47	.54	.26
Pavement	.75	0	1.24	1.02	2.05
Litter	69.50	51.04	48.66	45.04	52.20
Cryptogams	0	.24	.06	.66	.09
Bare Ground	27.25	18.57	31.65	36.72	31.26

SOIL ANALYSIS DATA --
Management unit 14, Study no: 27, Study Name: Mormon Pasture

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.8	7.5	53.6	17.8	28.6	1.4	3.9	118.4	0.6

PELLET GROUP DATA--
Management unit 14, Study no: 27

Type	Quadrat Frequency			
	'92	'99	'04	'09
Rabbit	51	20	19	2
Elk	8	8	4	6
Deer	15	1	-	3
Cattle	7	5	4	4

Days use per acre (ha)		
'99	'04	'09
-	-	-
21 (52)	6 (15)	12 (30)
5 (12)	4 (10)	8 (20)
36 (89)	14 (34)	25 (63)

BROWSE CHARACTERISTICS--
Management unit 14, 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)
Amelanchier utahensis									
86	**0**	0	0	0	-	0	0	0	-/-
92	**100**	60	40	0	-	60	0	0	-/-
99	**80**	0	100	0	-	25	25	0	89/90
04	**220**	9	91	0	-	9	0	0	69/70
09	**240**	8	83	8	20	25	8	0	78/76
Artemisia tridentata vaseyana									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**200**	40	60	-	20	40	10	0	16/24
04	**140**	14	86	-	-	86	0	0	25/37
09	**380**	26	74	-	-	26	11	11	17/23
Cercocarpus montanus									
86	**33**	0	100	-	-	100	0	0	55/43
92	**20**	0	100	-	40	100	0	0	-/-
99	**0**	0	0	-	-	0	0	0	44/39
04	**0**	0	0	-	-	0	0	0	64/66
09	**0**	0	0	-	-	0	0	0	54/58
Chrysothamnus nauseosus									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	21/32
04	**0**	0	0	-	-	0	0	0	33/38
09	**0**	0	0	-	-	0	0	0	27/34
Gutierrezia sarothrae									
86	**0**	0	0	0	-	0	0	0	-/-
92	**380**	37	63	0	120	0	0	0	-/-
99	**40**	50	50	0	-	0	0	0	-/-
04	**240**	0	83	17	-	0	0	0	9/10
09	**440**	27	73	0	-	0	0	0	7/10
Juniperus osteosperma									
86	**33**	100	0	-	-	0	0	0	-/-
92	**100**	80	20	-	-	0	0	0	-/-
99	**40**	0	100	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**40**	0	100	-	-	0	0	0	-/-

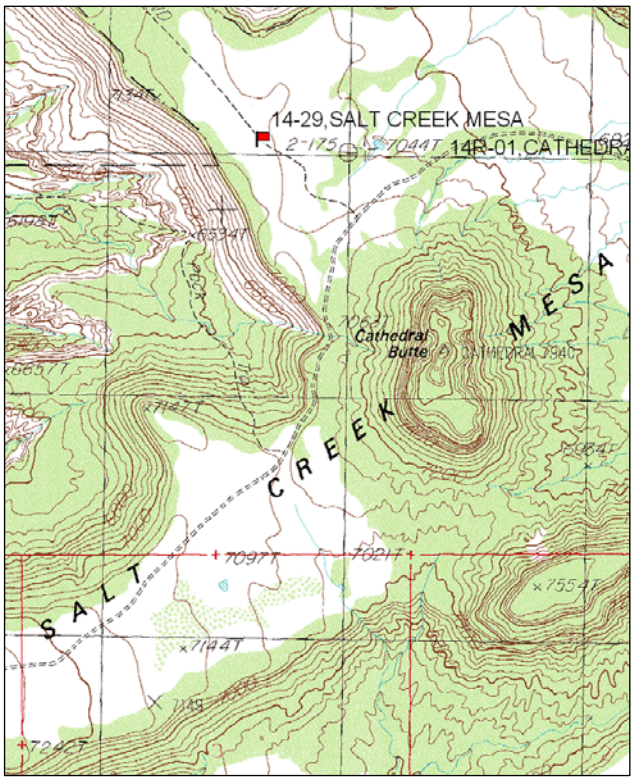
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Juniperus scopulorum									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	0	100	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
86	**0**	0	0	0	-	0	0	0	-/-
92	**200**	60	40	0	-	0	0	0	-/-
99	**200**	60	40	0	20	0	0	0	4/13
04	**240**	8	92	0	-	0	0	0	8/12
09	**520**	35	62	4	-	0	0	4	4/12
Pinus edulis									
86	**33**	100	0	-	66	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
99	**40**	50	50	-	-	0	0	0	-/-
04	**60**	0	100	-	-	0	0	0	-/-
09	**80**	0	100	-	-	0	0	0	-/-
Purshia tridentata									
86	**99**	0	100	0	-	33	67	0	12/20
92	**80**	0	100	0	-	0	100	0	-/-
99	**160**	0	63	38	-	50	50	38	19/50
04	**200**	0	70	30	-	30	70	30	18/43
09	**160**	0	75	25	-	75	25	13	22/40
Quercus gambelii									
86	**2165**	58	26	15	799	62	3	3	63/35
92	**500**	68	16	16	40	4	0	0	-/-
99	**1380**	45	54	1	20	0	14	0	61/40
04	**1820**	37	58	4	-	0	0	16	46/35
09	**2540**	34	65	2	-	0	0	.78	37/36
Ribes sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	100	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	59/31
04	**0**	0	0	-	-	0	0	0	60/33
09	**0**	0	0	-	-	0	0	0	-/-
Symphoricarpos oreophilus									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	100	0	-	40	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	28/72
04	**0**	0	0	-	-	0	0	0	31/53
09	**0**	0	0	-	-	0	0	0	-/-

SALT CREEK MESA - TREND STUDY NO. 14-29-09

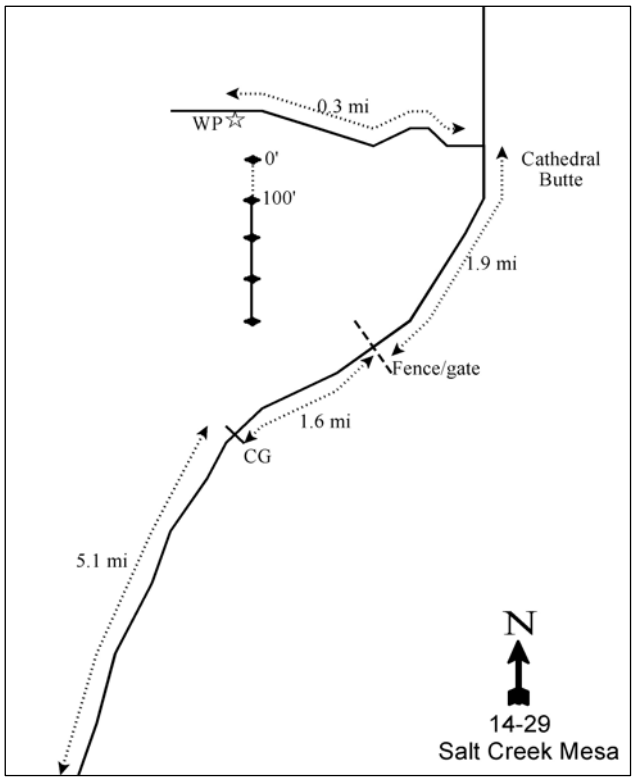
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Shallow Hardpan (Pinyon-Utah Juniper), R035XY316UT
Land Ownership: BLM
Elevation: 7,100 ft (2,164 m)
Aspect: Northeast
Slope: 2%
Transect bearing: 156 degrees magnetic
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
From the intersection in Sego Flat, go left towards Dugout Ranch 5.9 miles to the Beef Basin turnoff. Continue down Salt Creek Mesa Road for 5.1 miles to a cattleguard at the BLM/USFS boundary. Continue 1.6 miles on the main road to a fence/gate. Continue 1.9 miles to a fork on the west side of Cathedral Butte. Turn left and go 0.3 miles through junipers, into a chaining and to a witness post (full-high fence post) 18 feet off the left side of the road. The 0-foot baseline is 15 paces at a bearing of 220°M from the witness post.

Map Name: Cathedral Butte



Diagrammatic Sketch:



Township: 32S, Range: 20E, Section: 27

GPS: NAD 83, UTM 12S 613558 E 4202235 N

SALT CREEK MESA - TREND STUDY NO. 14-29

Site Information

Site Description: The study located on an old chaining that appears was seeded with crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*A. intermedium*), and alfalfa (*Medicago sativa*). Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees are scattered across the site. This area was targeted to be part of the Salt Creek prescribed fire that burned 130 acres in 2002, but the fire did not carry across the site and only a few trees were burned. Pellet group data has indicated fairly light use by deer since 1999. The estimated elk use was light in 1999 and 2004, but increased to moderately heavy use in 2009. Estimated cattle use has been light to moderate since 1999 (Table - Pellet Group Data).

Browse: Preferred browse is limited on the site. Only a low density of Utah serviceberry (*Amelanchier utahensis*), fourwing saltbush (*Atriplex canescens*), true-mountain mahogany (*Cercocarpus montanus*), and green ephedra (*Ephedra veridis*) were sampled within the chaining. Use of these shrubs varies from light to heavy. The preferred browse species appear to have survived the fire well. Broom snakeweed (*Gutierrezia sarothrae*) has been very abundant on the site over the sample years (Table - Browse Characteristics). This chained site also supports a moderately high density of released pinyon pine and Utah juniper trees. Point-quarter density estimates show a slight decline in juniper trees in 2004, after the fire, with a continued decrease in 2009, though the average diameter has increased since 1999. There has been little change in the density or average diameter of pinyon trees since 1999 (Table - Point-Quarter Tree Data). There has been an increase in the overhead canopy cover of juniper since 2004, and the canopy cover of pinyon has steadily increased on the site since 1999 (Table - Canopy Cover).

Herbaceous Understory: The dominant herbaceous species are intermediate wheatgrass, crested wheatgrass, and Indian ricegrass (*Oryzopsis hymenoides*), and these three species provide almost 100% of the grass cover. Each of the species showed declines from 1992 and 2004, but recovered slightly in 2009. Forbs are lacking with the two most dominant species being dusty penstemon (*Penstemon comarrhenus*) and Fendler euphorbia (*Euphorbia fendleri*). A few early seral annual forbs were found in 2004, after the fire, but were sampled at low frequency and cover.

Soil: The soil is a sandy clay loam with a slightly alkaline pH and a moderately deep effective rooting depth. Phosphorus has limited availability for plant growth and development at 5.3 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). There are many wind scoured depressions with large rock scattered throughout the site. Pavement is commonly found in small localized intervals. Litter is comprised mostly of pinyon and juniper debris remaining from the chaining. Even with fairly good cover, there are large areas of bare ground cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1992 to 1999 - slightly down (-1):** There was a slight decrease in the density of many of the preferred browse species, though cover of true mountain mahogany and serviceberry increased slightly. There was a large increase in the density and cover of broom snakeweed.
- **1999 to 2004 - slightly up (+1):** The density of serviceberry increased with a large increase in the recruitment of young plants. Cover of serviceberry also increased. Density of true mountain mahogany decreased, but it was noted that new sprouts were growing after the fire. No fourwing saltbush plants were sampled in the shrub density strips. There was a large decrease in the density and cover of broom snakeweed.
- **2004 to 2009 - slightly down (-1):** There was a decrease in the density of serviceberry and true mountain mahogany and a decrease in cover of serviceberry. Broom snakeweed increased to very high density and cover again.

Grass:

- **1992 to 1999 - down (-2):** The sum of nested frequency of perennial grasses decreased by 19% and cover decreased from 24% to 10%. There was a significant decrease in the nested frequency of intermediate wheatgrass.
- **1999 to 2004 - down (-2):** There was a 58% decrease in the sum of nested frequency of perennial grasses and cover decreased to 4%. All three of the dominant grass species decreased significantly in nested frequency.
- **2004 to 2009 - up (+1):** The sum of nested frequency of perennial grasses increased 27% with a significant increase in the nested frequency of crested wheatgrass.

Forb:

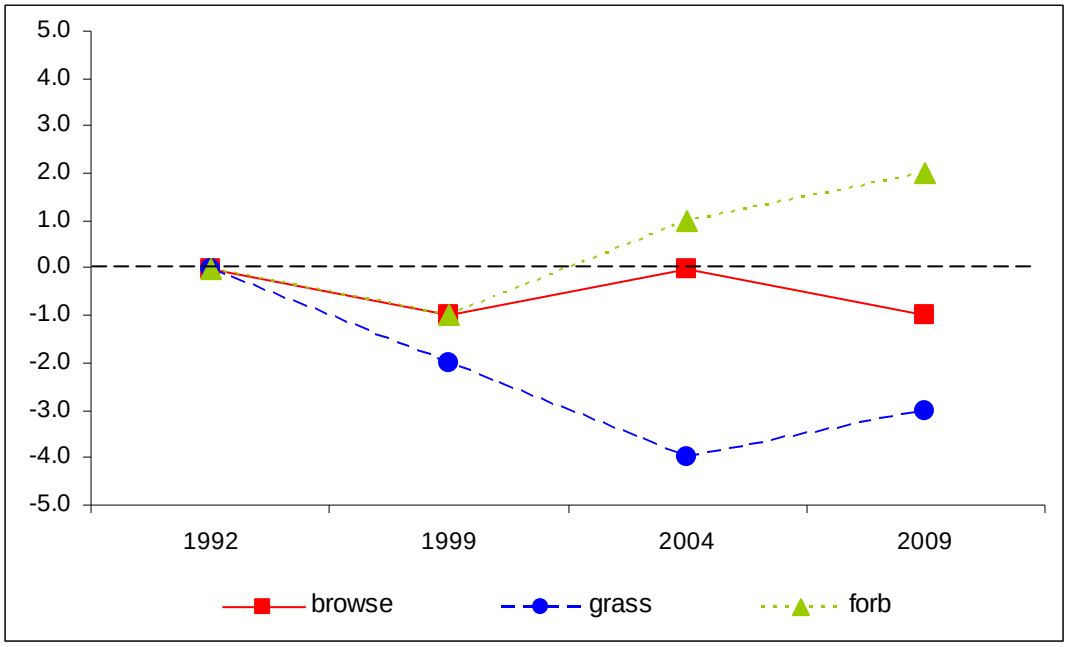
- **1992 to 1999 - slightly down (-1):** There was a 14% decrease in the sum of nested frequency of perennial forbs with a significant decline in the nested frequency of the seeded species alfalfa.
- **1999 to 2004 - up (+2):** The sum of nested frequency of perennial forbs increased 42% and cover increased from 2% to 3%.
- **2004 to 2009 - slightly up (+1):** There was a 26% increase in the sum of nested frequency of perennial forbs and cover increased to 5%. However, much of this increase is due to a significant increase in the nested frequency of the undesirable species Fendler euphorbia.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 14, study no: 29

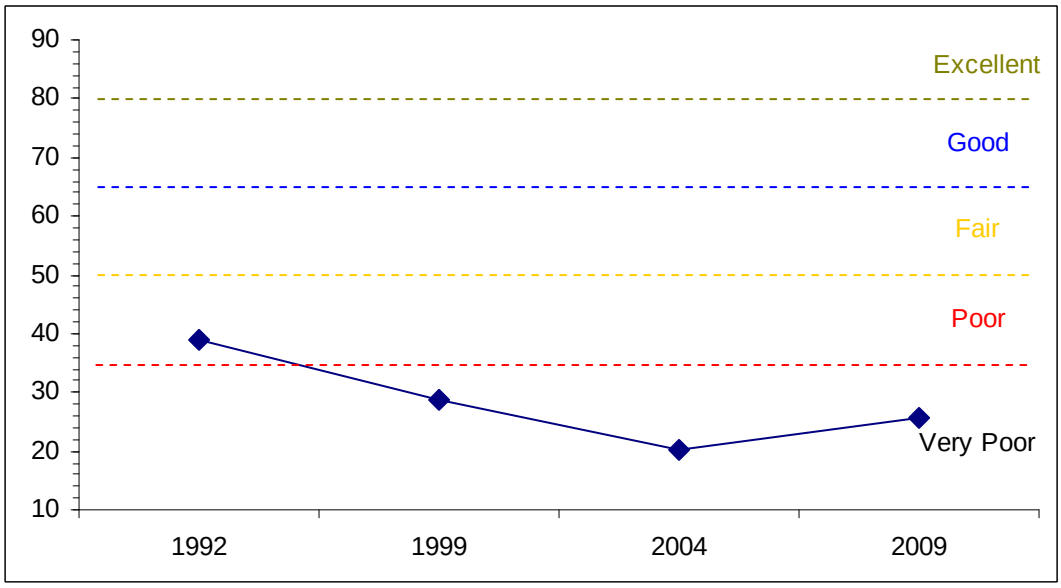
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	2.1	0.0	0.0	30.0	0.0	7.0	0.0	**39.1**	Poor
99	4.2	0.0	0.0	20.3	0.0	4.3	0.0	**28.7**	Very Poor
04	4.7	0.0	0.0	8.7	0.0	6.7	0.0	**20.2**	Very Poor
09	4.2	0.0	0.0	11.4	0.0	10.0	0.0	**25.5**	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 29



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 14, Study no: 29



HERBACEOUS TRENDS--
Management unit 14, Study no: 29

Type	Species	Nested Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron cristatum	$_{b}$112	$_{b}$106	$_{a}$47	$_{b}$104	5.34	5.89	2.25	3.90
G	Agropyron intermedium	$_{c}$230	$_{b}$169	$_{a}$55	$_{a}$63	13.05	2.52	1.12	1.16
G	Oryzopsis hymenoides	$_{b}$96	$_{b}$80	$_{a}$42	$_{a}$22	5.10	1.70	.78	.61
G	Sitanion hystrix	-	-	-	1	-	.00	-	.00
G	Stipa comata	$_{a}$-	$_{a}$-	$_{b}$6	$_{a}$-	-	.00	.18	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		438	355	150	190	23.50	10.13	4.35	5.69
Total for Grasses		438	355	150	190	23.50	10.13	4.35	5.69
F	Astragalus sp.	-	-	-	1	-	-	-	.00
F	Astragalus utahensis	-	-	2	1	-	-	.01	.00
F	Chaenactis douglasii	-	1	3	-	-	.03	.00	-
F	Chenopodium album (a)	4	-	-	1	.01	-	.00	.00
F	Chenopodium fremontii (a)	-	-	7	-	-	-	.16	-
F	Cordylanthus sp. (a)	-	$_{a}$-	$_{b}$17	$_{a}$2	-	-	.53	.03
F	Cryptantha sp.	-	3	6	6	-	.03	.04	.03
F	Descurainia pinnata (a)	5	2	10	-	.02	.00	.23	-
F	Erigeron sp.	-	-	-	2	-	-	.00	.00
F	Euphorbia fendleri	$_{a}$44	$_{a}$25	$_{a}$52	$_{b}$84	2.37	.52	1.35	2.71
F	Heterotheca villosa	-	-	5	-	-	-	.18	-
F	Hymenoxys acaulis	-	-	1	-	-	-	.03	-
F	Lappula occidentalis (a)	-	-	9	-	-	-	.24	-
F	Lepidium sp. (a)	-	-	1	-	-	-	.00	-
F	Lesquerella sp.	$_{a}$14	$_{a}$25	$_{b}$48	$_{ab}$34	.03	.09	.67	.14
F	Lupinus sp.	-	4	5	7	-	.04	.21	.18
F	Machaeranthera canescens	2	1	3	7	.01	.03	.01	.01
F	Medicago sativa	$_{b}$7	$_{a}$-	$_{a}$-	$_{a}$-	.22	-	-	-
F	Nicotiana attenuata (a)	-	-	1	-	-	-	.00	-
F	Orobanche sp.	2	-	-	-	.00	-	-	-
F	Penstemon comarrhenus	43	55	53	63	.82	1.06	.77	1.75
F	Petradoria pumila	-	-	-	1	-	-	.00	.15
F	Phlox hoodii	-	-	-	1	-	-	-	.03
F	Salsola iberica (a)	-	-	5	3	-	-	.01	.03
F	Salsola pestifer (a)	10	-	-	-	.02	-	-	-
F	Senecio multilobatus	$_{a}$-	$_{ab}$14	$_{a}$4	$_{b}$21	-	.30	.04	.27
F	Sphaeralcea coccinea	-	1	3	1	-	.00	.00	.00
F	Streptanthus cordatus	1	-	-	-	.00	-	-	-
F	Townsendia sp.	-	3	2	7	-	.03	.00	.04
F	Tragopogon dubius	3	-	-	-	.00	-	-	-
Total for Annual Forbs		19	2	50	6	0.05	0.00	1.19	0.07
Total for Perennial Forbs		116	132	187	236	3.48	2.16	3.37	5.37
Total for Forbs		135	134	237	242	3.54	2.16	4.57	5.44

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

BROWSE TRENDS--
Management unit 14, Study no: 29

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Amelanchier utahensis	2	2	5	1	1.36	1.77	3.15	1.92
B	Atriplex canescens	3	1	0	0	.03	.00	-	-
B	Cercocarpus montanus	3	3	1	1	.03	1.00	.00	.85
B	Ephedra viridis	0	1	1	1	-	.00	.00	.00
B	Gutierrezia sarothrae	80	87	34	88	3.77	6.47	.73	5.02
B	Juniperus osteosperma	5	6	6	5	.18	.59	.81	2.65
B	Mahonia fremontii	2	0	2	3	.00	-	1.00	3.44
B	Mahonia repens	0	0	0	0	.15	-	-	-
B	Opuntia sp.	1	0	1	1	.00	-	.03	.00
B	Pinus edulis	6	7	4	2	3.15	4.44	4.50	7.02
B	Pseudotsuga menziesii	0	0	0	0	.03	-	-	-
B	Symphoricarpos oreophilus	2	1	2	2	.06	.38	.41	.21
Total for Browse		104	108	56	104	8.76	14.65	10.64	21.12

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 29

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	1.79	4.05	3.45
Cercocarpus montanus	-	-	.66
Gutierrezia sarothrae	-	.96	3.08
Juniperus osteosperma	-	2.90	5.16
Mahonia fremontii	-	2.71	4.65
Opuntia sp.	-	.06	-
Pinus edulis	4.19	5.80	7.84
Symphoricarpos oreophilus	-	1.23	1.63

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 29

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	3.4	3.6
Atriplex canescens	4.2	2.2
Cercocarpus montanus	7.8	3.9
Purshia tridentata	2.7	2.0

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 29

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	51	42	37
Pinus edulis	60	50	57

Average diameter (in)		
'99	'04	'09
2.8	3.7	4.6
3.5	5.1	4.8

BASIC COVER--
Management unit 14, Study no: 29

Cover Type	Average Cover %			
	'92	'99	'04	'09
Vegetation	32.15	25.35	19.69	31.72
Rock	8.50	2.85	3.11	3.15
Pavement	0	4.39	5.96	3.08
Litter	50.20	32.48	32.18	46.06
Cryptogams	0	0	.03	0
Bare Ground	22.32	39.33	53.29	41.90

SOIL ANALYSIS DATA --
Management unit 14, Study no: 29, Study Name: Salt Creek Mesa

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.5	7.5	56	21.4	22.6	2.7	5.3	92.8	0.6

PELLET GROUP DATA--
Management unit 14, Study no: 29

Type	Quadrat Frequency				Days use per acre (ha)		
	'92	'99	'04	'09	'99	'04	'09
Rabbit	39	37	27	11	-	-	-
Elk	4	21	11	15	18 (45)	3 (7)	38 (94)
Deer	17	16	3	2	19 (48)	7 (18)	2 (5)
Cattle	8	10	1	2	23 (56)	3 (7)	33 (82)

BROWSE CHARACTERISTICS--
Management unit 14, 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)
Amelanchier utahensis									
92	**40**	50	50	-	-	0	50	0	-/-
99	**40**	0	100	-	-	0	0	0	98/125
04	**120**	83	17	-	280	17	0	17	94/110
09	**20**	0	100	-	-	0	0	0	114/120
Atriplex canescens									
92	**60**	0	67	33	-	0	100	0	-/-
99	**20**	0	0	100	-	0	100	100	23/26
04	**0**	0	0	0	-	0	0	0	26/33
09	**0**	0	0	0	-	0	0	0	29/27
Cercocarpus montanus									
92	**100**	60	40	-	-	20	80	0	-/-
99	**60**	0	100	-	-	33	33	0	48/55
04	**40**	0	100	-	-	0	100	0	44/55
09	**20**	0	100	-	-	0	100	0	79/73

		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									
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	36/24
Ephedra viridis									
92	**0**	0	0	-	-	0	0	0	-/-
99	**20**	100	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	16/21
09	**20**	0	100	-	-	0	0	0	-/-
Gutierrezia sarothrae									
92	**9960**	20	79	1	360	0	0	.40	-/-
99	**23760**	13	87	1	80	0	0	.16	6/9
04	**1400**	53	44	3	360	1	0	3	6/11
09	**11180**	21	73	6	340	0	0	2	6/9
Juniperus osteosperma									
92	**100**	80	20	0	-	20	0	0	-/-
99	**120**	100	0	0	-	0	0	0	-/-
04	**120**	17	50	33	-	0	0	17	-/-
09	**100**	20	80	0	-	0	0	0	-/-
Mahonia fremontii									
92	**40**	0	100	-	-	50	50	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**40**	0	100	-	-	0	0	0	67/84
09	**60**	33	67	-	-	0	0	0	70/90
Opuntia sp.									
92	**20**	100	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	4/10
09	**40**	0	100	-	-	0	0	0	4/15
Pinus edulis									
92	**140**	57	43	0	-	29	0	0	-/-
99	**140**	29	71	0	20	0	0	0	-/-
04	**80**	25	50	25	-	0	0	0	-/-
09	**40**	0	100	0	20	0	0	0	-/-
Purshia tridentata									
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	6/15
04	**0**	0	0	-	-	0	0	0	7/16
09	**0**	0	0	-	-	0	0	0	6/10

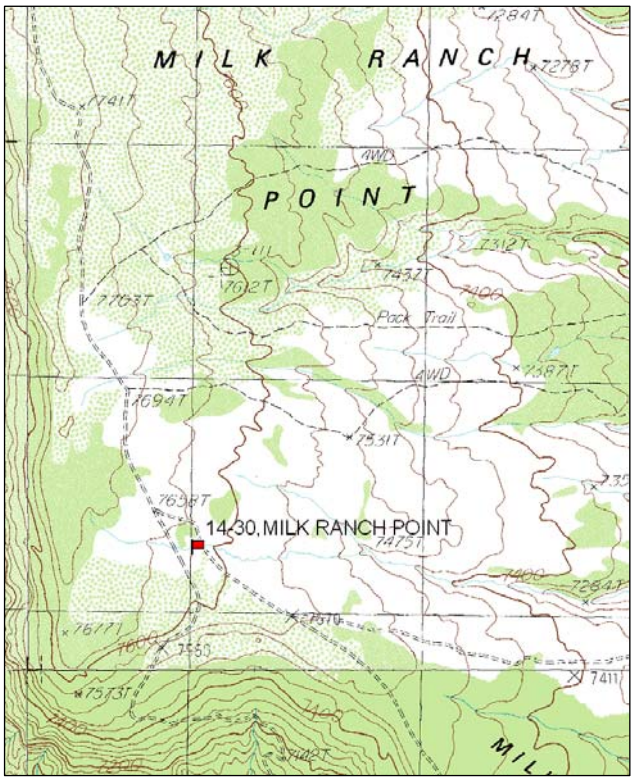
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus									
92	**40**	0	100	-	-	0	100	0	-/-
99	**20**	0	100	-	-	0	0	0	39/82
04	**60**	0	100	-	-	0	0	67	42/69
09	**60**	0	100	-	-	0	0	0	44/55
Yucca sp.									
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	7/17

MILK RANCH POINT - TREND STUDY NO. 14-30-09

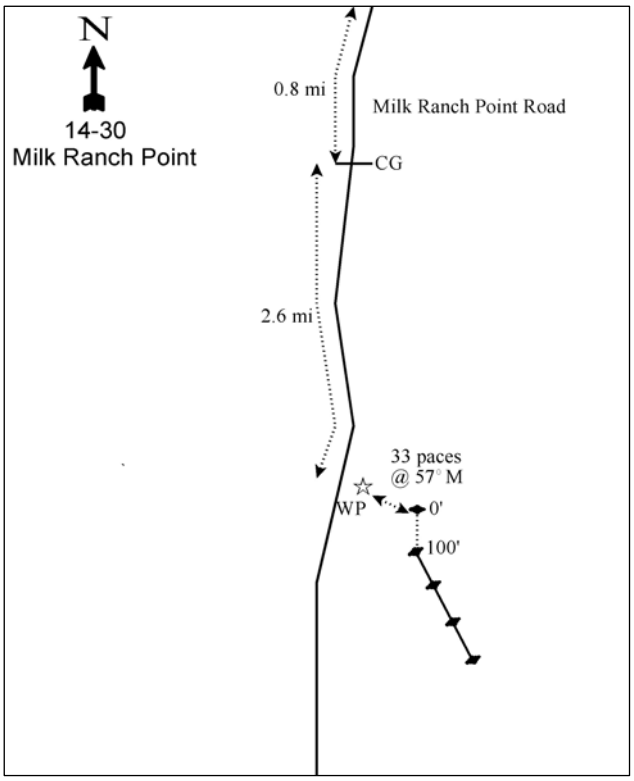
Vegetation Type: Mixed Mountain Brush
Range Type: Crucial Deer Spring/Fall, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 7,600 ft (2,316 m)
Aspect: East
Slope: 2%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
From Forest Service Road # 92, turn south onto Milk Ranch Point road. Drive 0.8 miles to a cattleguard. Continue 2.6 miles to a witness post. From the witness post, walk 33 paces at 57°M to the 0-foot stake. The 200'-400' stakes are at a bearing of 145°M.

Map Name: Cream Pots



Diagrammatic Sketch:



Township: 36S, Range: 20E, Section: 29

GPS: NAD 83, UTM 12S 610949 E 4165444 N

MILK RANCH POINT - TREND STUDY NO. 14-30

Site Information

Site Description: The study was established near the edge of a bench that drops off to the south to lower pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*) and sagebrush (*Artemisia sp.*) covered mesas above Arch Canyon. The site was originally plowed and seeded in 1953. Part of the bench burned sometime prior to 2004 in a prescribed burn, but the sampling area was not affected. There are many stock ponds along the bench and the area is managed as part of the Babylon allotment. Pellet group data has indicated light use from deer, elk and cattle since 1999 (Table - Pellet Group Data).

Browse: This mountain brush community is dominated by Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and Gambel oak (*Quercus gambelii*). Serviceberry provides the majority of browse cover on the site (Table - Browse Trends). The serviceberry plants are large and some are tall enough to be partly unavailable. All three species have healthy populations with low decadence and poor vigor, and good recruitment of young plants. Utilization has bee mostly light to moderate for all three species with some heavy use of serviceberry and sagebrush in some sample years. There is also a small population of antelope bitterbrush (*Purshia tridentata*) that has shown heavy use in the past (Table - Browse Characteristics). Mature pinyon and juniper trees are established at a fairly high density throughout the site. Point quarter data has estimated an increase in pinyon density since 1999 with very little change in the juniper density (Table - Point-Quarter Data). There has also been a steady increase in the overhead canopy cover of pinyon pine since 1999 (Table - Canopy Cover).

Herbaceous Understory: The herbaceous understory is diverse and fairly abundant. Crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*A. intermedium*), and mutton bluegrass (*Poa fendleriana*) are the dominant grass species. Intermediate wheatgrass and mutton bluegrass provide the majority of the grass cover. Other grass species are found only rarely on the site. Forbs are more diverse than grasses and provide more cover. The dominant species are arrowleaf balsamroot (*Balsamorhiza sagittata*), silvery lupine (*Lupinus argenteus*), Washington lupine (*Lupinus polyphyllus*), and rock goldenrod (*Petradoria pumilus*).

Soil: Soil is a sandy loam with a neutral pH and fairly shallow effective rooting depth (Table - Soil Analysis Data). There is good protective cover from vegetation and litter on the site and bare ground cover is low (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 and moderate in 2009 due to the pedestaling of plants and soil movement.

Trend Assessments

Browse:

- **1992 to 1999 - down (-2):** The primary browse species, serviceberry, decreased in density by 74% from 3,800 plants/acre to 980 plants/acre and cover decreased from 16% to 11%. Most of the decrease in density was from a decrease in young serviceberry plants, though there was a decrease in mature plants as well. There was little change in the other preferred browse species.
- **1999 to 2004 - stable (0):** There was a slight increase in the density of serviceberry and mountain big sagebrush, but cover remained similar. Recruitment of young serviceberry increased slightly, but recruitment of young sagebrush plants decreased slightly.
- **2004 to 2009 - slightly up (+1):** There was a 24% increase in the density of mountain big sagebrush from 1,580 plants/acre to 1,960 plants/acre, though there was little change in cover. Recruitment of young sagebrush plants increased to 11% of the population. There was also a slight increase in the density of serviceberry.

Grass:

- **1992 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover decreased from 10% to 7%.
- **1999 to 2004 - down (-2):** There was a 25% decrease in the sum of nested frequency of perennial grasses, though cover remained similar.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses.

Forb:

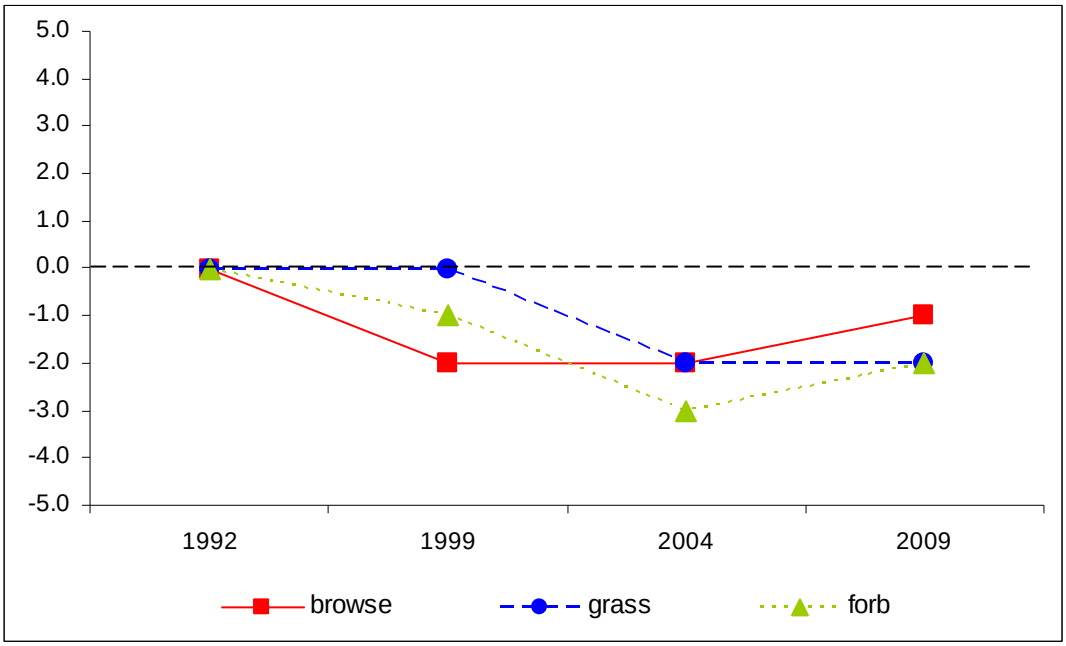
- **1992 to 1999 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 17% and cover decreased from 17% to 15%. There was a significant decrease in the nested frequency of Wyoming painted-cup (*Castilleja linariaefolia*), wing eriogonum (*Eriogonum alatum*), and stemless hymenoxys (*Hymenoxys acaulis*).
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 34% and cover decreased to 11%. There was a significant decrease in the nested frequency of silvery lupine.
- **2004 to 2009 - slightly up (+1):** There was a 12% increase in the sum of nested frequency of perennial forbs and cover increased to 12%. There was a significant increase in nested frequency of arrowleaf balsamroot and rock goldenrod.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 14, study no: 30

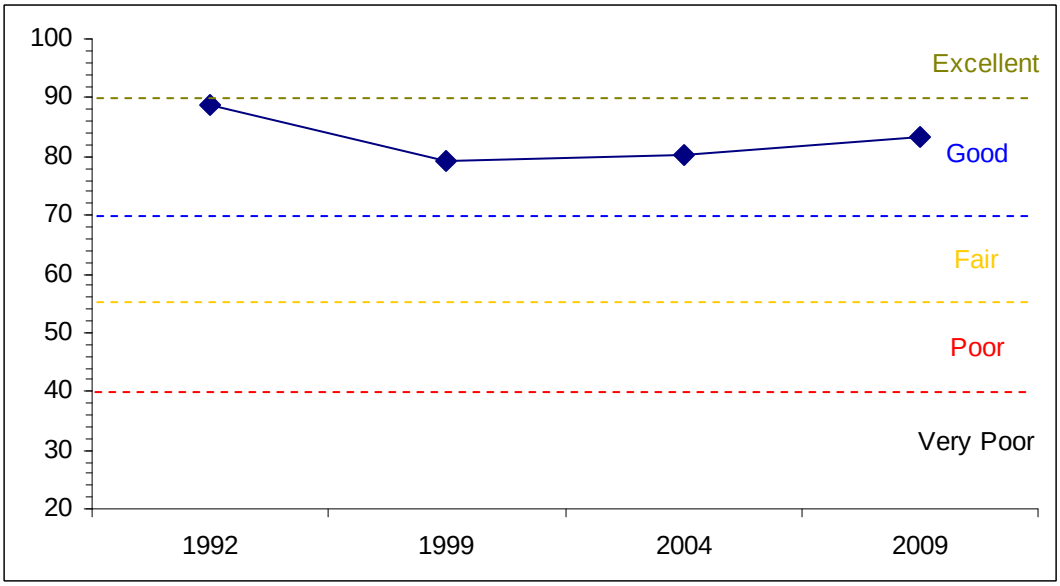
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	30.0	13.7	15.0	19.9	0.0	10.0	0.0	**88.7**	Good-Excellent
99	29.2	13.5	11.9	14.9	0.0	10.0	0.0	**79.4**	Good
04	29.1	12.2	13.3	15.6	0.0	10.0	0.0	**80.3**	Good
09	29.3	13.5	15.0	15.7	0.0	10.0	0.0	**83.5**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 30



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL
Management unit 14, Study no: 30



HERBACEOUS TRENDS--
Management unit 14, Study no: 30

Type	Species	Nested Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron cristatum	ab59	b95	b83	a21	.43	1.48	1.60	.32
G	Agropyron intermedium	b173	ab127	a96	a115	5.66	2.98	3.07	3.17
G	Bouteloua gracilis	4	4	4	1	.15	.03	.15	.00
G	Bromus inermis	-	-	-	2	-	-	-	.00
G	Carex sp.	b17	ab10	a1	a2	.39	.24	.18	.04
G	Koeleria cristata	7	5	-	-	.30	.03	-	-
G	Oryzopsis hymenoides	a4	b19	a4	a-	.04	.29	.02	-
G	Poa bulbosa	-	6	-	6	-	.01	-	.04
G	Poa fendleriana	a71	a99	a86	b145	2.89	2.20	2.78	4.07
G	Poa pratensis	2	-	-	-	.03	-	-	-
G	Sitanion hystrix	9	-	3	3	.03	-	.00	.18
G	Stipa columbiana	3	4	-	1	.03	.15	-	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		349	369	277	296	9.97	7.43	7.82	7.84
Total for Grasses		349	369	277	296	9.97	7.43	7.82	7.84
F	Agoseris glauca	a-	b7	a-	a-	-	.12	-	-
F	Androsace septentrionalis (a)	-	3	-	-	-	.00	-	-
F	Arabis sp.	-	2	2	-	-	.00	.00	-
F	Balsamorhiza sagittata	a46	bc89	ab57	c99	2.50	4.48	3.39	3.58
F	Castilleja linariaefolia	c59	b38	a-	a3	.87	.46	-	.01
F	Collinsia parviflora (a)	-	2	10	7	-	.00	.02	.01
F	Comandra pallida	-	-	5	2	-	-	.03	.03
F	Crepis acuminata	10	22	6	29	.12	.30	.05	.46
F	Cryptantha sp.	b44	a-	a2	ab11	1.86	-	.03	.08
F	Cymopterus sp.	a-	a6	a4	b27	-	.05	.04	.14
F	Erigeron eatonii	18	9	13	7	.39	.07	.02	.05
F	Erigeron pumilus	16	14	10	20	.14	.05	.07	.11
F	Eriogonum alatum	b102	a51	a43	a24	2.23	.48	.28	.23
F	Eriogonum racemosum	b43	ab30	ab23	a13	.56	.19	.21	.06
F	Eriogonum umbellatum	-	-	3	1	-	-	.03	.00
F	Euphorbia sp.	-	2	-	-	-	.00	-	-
F	Haplopappus acaulis	-	1	-	-	-	.00	-	-
F	Hymenoxys acaulis	b95	a37	ab68	a51	.90	.45	.46	.49
F	Ipomopsis aggregata	5	6	1	-	.01	.18	.00	-
F	Lathyrus lanszwertii	7	1	8	-	1.00	.03	.04	-
F	Lesquerella sp.	b98	ab63	ab58	a49	.54	.30	.37	.30
F	Lupinus argenteus	b79	b96	a2	a-	2.85	2.36	.09	-
F	Lupinus polyphyllus	a6	b41	b41	b30	.03	1.72	1.82	1.52
F	Microsteris gracilis (a)	-	a1	b25	b24	-	.00	.04	.04
F	Penstemon lentus	b68	ab57	a37	a31	.37	1.39	.24	.45
F	Penstemon strictus	6	14	1	7	.04	.05	.00	.04
F	Petradoria pumila	ab58	a35	a54	b85	2.45	1.73	3.30	4.33
F	Phlox longifolia	b77	b72	a30	a31	.43	.23	.13	.08

Type	Species	Nested Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
F	Polygonum douglasii (a)	$_{b}$60	$_{a}$1	$_{a}$-	$_{a}$1	.22	.00	-	.00
F	Senecio multilobatus	$_{a}$-	$_{a}$3	$_{a}$-	$_{b}$14	-	.03	-	.20
F	Senecio neomexicanus	$_{b}$25	$_{ab}$16	$_{ab}$10	$_{a}$3	.10	.07	.05	.06
F	Taraxacum officinale	-	4	1	-	-	.03	.00	-
F	Unknown forb-perennial	3	-	-	-	.01	-	-	-
F	Vicia americana	-	2	-	-	-	.00	-	-
F	Zigadenus paniculatus	-	2	-	-	-	.00	-	-
Total for Annual Forbs		60	7	35	32	0.22	0.01	0.05	0.05
Total for Perennial Forbs		865	720	479	537	17.46	14.89	10.72	12.27
Total for Forbs		925	727	514	569	17.69	14.92	10.78	12.33

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

BROWSE TRENDS--
Management unit 14, Study no: 30

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Amelanchier utahensis	41	36	34	32	16.15	11.07	11.76	11.36
B	Artemisia tridentata vaseyana	48	47	42	56	4.75	4.58	5.17	4.49
B	Chrysothamnus depressus	40	28	30	30	.28	.28	.25	.37
B	Gutierrezia sarothrae	44	20	39	43	1.19	.10	.72	.93
B	Juniperus osteosperma	1	0	0	0	.63	.15	.15	.38
B	Pinus edulis	8	5	4	7	2.55	2.09	2.39	2.82
B	Purshia tridentata	5	4	3	3	.41	.03	.00	.00
B	Quercus gambelii	19	16	16	16	6.48	6.48	4.71	6.15
B	Symphoricarpos oreophilus	2	0	0	1	.00	-	-	.00
Total for Browse		208	156	168	188	32.47	24.80	25.16	26.51

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 30

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	1.39	15.39	13.83
Artemisia tridentata vaseyana	-	5.09	8.10
Chrysothamnus depressus	-	.65	1.85
Gutierrezia sarothrae	-	.60	.88
Juniperus osteosperma	-	.50	1.00
Pinus edulis	3.79	4.53	7.78
Quercus gambelii	6.40	7.08	10.64

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 30

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	3.4	2.2
Artemisia tridentata vaseyana	1.9	1.3

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 30

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	20	-	20	4.5	-	5.0
Pinus edulis	84	95	118	3.5	4.5	4.3
Quercus gambelii	49	-	53	1.3	-	1.4

BASIC COVER--
Management unit 14, Study no: 30

Cover Type	Average Cover %			
	'92	'99	'04	'09
Vegetation	47.50	44.46	41.76	42.13
Rock	2.67	.96	1.24	1.51
Pavement	0	1.31	.85	1.48
Litter	52.97	50.88	42.66	49.05
Cryptogams	6.70	3.27	1.95	2.78
Bare Ground	18.52	26.10	35.11	27.42

SOIL ANALYSIS DATA --
Management unit 14, Study no: 30, Study Name: Milk Ranch Point

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.3	6.7	58	23.4	18.6	1.5	3.4	108.8	0.6

PELLET GROUP DATA--
Management unit 14, Study no: 30

Type	Quadrat Frequency				Days use per acre (ha)		
	'92	'99	'04	'09	'99	'04	'09
Rabbit	29	44	21	18	-	-	-
Elk	2	-	3	5	1 (2)	3 (7)	7 (18)
Deer	5	12	1	4	11 (27)	4 (8)	6 (15)
Cattle	-	1	1	-	6 (15)	-	-

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 30

		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									
92	**3800**	68	31	1	3220	28	5	4	-/-
99	**980**	16	82	2	20	31	35	2	53/67
04	**1120**	23	73	4	-	39	4	0	47/58
09	**1280**	50	48	2	240	8	16	0	52/62
Artemisia tridentata vaseyana									
92	**1520**	38	42	20	100	32	5	7	-/-
99	**1500**	11	69	20	20	21	4	13	18/30
04	**1580**	3	72	25	27460	6	0	9	20/29
09	**1960**	11	79	10	240	4	3	7	19/31
Chrysothamnus depressus									
92	**1600**	53	44	4	60	21	4	4	-/-
99	**920**	0	96	4	-	7	9	4	3/7
04	**1020**	2	92	6	-	20	12	2	5/10
09	**1020**	4	94	2	20	4	12	0	3/8
Gutierrezia sarothrae									
92	**2160**	2	98	0	20	0	0	.92	-/-
99	**740**	8	92	0	60	0	0	0	6/7
04	**2300**	46	54	0	240	0	0	0	8/9
09	**3200**	10	89	1	-	0	0	0	7/6
Juniperus osteosperma									
92	**20**	100	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Pinus edulis									
92	**280**	57	43	-	220	0	0	0	-/-
99	**100**	60	40	-	20	0	20	0	-/-
04	**80**	50	50	-	60	0	0	0	-/-
09	**140**	57	43	-	20	0	0	0	-/-
Purshia tridentata									
92	**100**	20	60	20	-	40	60	0	-/-
99	**80**	25	75	0	-	25	25	0	13/33
04	**60**	0	100	0	-	33	33	0	12/25
09	**60**	0	100	0	-	67	0	0	14/25
Quercus gambelii									
92	**1620**	42	58	0	380	26	0	0	-/-
99	**1280**	47	53	0	80	0	0	0	47/39
04	**1240**	63	32	5	-	0	0	0	47/44
09	**1220**	39	54	7	100	0	0	0	29/48

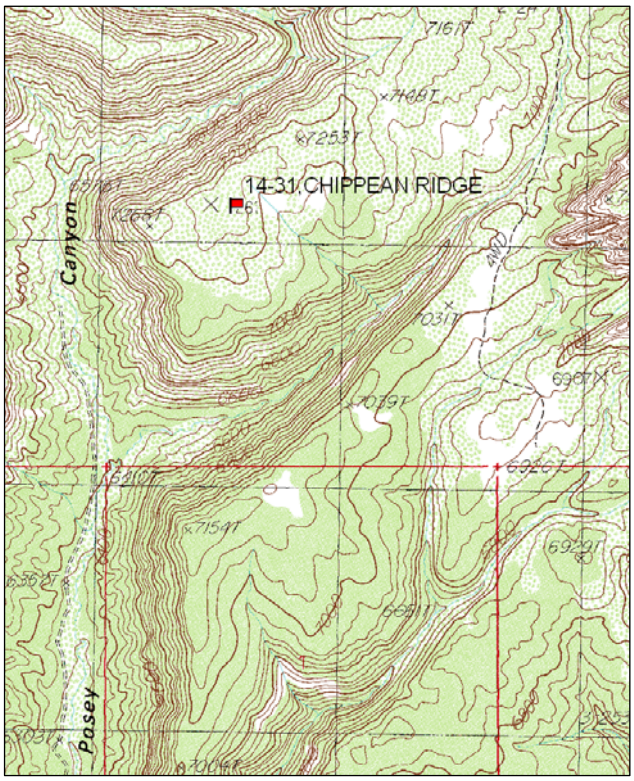
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus									
92	**160**	88	0	13	-	0	0	13	-/-
99	**0**	0	0	0	-	0	0	0	-/-
04	**0**	0	0	0	-	0	0	0	20/17
09	**20**	0	0	100	-	0	0	0	-/-

CHIPPEAN RIDGE - TREND STUDY NO. 14-31-09

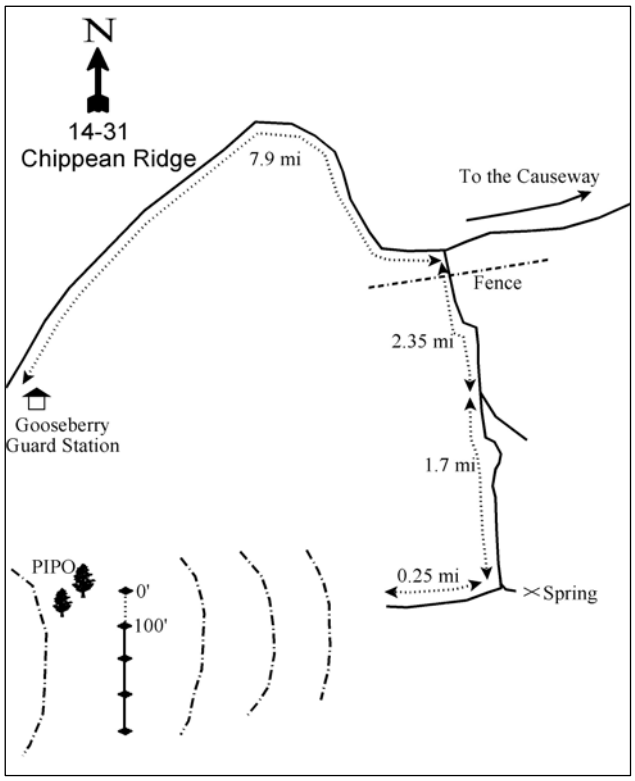
Vegetation Type: Mixed Mountain Brush
Range Type: Crucial Deer Summer, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 7,200 ft (2,195 m)
Aspect: South
Slope: 8%-10%
Transect bearing: 181 degrees magnetic
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
From the Gooseberry Guard Station go north and east towards 'The Causeway' for 7.9 miles to a fork. Turn right off the main road passing through a gate/fence shortly after the turn. Continue 2.35 miles to a fork and bear right. Drive 1.7 miles to another fork and turn right on a very faint overgrown road (left road ends about a 100 ft or so near a spring). Continue on another 0.25 miles to the end of the road. Continue to follow the old road or trail west at a slight rise in elevation about 2/3 of a mile to the third ridge. There are two Ponderosa pines 30 ft apart which are near the ridge's northern apex. The 0 ft baseline stake is 50 ft away from the lowermost, larger PIPO at a bearing of 60° M. The baseline is marked with half high steel fence posts.

Map Name: Chippean Rocks



Diagrammatic Sketch:



Township: 34S, Range: 20E, Section: 36

GPS: NAD 83, UTM 12S 616475 E 4182324 N

CHIPPEAN RIDGE - TREND STUDY NO. 14-31

Site Information

Site Description: The study is in a mountain brush community on the southwest side of Chippean Ridge above Posey Canyon. There are a few scattered ponderosa pine (*Pinus ponderosa*), pinyon pine (*P. edulis*) and Utah juniper (*Juniperus osteosperma*) on the study site, but further up the ridge ponderosa and manzanita (*Arctostaphylos patula*) are the dominant species association. Several elk antler drops were found on site in 1992, but all appeared to be from the previous winter ('91). Pellet group data has indicated lightly moderate use by elk and minimal use by deer and cattle since 1999 (Table - Pellet Group Data). There were signs of ATV use on the hillsides surrounding the site in 2009.

Browse: The shrub component is very diverse and abundant on the site. The preferred browse is dominated by mature Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and true mountain mahogany (*Cercocarpus montanus*). Serviceberry and true mountain mahogany have healthy populations with good vigor, low decadence, and good recruitment of young plants. The mountain big sagebrush population had an increase in poor vigor and decadence in 2004, and both values remained moderately high in 2009. Recruitment of young mountain big sagebrush plants has also steadily decreased since 1992. Utilization of the three primary browse species has been mostly light to moderate with some heavy use in several sample years (Table - Browse Characteristics). There is a moderately dense stand of mostly smaller pinyon pine and Utah juniper trees on the site. Point quarter data has shown little change in the density of the stand since 1999 (Table - Point-Quarter Tree Data), though the canopy cover of pinyon pine has increased slightly over that time (Table - Canopy Cover).

Herbaceous Understory: The herbaceous understory is diverse and abundant, though introduced grasses are dominant. Crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), and bulbous bluegrass (*Poa bulbosa*) provide nearly all of the grass cover on the site. Bulbous bluegrass is a short lived perennial with a low forage value and is considered undesirable. Needle-and-thread (*Stipa comata*) was the only common native grass on the site, but nested frequency declined significantly between 1999 and 2004. Forbs are diverse, but none are overly abundant or provide much forage on the site (Table - Herbaceous Trends).

Soil: The soil is a sandy clay loam with a neutral pH and a deep effective rooting depth. Phosphorus has limited availability for plant growth and development at 4.1 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Overall, there is good protective ground cover provided by litter and vegetation cover, but there are small scattered areas without litter cover and only small amounts of vegetation cover. The bare ground is moderately high for a site like this (Table - Basic Cover). The soil erosion condition was rated as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1992 to 1999 - stable (0):** There was a decrease in the density of serviceberry and mountain big sagebrush on the site. The decrease was due to a large decrease in the large number of young plants sampled in 1992 as the density of mature plants remained similar for both species. Even with the decrease in recruitment of young plants, recruitment was still good for both sagebrush and serviceberry.
- **1999 to 2004 - slightly down (-1):** There was a 25% decrease in the density of mountain big sagebrush from 2,240 plant/acre to 1,780 plants/acre and cover of serviceberry decreased slightly. Decadence and poor vigor of sagebrush increased to 35% and 22%, respectively. Recruitment of young sagebrush and true mountain mahogany plants decreased.
- **2004 to 1999 - slightly up (+1):** There was an increase in the density of serviceberry, mountain big sagebrush, and true mountain mahogany. Cover of serviceberry and true mountain mahogany increased slightly.

Grass:

- **1992 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover decreased slightly from 16% to 13%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 33% and cover decreased to 8%. There was a significant decrease in the nested frequency of bulbous bluegrass and needle-and-thread, and a significant increase in the nested frequency of Indian ricegrass (*Oryzopsis hymenoides*).
- **2004 to 2009 - up (+2):** There sum of nested frequency of perennial grasses increased 33% and cover increased to 12%. There was a significant increase in the nested frequency of bulbous bluegrass.

Forb:

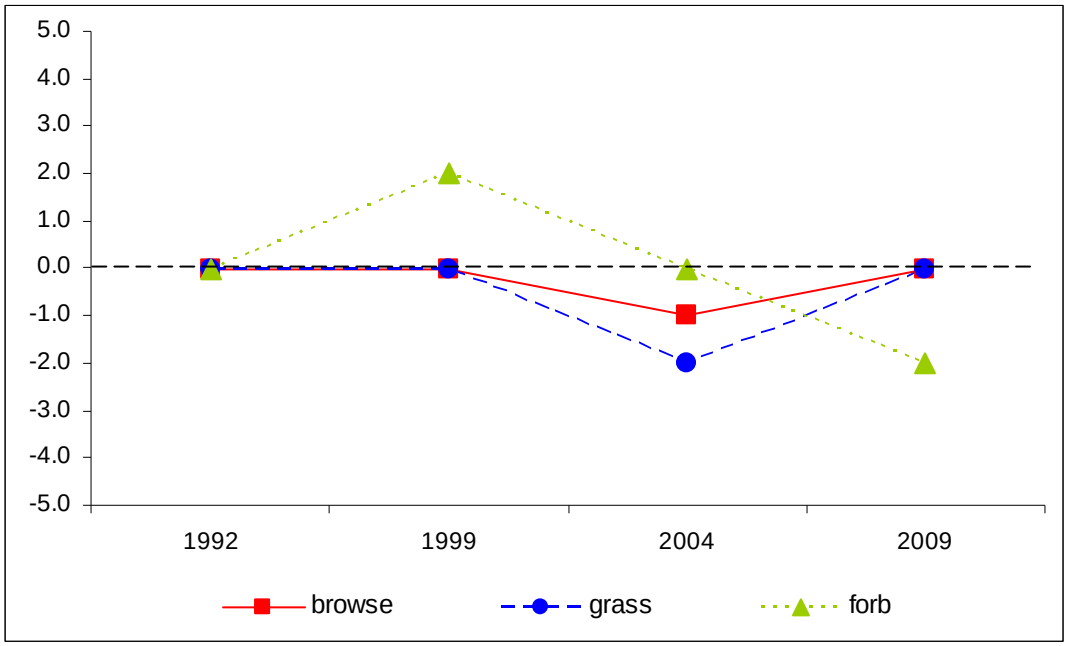
- **1992 to 1999 - up (+2):** There was a 44% increase in the sum of nested frequency of perennial grasses and cover increased from 3% to 5%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 30% and cover decreased to 4%.
- **2004 to 2009 - down (-2):** The sum of nested frequency of perennial forbs decreased by 26% with a significant decrease in the nested frequency of lobeleaf groundsel (*Senencio multilobatus*) and bladderpod (*Lesquerella rectipes*).

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 14, study no: 31

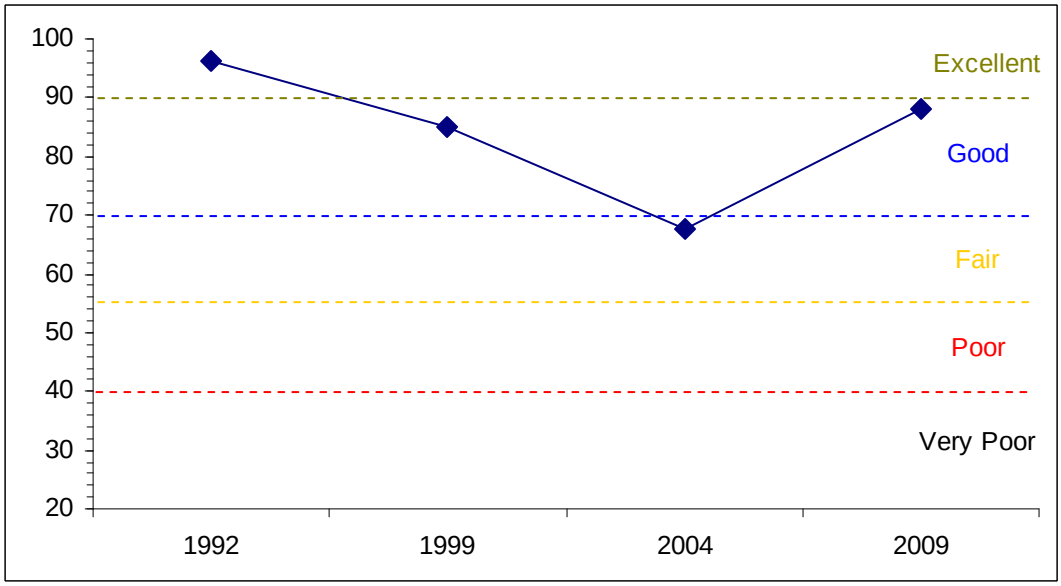
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	30.0	14.7	15.0	30.0	0.0	6.5	0.0	**96.1**	Excellent
99	25.2	13.6	10.7	26.2	0.0	9.3	0.0	**85.0**	Good
04	25.3	11.6	7.0	15.8	0.0	8.0	0.0	**67.6**	Fair
09	30.0	12.7	14.2	24.2	0.0	6.9	0.0	**88.0**	Good-Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 31



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL
Management unit 14, Study no: 31



HERBACEOUS TRENDS--
Management unit 14, Study no: 31

Type	Species	Nested Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron cristatum	72	64	76	70	4.77	2.73	3.55	3.34
G	Bouteloua gracilis	7	13	12	14	.30	.45	.31	.59
G	Bromus inermis	143	132	113	142	2.80	3.42	2.09	3.51
G	Bromus tectorum (a)	2	-	-	-	.00	-	-	-
G	Carex sp.	4	1	-	1	.33	.03	-	.03
G	Koeleria cristata	-	-	4	-	-	-	.00	-
G	Oryzopsis hymenoides	$_{a}$-	$_{a}$8	$_{b}$29	$_{ab}$11	-	.15	.28	.39
G	Poa bulbosa	$_{b}$165	$_{b}$175	$_{a}$29	$_{b}$122	6.51	5.01	.54	2.55
G	Poa fendleriana	$_{a}$13	$_{a}$8	$_{ab}$16	$_{b}$40	.27	.06	.48	.99
G	Sitanion hystrix	3	-	2	-	.00	-	.03	-
G	Stipa comata	$_{b}$74	$_{b}$61	$_{a}$31	$_{a}$16	1.29	1.23	.57	.69
G	Vulpia octoflora (a)	-	6	-	-	-	.01	-	-
Total for Annual Grasses		2	6	0	0	0.00	0.00	0	0
Total for Perennial Grasses		481	462	312	416	16.29	13.09	7.88	12.12
Total for Grasses		483	468	312	416	16.29	13.10	7.88	12.12
F	Calochortus nuttallii	-	3	-	-	-	.00	-	-
F	Castilleja linariaefolia	6	4	-	7	.04	.04	-	.59
F	Chaenactis douglasii	$_{b}$67	$_{a}$28	$_{a}$21	$_{a}$9	1.34	.34	.38	.33
F	Cirsium sp.	-	1	2	-	-	.03	.03	-
F	Collinsia parviflora (a)	-	4	-	-	-	.03	-	-
F	Comandra pallida	$_{a}$35	$_{b}$64	$_{ab}$56	$_{ab}$42	.14	1.09	.55	.64
F	Cordylanthus sp. (a)	-	$_{a}$-	$_{b}$23	$_{b}$14	-	-	.32	.18
F	Crepis acuminata	3	6	-	4	.00	.01	-	.01
F	Epilobium brachycarpum (a)	-	3	-	-	-	.18	-	-
F	Eriogonum alatum	-	-	2	9	-	-	.03	.04
F	Eriogonum racemosum	$_{b}$52	$_{b}$57	$_{ab}$41	$_{a}$30	.84	.57	.27	.27
F	Eriogonum umbellatum	5	16	5	15	.03	.17	.07	.10
F	Heterotheca villosa	-	1	-	-	-	.03	-	-
F	Hymenoxys acaulis	$_{a}$9	$_{bc}$26	$_{ab}$22	$_{c}$35	.10	.19	.15	1.00
F	Lesquerella rectipes	$_{ab}$67	$_{ab}$80	$_{b}$92	$_{a}$45	.26	.25	1.43	.18
F	Lomatium sp.	$_{a}$3	$_{b}$34	$_{a}$2	$_{ab}$6	.06	.58	.00	.01
F	Lupinus sericeus	3	12	9	1	.03	.31	.09	.03
F	Machaeranthera canescens	$_{ab}$7	$_{b}$21	$_{b}$9	$_{a}$-	.01	.04	.05	-
F	Penstemon comarrhenus	$_{b}$17	$_{ab}$8	$_{a}$3	$_{a}$-	.06	.04	.03	-
F	Phlox longifolia	$_{a}$26	$_{b}$53	$_{a}$6	$_{a}$17	.10	.14	.07	.03
F	Polygonum douglasii (a)	$_{b}$38	$_{a}$5	$_{a}$-	$_{a}$4	.11	.01	-	.00
F	Senecio multilobatus	$_{a}$14	$_{b}$60	$_{b}$63	$_{a}$22	.12	.75	.82	.15
F	Sphaeralcea coccinea	$_{b}$17	$_{a}$1	$_{a}$2	$_{a}$3	.06	.00	.00	.03
F	Zigadenus paniculatus	-	3	-	3	.00	.03	-	.01
Total for Annual Forbs		38	12	23	18	0.11	0.21	0.32	0.18
Total for Perennial Forbs		331	478	335	248	3.24	4.66	4.00	3.44
Total for Forbs		369	490	358	266	3.36	4.88	4.32	3.63

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

BROWSE TRENDS--
Management unit 14, Study no: 31

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Amelanchier utahensis	25	24	28	25	11.52	8.10	7.34	9.76
B	Arctostaphylos patula	2	4	3	1	2.96	4.88	5.66	4.56
B	Artemisia nova	0	0	5	0	-	-	.01	-
B	Artemisia tridentata vaseyana	55	57	47	58	5.14	4.48	4.49	4.49
B	Cercocarpus montanus	11	14	11	15	4.82	4.77	5.21	6.52
B	Chrysothamnus depressus	14	8	11	10	.69	.23	.71	.30
B	Coryphantha vivipara arizonica	0	1	0	0	-	.00	-	-
B	Gutierrezia sarothrae	51	21	33	36	.98	.16	.93	1.28
B	Juniperus osteosperma	1	1	1	0	.03	.15	.18	1.36
B	Opuntia sp.	14	4	4	10	.06	.01	.00	.13
B	Pediocactus simpsonii	0	1	0	1	-	.00	-	.38
B	Pinus edulis	4	3	6	3	3.40	2.97	3.74	3.82
B	Purshia tridentata	1	0	1	1	.15	-	.00	.15
B	Quercus gambelii	0	0	0	0	-	-	-	.15
B	Symphoricarpos oreophilus	5	2	8	2	.15	.15	1.31	.00
Total for Browse		183	140	158	162	29.93	25.94	29.62	32.93

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 31

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	2.00	13.18	14.30
Arctostaphylos patula	-	5.91	5.78
Artemisia tridentata vaseyana	-	6.78	5.23
Cercocarpus montanus	3.40	8.31	8.06
Chrysothamnus depressus	-	.18	.13
Gutierrezia sarothrae	-	.90	.55
Juniperus osteosperma	.80	-	.26
Opuntia sp.	-	.20	.03
Pinus edulis	4.59	5.61	6.84
Pinus ponderosa	-	.03	-
Purshia tridentata	-	.75	-
Quercus gambelii	1.00	1.00	.80
Symphoricarpos oreophilus	-	1.83	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 31

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	1.9	1.4
Artemisia tridentata vaseyana	1.8	1.9
Cercocarpus montanus	4.3	3.5

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 31

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	29	-	28	8.5	-	5.9
Pinus edulis	33	-	38	5.0	-	3.3
Quercus gambelii	20	-	-	2.0	-	-

BASIC COVER--
Management unit 14, Study no: 31

Cover Type	Average Cover %			
	'92	'99	'04	'09
Vegetation	41.22	40.61	43.33	43.06
Rock	.49	.26	1.17	.63
Pavement	0	.12	.08	.01
Litter	43.40	40.94	39.56	46.66
Cryptogams	6.87	8.56	2.98	5.11
Bare Ground	22.28	29.17	40.18	31.56

SOIL ANALYSIS DATA --
Management unit 14, Study no: 31, Study Name: Chippean Ridge

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
24.7	7.2	57.6	17.8	24.6	1.2	4.1	102.4	0.7

PELLET GROUP DATA--
Management unit 14, Study no: 31

Type	Quadrat Frequency				Days use per acre (ha)		
	'92	'99	'04	'09	'99	'04	'09
Rabbit	15	34	15	5	-	-	-
Elk	1	3	7	11	24 (59)	23 (58)	28 (69)
Deer	10	6	4	2	7 (17)	5 (12)	1 (2)
Cattle	-	2	-	-	4 (10)	2 (4)	-

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 31

		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									
92	**1280**	55	45	0	340	41	5	0	-/-
99	**680**	26	74	0	180	6	56	0	64/87
04	**880**	30	66	5	-	32	9	2	59/71
09	**1040**	33	65	2	320	6	8	0	59/79
Arctostaphylos patula									
92	**40**	0	100	-	-	0	0	0	-/-
99	**80**	25	75	-	-	0	0	0	44/143
04	**60**	0	100	-	-	0	0	0	30/89
09	**20**	0	100	-	-	0	0	0	24/76
Artemisia nova									
92	**0**	0	0	0	-	0	0	0	-/-
99	**0**	0	0	0	-	0	0	0	-/-
04	**200**	0	20	80	-	70	20	40	11/21
09	**0**	0	0	0	-	0	0	0	-/-
Artemisia tridentata vaseyana									
92	**3300**	55	40	5	20	55	19	5	-/-
99	**2240**	10	73	17	40	21	13	5	18/27
04	**1780**	6	60	35	-	81	3	22	17/27
09	**2100**	2	73	25	40	34	18	19	20/29
Cercocarpus montanus									
92	**240**	33	67	0	180	58	8	0	-/-
99	**320**	25	75	0	60	44	6	0	66/73
04	**240**	0	100	0	-	50	0	0	65/61
09	**380**	42	53	5	60	21	0	5	50/50
Chrysothamnus depressus									
92	**680**	35	65	0	20	21	0	0	-/-
99	**420**	5	81	14	-	0	10	14	7/15
04	**620**	0	87	13	-	6	0	6	7/12
09	**380**	5	95	0	-	0	0	0	5/10
Coryphantha vivipara arizonica									
92	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	2/3
04	**0**	0	0	-	-	0	0	0	3/4
09	**0**	0	0	-	-	0	0	0	-/-
Cowania mexicana stansburiana									
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	43/42
09	**0**	0	0	-	-	0	0	0	-/-

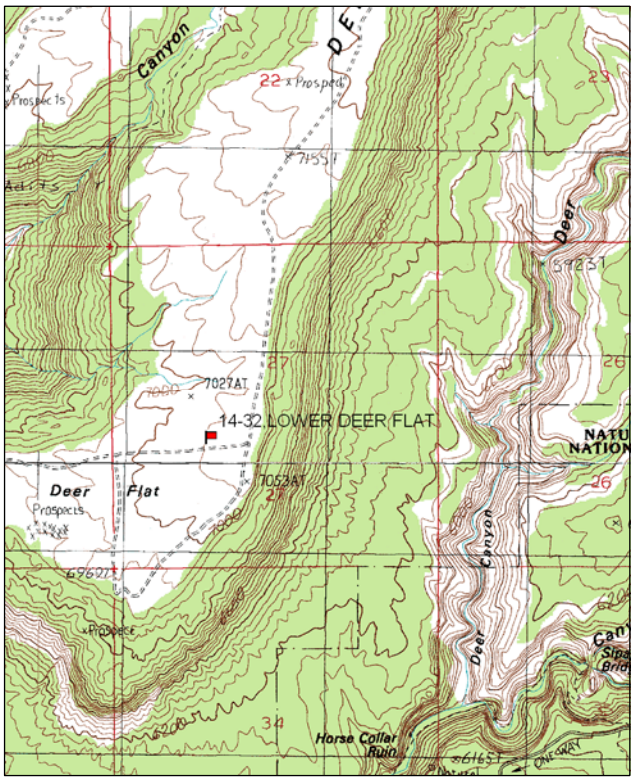
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
92	**3120**	4	95	1	-	0	0	.64	-/-
99	**1000**	62	38	0	240	4	0	0	5/5
04	**2540**	1	98	1	-	0	0	0	7/10
09	**2360**	0	100	0	140	0	0	0	8/9
Juniperus osteosperma									
92	**20**	100	0	-	-	0	0	0	-/-
99	**20**	100	0	-	40	0	0	0	-/-
04	**20**	100	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
92	**400**	55	40	5	-	0	0	5	-/-
99	**140**	29	57	14	-	0	0	29	3/7
04	**80**	25	50	25	-	0	0	25	3/10
09	**280**	14	86	0	20	0	0	0	3/7
Pediocactus simpsonii									
92	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	3/5
04	**0**	0	0	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	12/32
Pinus edulis									
92	**80**	25	75	-	-	0	0	0	-/-
99	**60**	33	67	-	40	0	0	0	-/-
04	**180**	78	22	-	40	0	0	0	-/-
09	**60**	33	67	-	60	0	0	0	-/-
Purshia tridentata									
92	**20**	100	0	-	-	100	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**40**	0	100	-	-	0	100	0	18/42
09	**20**	0	100	-	-	100	0	0	22/56
Quercus gambelii									
92	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	20	0	0	0	28/25
04	**0**	0	0	-	-	0	0	0	34/22
09	**0**	0	0	-	-	0	0	0	91/114
Symphoricarpos oreophilus									
92	**240**	42	58	-	40	8	0	0	-/-
99	**40**	100	0	-	-	0	0	0	31/47
04	**480**	17	83	-	-	4	0	0	11/20
09	**60**	33	67	-	20	0	0	0	16/34

LOWER DEER FLAT - TREND STUDY NO. 14-32-09

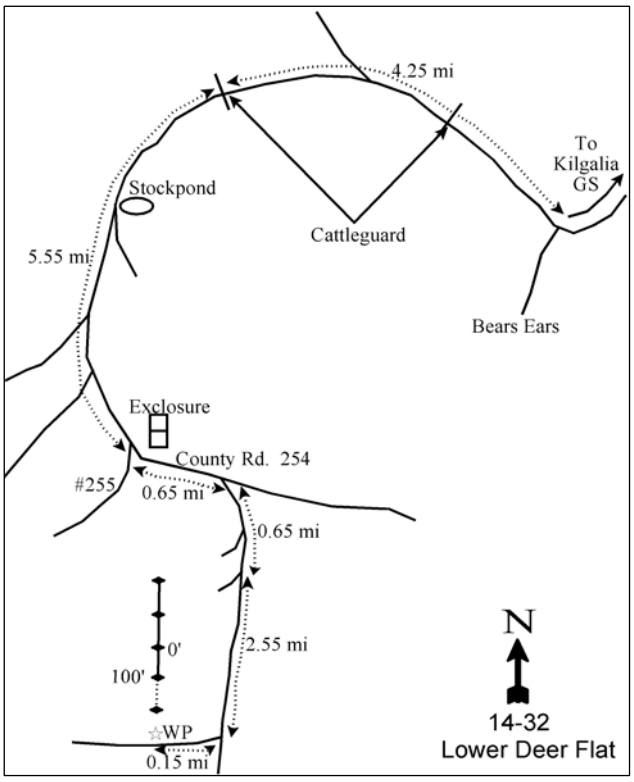
Vegetation Type: Sagebrush-Grass
Range Type: Crucial Deer Summer, Substantial Elk Winter
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper) R035XY315UT
Land Ownership: BLM
Elevation: 7,000 ft (2,195 m)
Aspect: West
Slope: 3%
Transect bearing: 356 degrees magnetic
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
At the intersection 2.45 miles southwest of the turnoff to Kigalia Guard Station and almost 2 miles northeast of the Bears Ears, turn west and proceed 2.0 miles to a cattleguard near a corral. Continue straight on this road, ignoring the turnoffs near the corral, for 1.75 miles to a fork. Stay left and continue 1.5 miles to a cattleguard at the FS/BLM boundary. After 2.4 more miles stay to the right at a fork under a stock pond. Continue 0.65 miles to another fork. Stay left. Proceed 0.6 more miles and stay left at the fork. Go 1.90 miles to an exclosure on the east side of the road. From the fork where county roads 254 and 255 split, go left on Road 254 for 0.65 miles to a fork. Turn right and go 0.35 miles to another fork. Stay left for 0.3 miles to another fork. Stay left for 2.55 miles to another fork. Turn right on a two-track for 0.15 miles to a witness post. The 0-foot stake is 19 paces at 342°M from the witness post. Browse tag # 267 is attached to the 0-foot stake.

Map name: Woodenshoe Butte



Diagrammatic Sketch:



Township: 36S, Range: 18E, Section: 19

GPS: NAD 83, UTM 12S 585339 E 4164745 N

LOWER DEER FLAT - TREND STUDY NO. 14-32

Site Information

Site Description: The study is located on Deer Flat, about 3 miles south of the suspended Deer Flat study (14-17), in an old chaining where deer winter in larger numbers. Pellet group data from the site has indicated very heavy use by deer since 1999. Estimated elk use was light in 1999 and 2004, but increased to more moderate use in 2009. Estimated cattle use has been moderate on the site since 1999 (Table - Pellet Group Data).

Browse: The site supports a dense stand of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) which provides almost all of the browse cover on the site (Table - Browse Trends). The density of sagebrush has steadily decreased over the sample years. The sagebrush population is mostly mature with moderate amounts of decadence. The proportion of sagebrush plants displaying poor vigor was high at the outset of the study in 1994, but has been more moderate in the other sample years. Utilization of sagebrush has been mostly moderate to heavy since 1999 (Table - Browse Characteristics). Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees are found at a relatively low density on the site. Point quarter data has indicated little change in the density or average diameter of pinyon and juniper since 1999 (Table - Point-Quarter Tree Data).

Herbaceous Understory: The herbaceous understory is dominated by the seeded species crested wheatgrass (*Agropyron cristatum*) which provides the majority of the total herbaceous cover. Other perennial grasses on this site have decreased since the outset of the study and were rare in 2009. These grasses include Indian ricegrass (*Oryzopsis hymenoides*), bottlebrush squirreltail (*Sitanion hystrix*), and needle-and-thread (*Stipa comata*). Annual cheatgrass (*Bromus tectorum*) is also present, but not very abundant. Forbs are rare and provide little forage. The only fairly common species include timber poisonvetch (*Astragalus convallarius*), longleaf phlox (*Phlox longifolia*), and scarlet globemallow (*Sphlaeralcea coccinea*).

Soil: The soil is a very compact loam with a neutral pH and a shallow effective rooting depth. Phosphorus and potassium have a limited availability for plant growth and development at 4.5 and 51.2 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). There is quite a bit of bare ground exposed, but erosion is minimal due to the abundant herbaceous vegetation cover and chaining debris (Table - Basic Cover). The soil erosion condition was classified as stable in 2004, but as slight in 2009 due to pedestaling of plants and flow patterns.

Trend Assessments

Browse:

- **1994 to 1999 - slightly down (-1):** The density of the primary browse species, Wyoming big sagebrush decreased by 23% from 6,740 plants/acre to 5,160 plants/acre, but cover remained similar. The proportion of sagebrush plants displaying poor vigor decreased from 47% to 10% and recruitment of young plants increased to 22%.
- **1999 to 2004 - slightly down (-1):** The density of sagebrush decreased slightly to 4,920 plants/acre, but decadence increased from 19% to 39% and recruitment of young plants decreased to 7%. Plants displaying poor vigor also increased slightly to 24%. Cover of sagebrush increased slightly.
- **2004 to 2009 - slightly down (-1):** Sagebrush density decreased by a further 13% to 4,260 plants/acre and cover decreased slightly. Decadence and poor vigor both decreased in the population, but the recruitment of young plants decreased slightly as well.

Grass:

- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses. There was a significant increase in the nested frequency of cheatgrass, but it is still not abundant on the site. Crested wheatgrass increased significantly in nested frequency and mutton bluegrass (*Poa fendleriana*) and needle-and-thread decreased significantly.

- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 26% with a significant decrease in the nested frequency of crested wheatgrass and bottlebrush squirreltail.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses, but native perennial species have become very rare on the site.

Forb:

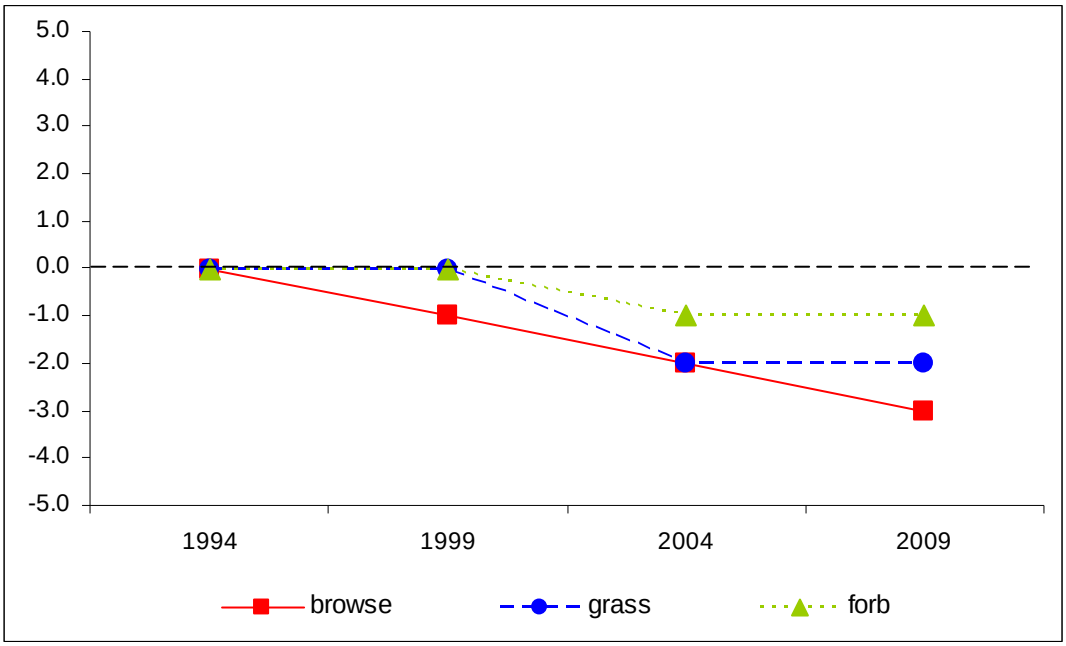
- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs.
- **1999 to 2004 - slightly down (-1):** There was a 23% decrease in the sum of nested frequency, mostly due to a decrease in the nested frequency of longleaf phlox.
- **2004 to 2009 - stable (0):** The sum of nested frequency of perennial forbs changed little, though cover increased to over 1% for the first time since the outset of the study.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 14, study no: 32

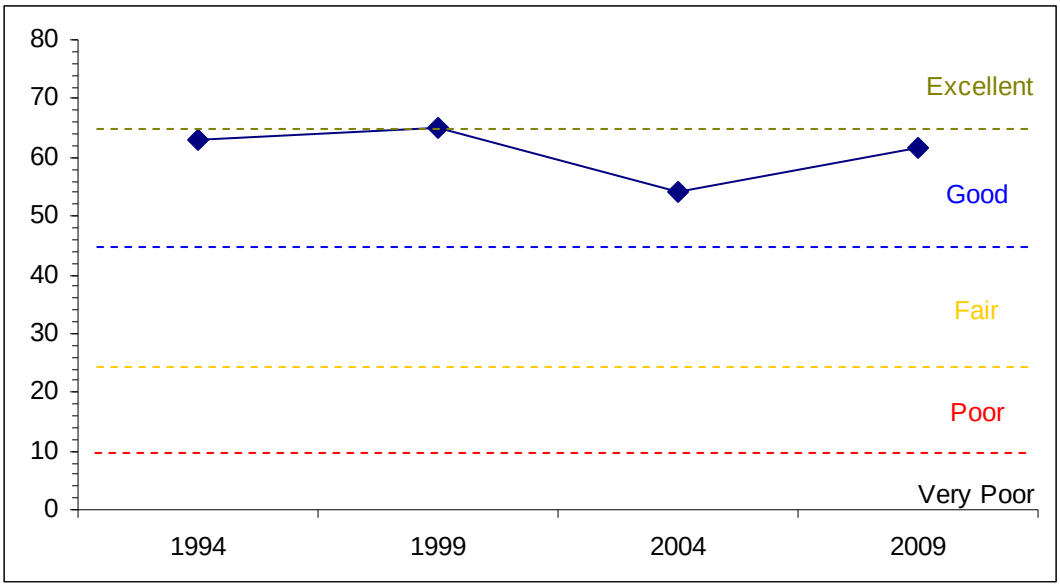
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	19.2	9.9	6.5	25.5	-0.2	1.9	0.0	**62.8**	Good
99	15.2	9.5	12.2	27.0	-0.6	1.7	0.0	**65.0**	Good-Excellent
04	16.4	3.3	3.5	30.0	-0.2	1.3	0.0	**54.2**	Good
09	15.1	11.4	2.5	30.0	0.0	2.6	0.0	**61.5**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 32



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 14, Study no: 32



HERBACEOUS TRENDS--
Management unit 14, Study no: 32

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	a198	c291	ab247	bc289	9.43	12.62	15.63	16.30
G	Agropyron intermedium	2	-	-	-	.00	-	-	-
G	Bouteloua gracilis	-	2	-	-	-	.01	-	-
G	Bromus tectorum (a)	b35	c103	b61	a4	.24	.81	.31	.03
G	Oryzopsis hymenoides	b58	ab23	a1	a-	.81	.19	.03	-
G	Poa fendleriana	b12	a-	a-	a-	.34	-	-	-
G	Sitanion hystrix	b39	b17	a1	a2	.71	.26	.03	.00
G	Sporobolus cryptandrus	3	-	11	8	.00	-	.06	.07
G	Stipa comata	c94	b41	ab16	a3	1.44	.40	.14	.15
Total for Annual Grasses		35	103	61	4	0.24	0.81	0.31	0.03
Total for Perennial Grasses		406	374	276	302	12.76	13.49	15.90	16.53
Total for Grasses		441	477	337	306	13.00	14.30	16.21	16.57
F	Astragalus convallarius	b18	ab15	a4	ab16	.67	.43	.19	.69
F	Cordylanthus wrightii (a)	-	-	-	11	-	-	-	.04
F	Crepis acuminata	3	6	11	2	.00	.02	.07	.03
F	Descurainia pinnata (a)	-	5	-	-	-	.00	-	-
F	Erigeron sp.	9	-	-	-	.01	-	-	-
F	Lappula occidentalis (a)	4	3	1	-	.01	.00	.03	-
F	Machaeranthera canescens	2	-	1	-	.00	-	.00	-
F	Microsteris gracilis (a)	-	1	-	-	-	.00	-	-
F	Orthocarpus sp. (a)	b15	a-	a-	a-	.04	-	-	-
F	Penstemon sp.	-	-	-	3	-	-	-	.00
F	Phlox longifolia	91	105	75	71	.19	.32	.25	.46
F	Sphaeralcea coccinea	29	18	20	18	.08	.08	.12	.09

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
Total for Annual Forbs		19	9	1	11	0.05	0.01	0.03	0.03
Total for Perennial Forbs		152	144	111	110	0.97	0.86	0.64	1.28
Total for Forbs		171	153	112	121	1.03	0.87	0.67	1.32

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

BROWSE TRENDS--
Management unit 14, Study no: 32

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	87	80	84	84	12.77	11.80	13.08	12.04
B	Atriplex canescens	0	1	0	0	-	.38	-	-
B	Chrysothamnus viscidiflorus	1	3	2	2	.00	.15	.15	.15
B	Juniperus osteosperma	0	3	3	2	1.01	1.23	.53	1.54
B	Opuntia sp.	1	0	0	2	.00	-	-	.00
B	Pinus edulis	0	0	0	0	.15	-	-	-
Total for Browse		89	87	89	90	13.94	13.57	13.77	13.73

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 32

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata wyomingensis	-	13.56	18.54
Chrysothamnus viscidiflorus	-	.06	.20
Juniperus osteosperma	.20	1.66	1.96

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 32

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.4	2.0

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 32

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	45	48	50
Pinus edulis	32	32	30

Average diameter (in)		
'99	'04	'09
4.3	3.2	3.9
3.1	3.4	3.2

BASIC COVER--
Management unit 14, Study no: 32

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	28.21	27.89	29.85	30.94
Rock	.15	0	0	0
Pavement	0	0	.01	.01
Litter	41.73	43.37	32.42	38.20
Cryptogams	.22	.49	.69	.74
Bare Ground	30.58	36.52	48.65	41.03

SOIL ANALYSIS DATA --
Management unit 14, Study no: 32, Study Name: Lower Deer Flat

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.4	7.1	46	29.4	24.6	1.4	4.5	51.2	0.6

PELLET GROUP DATA--
Management unit 14, Study no: 32

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	30	50	24	43
Elk	1	1	5	8
Deer	59	61	45	41
Cattle	1	4	14	7

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (2)	9 (23)	21 (53)
121 (299)	56 (139)	126 (311)
40 (99)	30 (73)	21 (52)

BROWSE CHARACTERISTICS--
Management unit 14, 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)
Artemisia tridentata wyomingensis									
94	**6740**	8	73	18	1060	4	.89	47	37/50
99	**5160**	22	59	19	-	41	42	10	20/28
04	**4920**	7	54	39	2520	65	20	24	18/30
09	**4260**	5	83	12	-	36	52	8	18/30
Atriplex canescens									
94	**0**	0	0	0	-	0	0	0	-/-
99	**20**	0	0	100	-	0	100	100	-/-
04	**0**	0	0	0	-	0	0	0	-/-
09	**0**	0	0	0	-	0	0	0	-/-
Chrysothamnus nauseosus									
94	**0**	0	0	-	-	0	0	0	142/9
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-

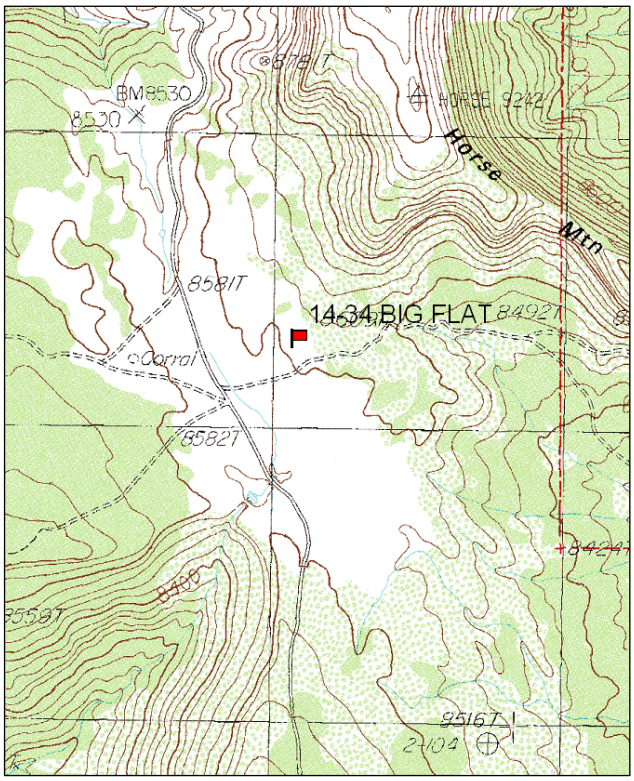
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus									
94	**40**	0	50	50	-	0	0	50	8/13
99	**60**	0	33	67	-	0	0	33	12/18
04	**40**	0	50	50	-	0	0	50	9/13
09	**40**	0	100	0	-	0	0	0	11/17
Juniperus osteosperma									
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	67	33	-	-	0	0	0	-/-
04	**60**	0	100	-	-	0	0	0	-/-
09	**40**	0	100	-	-	0	0	0	-/-
Opuntia sp.									
94	**20**	0	100	-	-	0	0	0	4/15
99	**0**	0	0	-	-	0	0	0	5/13
04	**0**	0	0	-	-	0	0	0	4/21
09	**40**	0	100	-	-	0	0	0	4/16

BIG FLAT - TREND STUDY NO. 14-34-09

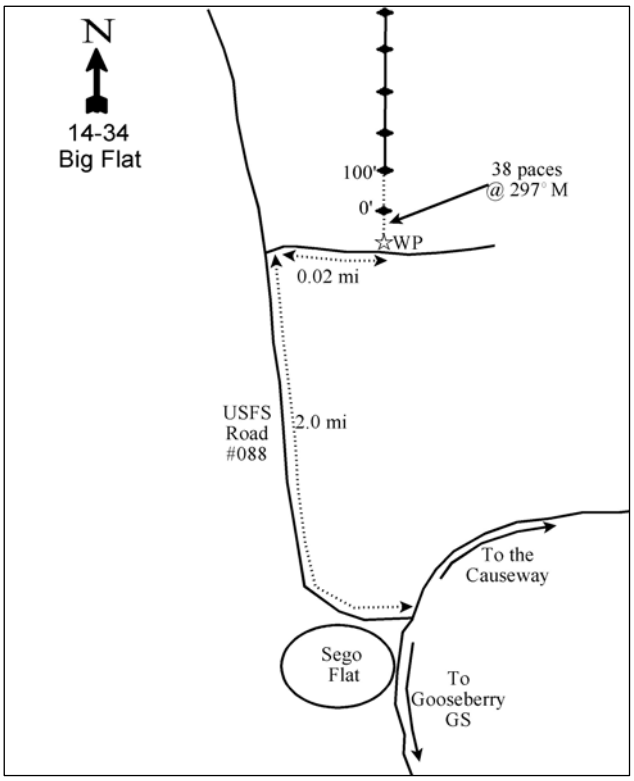
Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Summer, Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,600 ft (2,621 m)
Aspect: Southwest
Slope: 2%
Transect bearing: 322 degrees magnetic
Belt placement: line 1(11 ft), line 2(34 ft), line 3(59 ft), line 4(71 ft), line 5(95 ft)

Directions:
From the Kigalia Guard Station travel north about 1.2 miles to Sego Flat. From Sego Flat travel 2.0 miles north. Take a right onto a faint road and drive 0.2 miles to a witness post on the left. The beginning of the frequency baseline is 38 paces away at 297°M. The 0-foot stake is marked with a browse tag #152.

Map name: Poison Canyon



Diagrammatic Sketch:



Township: 33S, Range: 19E, Section: Unsurveyed

GPS: NAD 83, UTM 12S 607009 E 4191476 N

BIG FLAT - TREND STUDY NO. 14-34

Site Information

Site Description: The study is located on the northern end of Elk Ridge, just south of Horse Mountain. The study area is a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass flat with a few large, mature Gambel oak (*Quercus gambelii*) clones surrounding and intermixed on the site. This study was located near a clipping study that the Range Trend Project monitored in the past to determine use of elk and cattle. Between 1999 and 2002 pellet group transects found an average of 29 elk days use/acre (72 edu/ha), 15 cow days use/acre (37 cdu/ha), and 9 deer days/use acre (21 ddu/ha). Production of available forage varied between 1,550 lbs/acre in 1999 and 251 lbs/acre in 2002. Total use was lowest in 1999 at 48% and highest in 2002 at 80%. Pellet group data has indicated fairly light use by deer and light to moderate use by elk since 2004. Estimated cattle use has been lightly moderate since 2004 (Table - Pellet Group Data). Cattle were on the site at the time of sampling in 2009.

Browse: Mountain big sagebrush is the most dominant in cover on the site providing over 90% of the browse cover since 2004 (Table - Browse Trends). Density of sagebrush was very high at the outset of the study in 2004, due to an abundance of young sagebrush plants. Sagebrush density decreased in 2009 because of a decrease in recruitment of young plants, but the population remains healthy with good vigor, low decadence, and high recruitment of young plants. Utilization of sagebrush has been mostly light to moderate, with some heavy use noted in 2009 (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is dominated by two introduced grasses, smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*). Together they produce nearly all of the grass cover on the site. Both are sod forming grasses that are resistant to grazing. Native grasses are quite rare here. Forbs are diverse and abundant with some of the more common species being western yarrow (*Achillea millefolium*), ballhead sandwort (*Arenaria congesta*), aster (*Aster sp.*), peavine (*Lathryrus sp.*), and silvery lupine (*Lupinus argenteus*).

Soil: The soil is a clay loam with a neutral pH and moderately deep effective rooting depth (Table - Soil Analysis Data). Bare ground cover has been moderately high for a summer range, but litter and vegetation cover provide good protective cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **2004 to 2009 - stable (0):** There was a 29% decrease in the total density of the primary browse species, mountain big sagebrush, but most of the decrease is due to a decrease in young plants. The density of mature sagebrush plants actually increased by 29% and recruitment of young sagebrush plants remained good. Decadence and poor vigor remained good in the sagebrush population.

Grass:

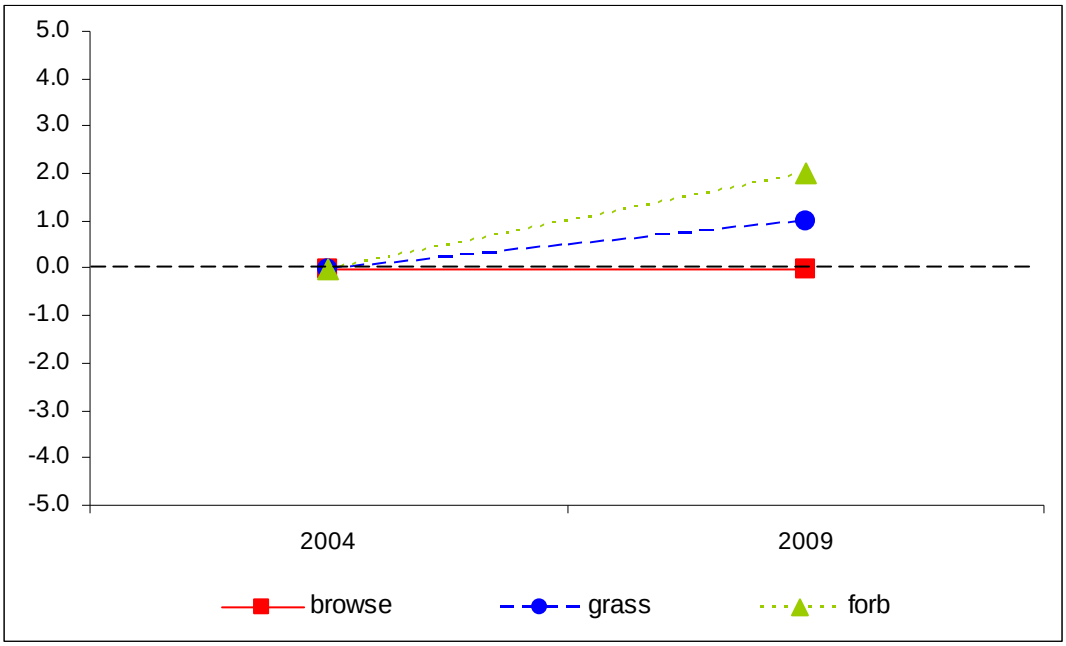
- **2004 to 2009 - slightly up (+1):** There was a 15% increase in the sum of nested frequency of perennial grasses and cover increased from 12% to 25%. There was a significant increase in the nested frequency of the two dominant grasses, smooth brome and Kentucky bluegrass.

Forb:

- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased by 32% and cover increased from 10% to 22%. There was a significant increase in many of the perennial forbs including peavine and silvery lupine.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 34



HERBACEOUS TRENDS--
Management unit 14, Study no: 34

Type	Species	Nested Frequency '04	Nested Frequency '09	Average Cover % '04	Average Cover % '09
G	Agropyron intermedium	13	5	.03	.03
G	Bromus inermis	$_{a}$246	$_{b}$273	6.09	9.55
G	Carex sp.	4	3	.06	.00
G	Dactylis glomerata	-	4	-	.15
G	Elymus junceus	-	3	-	.00
G	Poa fendleriana	-	6	-	.06
G	Poa pratensis	$_{a}$254	$_{b}$301	6.05	15.03
G	Sitanion hystrix	1	-	.00	-
G	Stipa columbiana	-	1	-	.03
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		518	596	12.24	24.87
Total for Grasses		518	596	12.24	24.87
F	Achillea millefolium	86	111	2.13	5.10
F	Agoseris glauca	2	3	.00	.21
F	Androsace septentrionalis (a)	-	4	-	.01
F	Antennaria rosea	6	7	.06	.21
F	Arenaria congesta	$_{a}$81	$_{b}$108	1.37	2.50
F	Artemisia ludoviciana	3	4	.01	.03
F	Aster sp.	$_{a}$67	$_{b}$132	1.23	3.21
F	Collinsia parviflora (a)	9	1	.01	.00

Type	Species	Nested Frequency '04	Nested Frequency '09	Average Cover % '04	Average Cover % '09
F	Cordylanthus sp. (a)	-	4	-	.03
F	Crepis acuminata	3	-	.01	-
F	Cymopterus sp.	17	12	.14	.63
F	Delphinium nuttallianum	-	4	-	.01
F	Erigeron flagellaris	$_{b}$97	$_{a}$63	1.87	.53
F	Eriogonum racemosum	26	24	.31	.71
F	Heterotheca villosa	9	6	.54	.53
F	Lathyrus sp.	$_{a}$6	$_{b}$35	.01	2.34
F	Lupinus argenteus	$_{a}$26	$_{b}$84	1.70	3.75
F	Lupinus polyphyllus	8	13	.16	.33
F	Microsteris gracilis (a)	$_{a}$-	$_{b}$19	-	.05
F	Navarretia breweri (a)	-	3	-	.00
F	Penstemon humilis	$_{a}$2	$_{b}$19	.03	.35
F	Penstemon strictus	2	6	.03	.21
F	Phlox longifolia	$_{b}$43	$_{a}$8	.33	.04
F	Polygonum douglasii (a)	4	17	.01	.03
F	Potentilla concinna	7	3	.15	.18
F	Taraxacum officinale	2	14	.01	.47
F	Tragopogon dubius	1	5	.00	.06
F	Vicia americana	11	5	.02	.24
Total for Annual Forbs		13	48	0.03	0.13
Total for Perennial Forbs		505	666	10.19	21.71
Total for Forbs		518	714	10.22	21.85

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

BROWSE TRENDS--
Management unit 14, Study no: 34

Type	Species	Strip Frequency '04	Strip Frequency '09	Average Cover % '04	Average Cover % '09
B	Artemisia tridentata vaseyana	88	89	19.36	23.09
B	Quercus gambelii	3	4	.00	.03
B	Rosa woodsii	4	1	.03	.00
B	Symphoricarpos oreophilus	16	17	.78	1.42
Total for Browse		111	111	20.18	24.55

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 34

Species	Percent Cover '04	Percent Cover '09
Artemisia tridentata vaseyana	25.03	24.33
Quercus gambelii	1.39	.36
Rosa woodsii	.13	-
Symphoricarpos oreophilus	2.33	2.04

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 34

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.0	2.2

BASIC COVER--
Management unit 14, Study no: 34

Cover Type	Average Cover %	
	'04	'09
Vegetation	45.00	58.90
Rock	.38	.00
Pavement	.12	.05
Litter	33.32	35.87
Cryptogams	.15	.15
Bare Ground	33.60	25.11

SOIL ANALYSIS DATA --
Management unit 14, Study no: 34, Study Name: Big Flat

Effective rooting depth (in)	pH	clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.4	6.8	23.9	44.2	31.8	3.6	18.5	249.6	0.8

PELLET GROUP DATA--
Management unit 14, Study no: 34

Type	Quadrat Frequency		Days use per acre (ha)	
	'04	'09	'04	'09
Rabbit	-	3	-	-
Elk	15	5	32 (79)	17 (43)
Deer	12	4	16 (40)	13 (31)
Cattle	10	11	26 (65)	34 (84)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 34

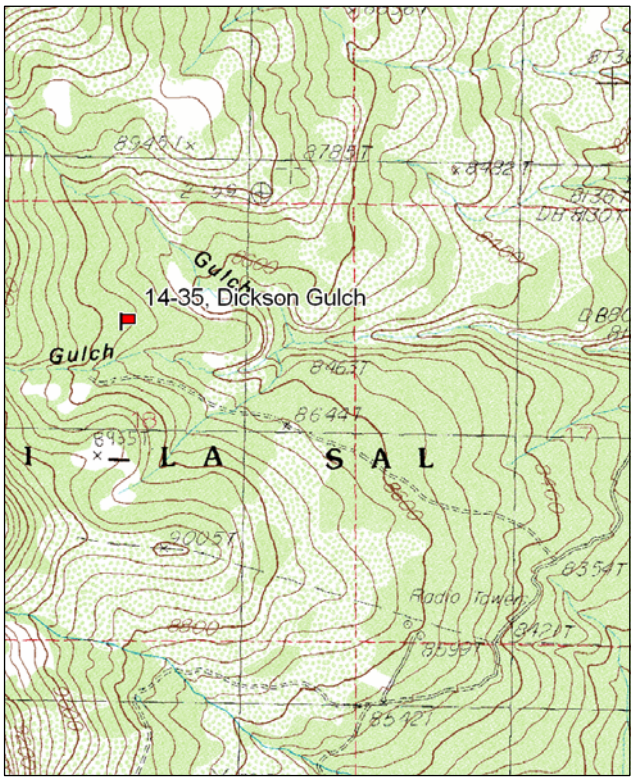
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana									
04	**12380**	60	37	3	11940	22	2	.48	21/32
09	**8800**	22	67	11	2780	33	14	8	18/36
Ceanothus fendleri									
04	**0**	0	0	-	-	0	0	0	13/42
09	**0**	0	0	-	-	0	0	0	-/-
Mahonia repens									
04	**0**	0	0	-	-	0	0	0	4/8
09	**0**	0	0	-	-	0	0	0	-/-
Quercus gambelii									
04	**80**	50	50	0	-	50	0	0	13/16
09	**260**	46	46	8	-	8	8	0	11/16
Rosa woodsii									
04	**120**	0	100	-	-	0	0	0	14/12
09	**40**	100	0	-	-	0	0	0	-/-
Symphoricarpos oreophilus									
04	**600**	17	83	0	-	17	0	0	15/25
09	**840**	17	81	2	-	2	2	0	18/18

DICKSON GULCH - TREND STUDY NO. 14-35-09

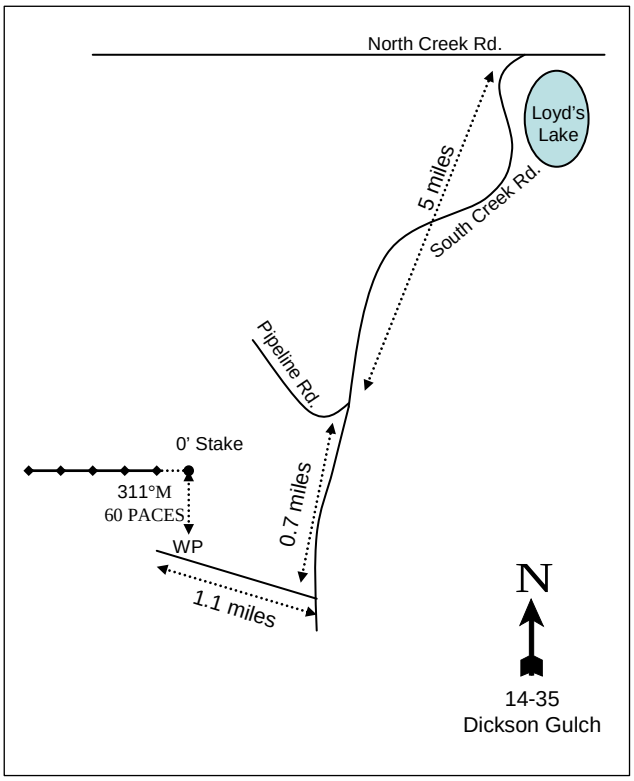
Vegetation Type: Aspen
Range Type: Crucial Deer Summer, Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,740 ft (2,664 m)
Aspect: Southeast
Slope: 5%-10%
Transect bearing: 278 degrees magnetic
Belt placement: line 1(11 ft), line 2(34 ft), line 3(59 ft), line 4(71 ft), line 5(95 ft)
Notes: Soil sample needed.

Directions:
From the junction of South Creek Rd. (the road to Loyd's Lake) and North Creek Rd. (200 S. going west out of Monticello) go south on South Creek Rd. for 5 miles to a fork with the Pipeline Rd. Go left at the fork and continue 0.7 miles to another fork. Go right and continue 1.1 miles to the witness post on the right (north) side of the road. The 0 foot stake is 60 paces up the hill from the witness post at a bearing of 311°M and is marked by browse tag #270.

Map name: Abajo Peak



Diagrammatic Sketch:



Township: 34S, Range: 23E, Section: 18

GPS: NAD 83, UTM 12S 637504 E 4187545 N

DICKSON GULCH - TREND STUDY NO. 14-35

Site Information

Site Description: The study is located in a dense aspen (*Populus tremuloides*) stand on the east side of the Abajo Mountains. The last belt of the study transect fell in a clearing with fewer forbs and a few Gambel oak (*Quercus gambelii*). The understory is very thick, making it difficult to see pellets, but deer were seen on the site in 2009. There were also bedding areas and bear scat found in the area in 2009. Pellet group data indicated light use by deer and cattle in 2009 (Table - Pellet Group Data).

Browse: Point-quarter data shows a dense stand of aspen (Table - Point-Quarter Data) with most of the trees being over 12 feet tall, but with many young plants less than 1 foot tall. The strip density data also indicated that there were a large number of young plants in the aspen population. The only understory browse species of note is snowberry (*Symphoricarpos oreophilus*). The snowberry population is mostly mature with low decadence and good vigor (Table - Browse Characteristics).

Herbaceous Understory: Grasses are fairly diverse and abundant, but are dominated by the introduced grass Kentucky bluegrass (*Poa pratensis*). Other common grasses include smooth brome (*Bromus inermis*), sedge (*Carex sp.*), and Letterman needlegrass (*Stipa lettermani*). Forbs are very diverse and very abundant on the site. The dominant forb species is thickleaf peavine (*Lathyrus lanszwertii*) which provided nearly half of the forb cover. Other common forb species include western yarrow (*Achillea millefolium*), western sweetroot (*Osmorhiza occidentalis*), dandelion (*Taraxacum officinale*), stickseed (*Hackelia sp.*), and nettleleaf (*Agastache urticifolia*).

Soil: The soil is a loam with a moderately acidic pH (Table - Soil Analysis Data). There is almost no bare ground cover on this site due to high amounts of litter and vegetation cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2009.

Trend Summary

HERBACEOUS TRENDS--
Management unit 14, Study no: 35

Type	Species	Nested Frequency '09	Average Cover % '09
G	Bromus carinatus	-	.30
G	Bromus inermis	72	1.64
G	Carex sp.	65	1.54
G	Dactylis glomerata	7	.53
G	Poa fendleriana	5	.15
G	Poa pratensis	381	26.87
G	Poa secunda	5	.15
G	Stipa lettermani	69	3.08
Total for Annual Grasses		0	0
Total for Perennial Grasses		604	34.29
Total for Grasses		604	34.29
F	Achillea millefolium	257	9.42
F	Agastache urticifolia	15	1.06
F	Androsace septentrionalis (a)	31	.18
F	Casella bursa-pastoris	-	.03

Type	Species	Nested Frequency '09	Average Cover % '09
F	Chenopodium fremontii (a)	21	.19
F	Conioselinum scopulorum	4	.41
F	Cymopterus sp.	5	.04
F	Erigeron flagellaris	7	.21
F	Geranium sp.	46	.91
F	Hackelia sp.	102	2.20
F	Lathyrus lanszwertii	274	25.18
F	Osmorhiza occidentalis	208	9.10
F	Polygonum douglasii (a)	5	.15
F	Potentilla sp.	13	.20
F	Senecio neomexicanus	1	.03
F	Stellaria jamesiana	118	2.98
F	Taraxacum officinale	98	3.10
F	Thermopsis montana	7	.53
F	Unknown forb-perennial	3	.03
F	Vicia americana	68	1.12
F	Viola sp.	30	1.23
Total for Annual Forbs		57	0.53
Total for Perennial Forbs		1256	57.82
Total for Forbs		1313	58.36

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

BROWSE TRENDS--
Management unit 14, Study no: 35

Type	Species	Strip Frequency '09	Average Cover % '09
B	Populus tremuloides	30	1.36
B	Quercus gambelii	3	.03
B	Symphoricarpos oreophilus	67	6.31
Total for Browse		100	7.70

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 35

Species	Percent Cover '09
Populus tremuloides	38.31
Quercus gambelii	13.10
Symphoricarpos oreophilus	4.73

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 35

Species	Average leader growth (in) '09
Symphoricarpos oreophilus	2.9

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 35

Species	Trees per Acre '09	Average diameter (in) '09
Populus tremuloides	375	8.9

BASIC COVER--
Management unit 14, Study no: 35

Cover Type	Average Cover % '09
Vegetation	79.51
Litter	60.62
Bare Ground	.93

PELLET GROUP DATA--
Management unit 14, Study no: 35

Type	Quadrat Frequency '09	Days use per acre (ha) '09
Deer	9	5 (12)
Cattle	4	12 (29)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 35

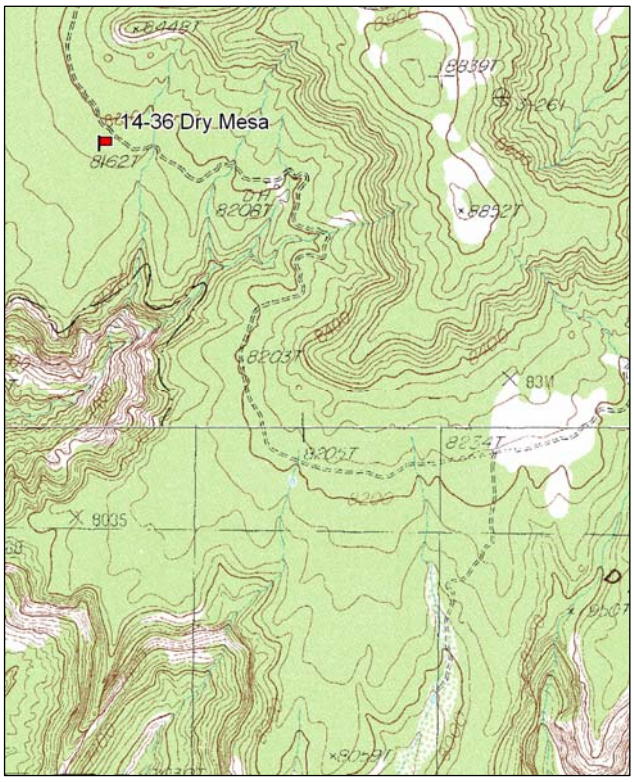
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Populus tremuloides									
09	**1040**	73	27	-	320	0	2	0	-/-
Quercus gambelii									
09	**160**	50	50	-	-	0	0	0	-/-
Symphoricarpos oreophilus									
09	**4760**	35	65	-	-	0	0	0	15/18

DRY MESA - TREND STUDY NO. 14-36-09

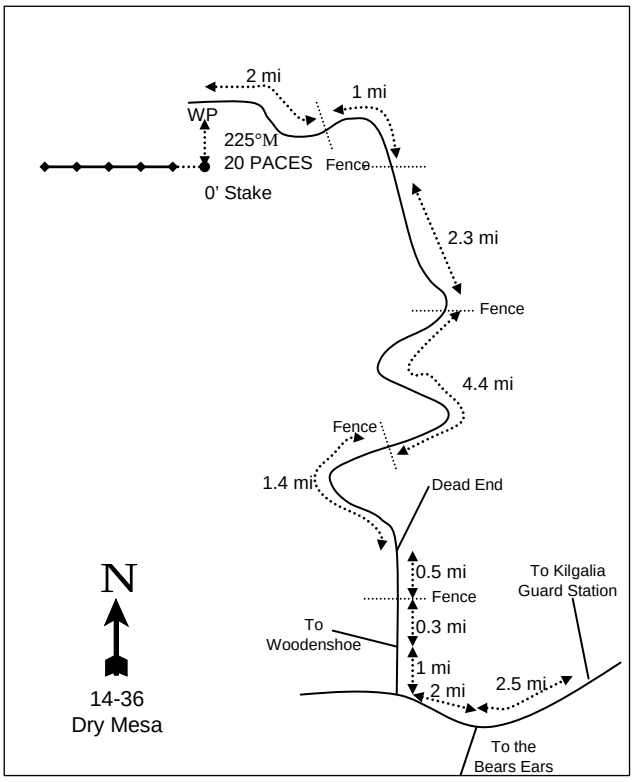
Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Summer, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,160 ft (2,487 m)
Aspect: South
Slope: 5%
Transect bearing: 305 degrees magnetic
Belt placement: line 1(11 ft), line 2(34 ft), line 3(59 ft), line 4(71 ft), line 5(95 ft)
Notes: Soil sample needed.

Directions:
From the Kigalia Guard Station turnoff, go 2.5 miles southwest towards the Bears Ears. Turn right at the fork with the road to the Bears Ears and proceed 2 miles to a fork located just west of a cattleguard and opposite a corral. Turn right, and go north 1 mile to a fork with the road to Woodenshoe. Turn right (north) for 0.3 miles to a fence and continue another 0.5 miles to another fork. Go left and proceed 9.1 miles, passing through four more fences. After the fourth fence, continue another 2 miles to the witness post on the left (south) side of the road. The 0 foot stake is 20 paces from the witness post at a bearing of 225°M and marked with browse tag #269.

Map name: Warren Canyon



Diagrammatic Sketch:



Township: 35S, Range: 18E, Section: Unsurveyed

GPS: NAD 83, UTM 12S 594600 E 4179760 N

DRY MESA - TREND STUDY NO. 14-36

Site Information

Site Description: The study is located in a mixed mountain brush community on the west side of Dry Mesa before it drops into Woodenshoe Canyon. There are scattered pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) on the site with denser stands on the hillsides surrounding the site. Pellet group data indicated light use by deer, elk, and cattle in 2009 (Table - Pellet Group Data).

Browse: The primary browse species on the site is mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). The sagebrush population is mostly mature, but is healthy with low decadence, good vigor, and good recruitment of young sagebrush plants. Utilization of sagebrush was mostly moderate with some heavy use in 2009. There are some dense clones of Gambel oak (*Quercus gambelii*) that provide a large amount of cover on the site, but receive little use from wildlife. Other important browse that occur at low density, but receive moderate to heavy use are Utah serviceberry (*Amelanchier utahensis*), antelope bitterbrush (*Purshia tridentata*), and true mountain mahogany (*Cercocarpus montanus*) (Table - Browse Characteristics).

Herbaceous Understory: Grasses are abundant on the site, but are dominated by the introduced grass smooth brome (*Bromus inermis*). Smooth brome provided over 80% of the grass cover in 2009. The only other common grass on the site is mutton bluegrass (*Poa fendleriana*), which provided most of the remaining grass cover. The forbs are fairly diverse and quite abundant. The dominant forbs are arrowleaf balsamroot (*Balsamorhiza sagittata*) and rock goldenrod (*Petradoria pumila*), which together provided over 70% of the forb cover in 2009.

Soil: The soil is a silt loam with a neutral pH. Phosphorus has limited availability for plant growth and development at only 1.45 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately low with good protective cover provided by litter and vegetation cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2009.

Trend Assessments

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 14, study no: 36

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
09	16.0	13.9	11.8	30.0	0.0	10.0	0.0	**81.6**	Good-Excellent

Trend Summary

HERBACEOUS TRENDS--
Management unit 14, Study no: 36

Type	Species	Nested Frequency '09	Average Cover % '09
G	Agropyron cristatum	13	.37
G	Agropyron intermedium	21	.14
G	Bromus inermis	376	21.22
G	Poa fendleriana	134	4.50
G	Sitanion hystrix	3	.00
Total for Annual Grasses		0	0

Type	Species	Nested Frequency '09	Average Cover % '09
Total for Perennial Grasses		547	26.23
Total for Grasses		547	26.23
F	Aster sp.	7	.07
F	Balsamorhiza sagittata	90	6.28
F	Cordylanthus sp. (a)	3	.00
F	Crepis acuminata	4	.03
F	Cymopterus sp.	4	.06
F	Erigeron sp.	1	.00
F	Eriogonum alatum	16	.08
F	Hymenoxys acaulis	18	.40
F	Lesquerella sp.	4	.00
F	Lupinus sp.	11	.62
F	Penstemon comarrhenus	20	.29
F	Penstemon sp.	1	.03
F	Petradoria pumila	41	1.16
F	Phlox hoodii	19	.30
F	Phlox longifolia	28	.06
F	Swertia radiata	4	.33
Total for Annual Forbs		3	0.00
Total for Perennial Forbs		268	9.77
Total for Forbs		271	9.78

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

BROWSE TRENDS--
Management unit 14, Study no: 36

Type	Species	Strip Frequency '09	Average Cover % '09
B	Amelanchier utahensis	2	.00
B	Arctostaphylos sp.	6	2.13
B	Artemisia tridentata vaseyana	62	8.34
B	Cercocarpus montanus	1	.03
B	Chrysothamnus depressus	21	.30
B	Pinus edulis	3	1.36
B	Purshia tridentata	2	.03
B	Quercus gambelii	14	5.06
B	Symphoricarpos oreophilus	27	1.35
B	Tetradymia canescens	2	.00
B	Yucca sp.	6	.06
Total for Browse		146	18.69

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 36

Species	Percent Cover '09
Amelanchier utahensis	.03
Arctostaphylos sp.	1.89
Artemisia tridentata vaseyana	8.63
Cercocarpus montanus	.05
Chrysothamnus depressus	.46
Pinus edulis	1.63
Purshia tridentata	.06
Quercus gambelii	8.13
Symphoricarpos oreophilus	2.59
Tetradymia canescens	.08
Yucca sp.	.30

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 36

Species	Average leader growth (in) '09
Artemisia tridentata vaseyana	2.6
Cercocarpus montanus	3.2
Purshia tridentata	2.3

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 36

Species	Trees per Acre '09	Average diameter (in) '09
Pinus edulis	49	2.2

BASIC COVER--
Management unit 14, Study no: 36

Cover Type	Average Cover % '09
Vegetation	53.16
Rock	.15
Pavement	.12
Litter	43.48
Cryptogams	.22
Bare Ground	28.41

PELLET GROUP DATA--
Management unit 14, Study no: 36

Type	Quadrat Frequency '09	Days use per acre (ha) '09
Rabbit	9	-
Elk	2	19 (46)
Deer	2	14 (35)
Cattle	2	15 (38)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 36

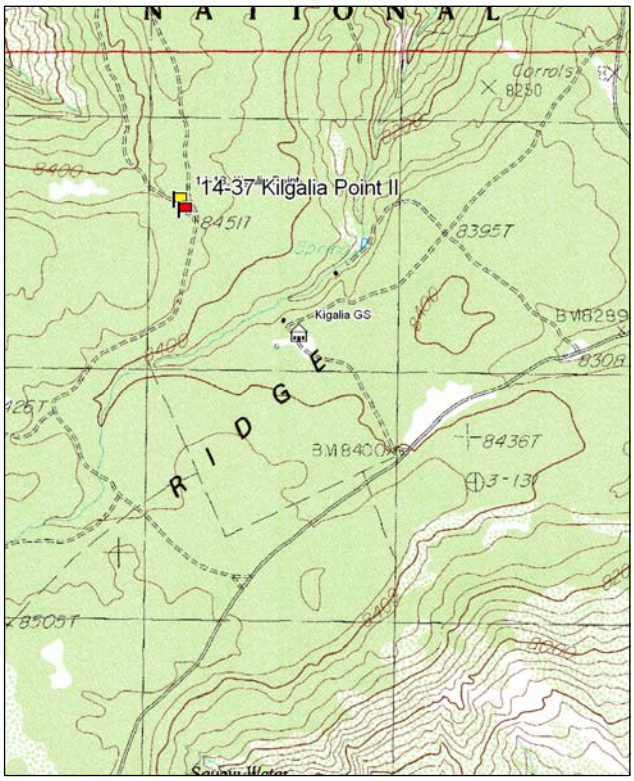
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
09	**60**	0	100	-	-	100	0	0	28/29
Arctostaphylos sp.									
09	**220**	9	82	9	-	0	0	0	18/44
Artemisia tridentata vaseyana									
09	**2680**	14	81	5	200	40	16	2	16/26
Cercocarpus montanus									
09	**20**	0	100	-	-	0	100	0	33/34
Chrysothamnus depressus									
09	**1160**	10	90	-	40	0	0	0	4/8
Pinus edulis									
09	**60**	0	100	-	-	0	0	0	-/-
Purshia tridentata									
09	**40**	50	50	-	-	50	0	0	16/36
Quercus gambelii									
09	**2920**	40	58	2	80	0	0	0	30/20
Symphoricarpos oreophilus									
09	**1300**	25	75	-	40	0	0	0	18/19
Tetradymia canescens									
09	**40**	0	100	-	-	0	0	0	12/8
Yucca sp.									
09	**240**	0	100	-	20	0	0	0	10/14

KILGALIA POINT II - TREND STUDY NO. 14-37-09

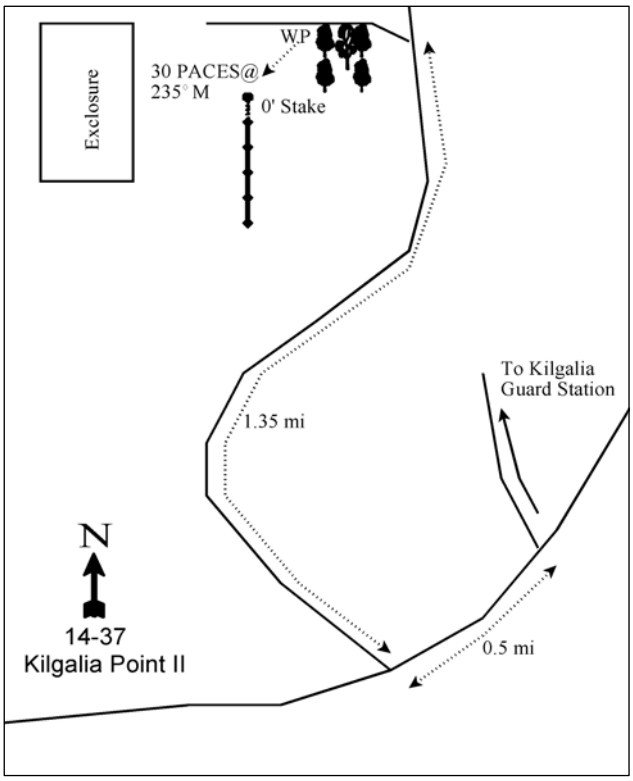
Vegetation Type: Logged Ponderosa
Range Type: Crucial Deer Summer, Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,400 ft (2,560 m)
Aspect: Northeast
Slope: 3%
Transect bearing: 175 degrees magnetic
Belt placement: line 1(11 ft), line 2(34 ft), line 3(59 ft), line 4(71 ft), line 5(95 ft)

Directions:
From the turnoff to the Kigalia Guard Station on the main Elk Ridge-Bears Ears Road, proceed southwest for 0.50 miles to the Kigalia Point Road. Turn right on this road and travel north for 1.35 miles to a small clearing in the ponderosa pine-aspen forest with a faint road turning off to the left. Park here and walk 0.05 miles down the faint road (just past the west end of the clearing) to where four clustered ponderosa with a large aspen growing in the middle of them are located on the left side of the road. The witness post is located near these on the left (south) side of the road. The 0 foot stake is about 30 paces away at a bearing of 235°M and is marked by browse tag # 9178.

Map name:



Diagrammatic Sketch:



Township: Range: Section:

GPS: NAD 83, UTM 12S 603043 E 4170826 N

KILGALIA POINT II - TREND STUDY NO. 14-37

Site Information

Site Description: The study is located on Kigalia Point on the same site as the original Kilgalia Point (14-18) study. The original study was suspended because a wildlife exclosure was constructed between the 2004 and 2009 sample years around the quaking aspen (*Populus tremuloides*) stand that the study transect sampled. The exclosure fence divided the study transect surrounding several of the sample belts, but leaving several outside of the exclosure. The new study samples a ponderosa pine (*Pinus ponderosa*) flat that is representative of the area. Kilgalia point is a narrow, two mile long ridge which extends to the north off the southern end of Elk Ridge. The point drops sharply on all sides to the east, west and north and is managed by the Forest Service as part of the Twin Springs allotment. The level terrain on top of this extension of the plateau is dominated by ponderosa pine with areas of quaking aspen. In the early 1960's, part of this area was logged to harvest old growth timber as part of an accelerated harvest to minimize beetle damage. In 1964, a small part of the section was thinned. A ground fire occurred on the site some time between 1992 and 1999, but probably in 1998, that did not affect large, mature trees. Resting cover is good, but the openness of the forest above 3 to 4 feet does not hide a moving animal. Pellet group data from the original study transect showed the average use from 1999 and 2004 to be 10 deer days use/acre (24 ddu/ha), 8 elk days use/acre (19 edu/ha), and 8 cattle days use/acre (19 cdu/ha). Pellet group data along the new transect also indicated light use by deer, elk, and cattle in 2009 (Table - Pellet Group Data). Other uses of the forest include mining claims, uranium exploration, and recreation. The area has an extensive network of roads allowing easy access to most of the remote areas.

Browse: Browse is not an important component of this summer range. The only understory browse of any note on the site is snowberry (*Symphoricarpos oreophilus*). There is a fairly dense stand of mostly mature ponderosa pine on the site (Table - Point-Quarter Tree Data). There are a few mature aspen trees scattered over the site as well as quite a few aspen seedlings sampled with the point-quarter method.

Herbaceous Understory: Grasses are diverse and abundant, but are dominated by the introduced species. Smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*) are the dominant grass species and combined provided nearly 90% of the grass cover in 2009. Another introduced species, intermediate wheatgrass (*Agropyron cristatum*), is also common and provides the majority of the remaining grass cover. Forbs are fairly diverse and abundant. Tuber starwort (*Stellaria jamesiana*) and clover (*Trifolium sp.*) are the most common species and provide the majority of forb cover on the site (Table - Herbaceous Trends).

Soil: The soil is a loam with a moderately acidic pH (Table - Soil Analysis Data). Bare ground cover is low on the site with protective cover provided primarily by litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2009.

Trend Summary

HERBACEOUS TRENDS--
Management unit 14, Study no: 37

Type	Species	Nested Frequency '09	Average Cover % '09
G	Agropyron intermedium	107	1.80
G	Bromus inermis	276	18.70
G	Carex sp.	7	.18
G	Dactylis glomerata	8	.15
G	Phleum pratense	27	.28
G	Poa bulbosa	3	.41
G	Poa pratensis	326	11.56

Type	Species	Nested Frequency '09	Average Cover % '09
G	Stipa columbiana	10	.44
G	Stipa lettermani	7	.24
Total for Annual Grasses		0	0
Total for Perennial Grasses		771	33.79
Total for Grasses		771	33.79
F	Achillea millefolium	31	.52
F	Agoseris glauca	13	.16
F	Arenaria sp.	8	.09
F	Collinsia parviflora (a)	6	.01
F	Erigeron flagellaris	11	.22
F	Lathyrus brachycalyx	9	.36
F	Senecio multilobatus	5	.03
F	Stellaria jamesiana	121	1.62
F	Taraxacum officinale	31	.51
F	Thermopsis montana	8	.59
F	Trifolium sp.	148	3.52
F	Vicia americana	13	.48
Total for Annual Forbs		6	0.01
Total for Perennial Forbs		398	8.12
Total for Forbs		404	8.14

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

BROWSE TRENDS--
Management unit 14, Study no: 37

Type	Species	Strip Frequency '09	Average Cover % '09
B	Mahonia repens	12	.48
B	Pinus ponderosa	7	1.77
B	Symphoricarpos oreophilus	57	2.94
Total for Browse		76	5.20

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 37

Species	Percent Cover '09
Mahonia repens	.36
Pinus ponderosa	40.04
Populus tremuloides	4.19
Quercus gambelii	.96
Symphoricarpos oreophilus	3.01

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 37

Species	Trees per Acre '09	Average diameter (in) '09
Pinus ponderosa	86	15.1
Populus tremuloides	29	6.6

BASIC COVER--
Management unit 14, Study no: 37

Cover Type	Average Cover % '09
Vegetation	45.53
Rock	1.89
Litter	85.45
Bare Ground	1.05

PELLET GROUP DATA--
Management unit 14, Study no: 37

Type	Quadrat Frequency '09	Days use per acre (ha) '09
Elk	-	12 (30)
Deer	1	8 (20)
Cattle	2	15 (36)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 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)
Mahonia repens									
09	**1720**	12	88	-	-	0	0	0	4/7
Pinus ponderosa									
09	**160**	0	100	-	-	0	0	0	-/-
Populus tremuloides									
09	**0**	0	0	-	-	0	0	0	-/-
Quercus gambelii									
09	**0**	0	0	-	20	0	0	0	-/-
Rosa woodsii									
09	**0**	0	0	-	-	0	0	0	12/10
Symphoricarpos oreophilus									
09	**5660**	45	55	-	40	0	1	1	13/17

SUMMARY
WILDLIFE MANAGEMENT UNIT 14 - SAN JUAN

Community Types

There were twenty six Range Trend studies sampled in WMU 14 during the summer of 2009. Seven of the studies [Brushy Basin (14-2), Peters Point (14-8), Shay Mesa (14-11), Wild Cow Point (14-22), Mormon Pasture Point (14-27), Salt Creek Mesa (14-29) and Lower Deer Flat (14-32)] sampled areas that had been chained and seeded in the past to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Three of the studies (14-11, 14-29 and 14-32) sample crucial deer winter habitat, three studies (14-2, 14-8 and 14-27) sample crucial deer spring/fall habitat and one study (14-22) samples crucial deer year-long habitat. Five of the studies (14-2, 14-11, 14-22, 14-27 and 14-29) sample crucial elk winter habitat, one study (14-32) samples substantial elk winter habitat and one study (14-8) samples crucial elk year-long habitat.

Seven study sites [Alkali Point (14-1), Harts Draw (14-9), Harts Point (14-10), Black Mesa (14-13), Lower Lost Park (14-16), South Plain (14-23) and Ruin Park (14-24)] sample Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities. Five of these studies (14-1, 14-9, 14-10, 14-13 and 14-16) are considered to be crucial deer winter habitat with the remaining two studies (14-23 and 14-24) considered to be crucial deer year-long habitat. Only one of the Wyoming big sagebrush studies (14-16) is considered to be crucial elk winter habitat.

Two studies [Big Flat (14-34) and Dry Mesa (14-36)] sample mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) communities, one study [Texas Flat (14-14)] samples a basin big sagebrush (*A. tridentata* ssp. *tridentata*) community and four studies [Harts Draw Reservoir (14-6), Shingle Mill (14-12), Milk Ranch Point (14-300 and Chippean Ridge (14-31)] sample mixed mountain brush communities. Five of these studies (14-6, 14-12, 14-31, 14-34 and 14-36) sample crucial deer summer habitat, with the remaining two (14-30 and 14-14) sampling crucial deer spring/fall habitat. Five of these studies (14-12, 14-14, 14-30, 14-31 and 14-36) sample crucial winter elk habitat, one study (14-6) samples crucial elk spring/fall habitat and one study (14-34) samples crucial elk summer habitat.

Three studies [Woodenshoe (14-19), Gooseberry (14-20) and Kilgalia Point II (14-37)] sample logged Ponderosa pine (*Pinus ponderosa*) communities and two studies [Jackson Ridge (14-5) and Dickson Gulch (14-35)] sample aspen (*Populus tremuloides*) stands. All five of these studies are on crucial deer and elk summer habitat.

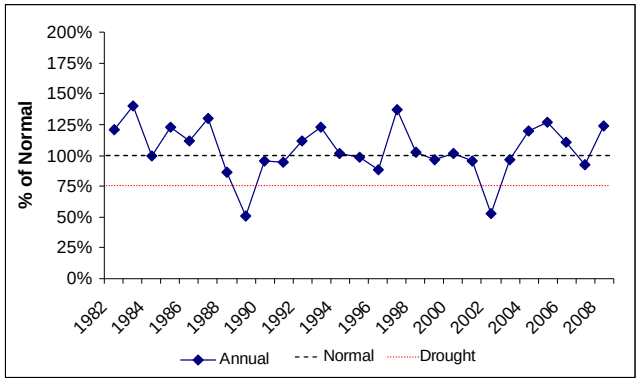


Figure 1. Percent annual precipitation based on the 27 year mean precipitation for WMU 14, San Juan. Precipitation data were collected at the Blanding, Monticello and Natural Bridges National Monument weather stations (Utah Climate Summary 2009).

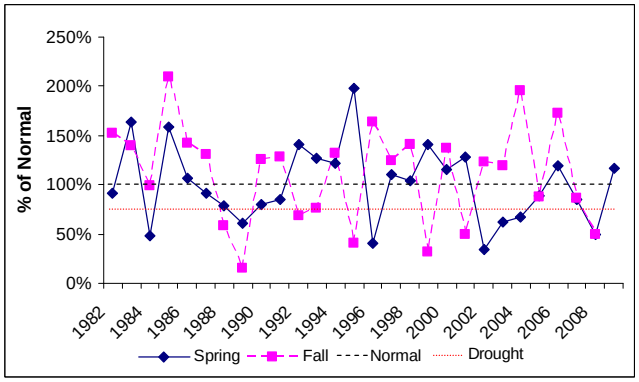


Figure 2. Percent annual precipitation based on the 27 year mean for spring (March-May) and fall (Sept.-Nov.) precipitation for WMU 14, San Juan. Precipitation data were collected at the Blanding, Monticello and Natural Bridges National Monument weather stations (Utah Climate Summary 2009).

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation data from this herd unit were compiled from the Blanding, Monticello and Natural Bridges National Monument weather stations (Figures 1 and 2). The units 27 year annual mean was 13.58 inches, the 28 year spring (March to May) mean was 2.78 inches, and the 27 year fall (Sept. to Nov.) mean was 3.94 inches. The unit annual precipitation was below 75% of the normal annual mean (drought conditions) in 1989 and 2002 (Figure 1). Spring precipitation was below 75% of normal in 1984, 1996, 2002, 2003, 2004 and 2008 (Figure 2). Fall precipitation was below 75% of normal in 1988, 1989, 1992, 1995, 1999, 2001 and 2008 (Figure 2) (Utah Climate Summary 2009).

Browse

The median browse trend had a slight decrease from 1992/1994 to 1999 and again from 1999 to 2004(Figure 5). Four sagebrush species were sampled in the unit; Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*), basin big sagebrush (*A. tridentata* ssp. *tridentata*) and black sagebrush (*A. nova*). Mountain big sagebrush was the most common species sampled and was sampled at eleven study sites in the unit, 14-2, 14-6, 14-8, 14-11, 14-12, 14-19, 14-27, 14-30, 14-31, 14-34 and 14-36. The mean density of mountain big sagebrush increased significantly between 1999 and 2004 (Figure 3a), while mean cover steadily increased from 1992/1994 to 2009 and was significantly higher in 2004 and 2009 than in 1992/1994 (Figure 3b). The mean mountain big sagebrush population decadence has fluctuated slightly through the years, but has always been low at below 20% decadence (Figure 3c). Wyoming big sagebrush was sampled on nine sites in the unit, 14-1, 14-9, 14-10, 14-13, 14-16, 14-22, 14-23, 14-24 and 14-32. The mean density of Wyoming big sagebrush decreased significantly between 1992/1994 and 1999 (Figure 3a) with a corresponding decrease in mean cover (Figure 3b). The mean population decadence of Wyoming big sagebrush has been relatively high at near or above 40% since 1992/1994. There was a significant increase in decadence of Wyoming big sagebrush from 1999 to 2004, but then a significant decrease to the lowest levels of all the sample years in 2009 (Figure 3c). Basin big sagebrush and black sagebrush were sampled repeatedly on only one study each, Texas Flat (14-14) and Wild Cow Point (14-22), respectively, and are therefore not included in the unit summary discussion. For a summary of basin big and black sagebrush trends, refer to the Texas Flat and Wild Cow Point study discussions.

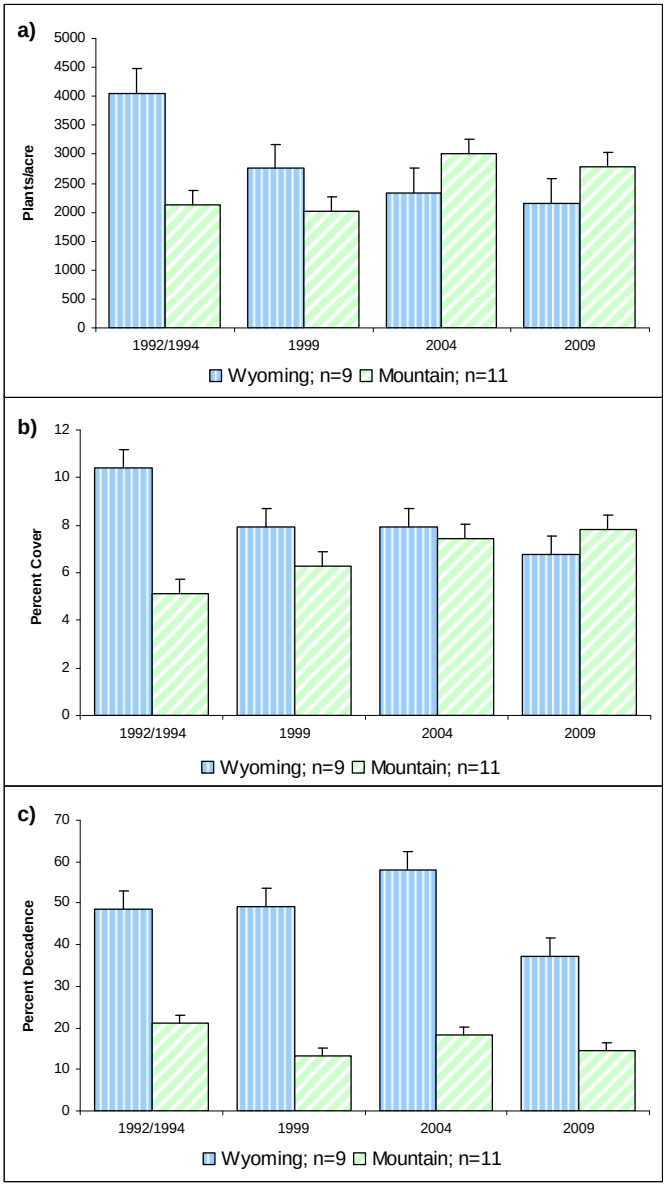


Figure 3. a) Mean density of sagebrush (*Artemisia spp.*) by year for WMU 14, San Juan. **b)** Mean cover of sagebrush by year for WMU 14. **c)** Mean population decadence of sagebrush by year for WMU 14.

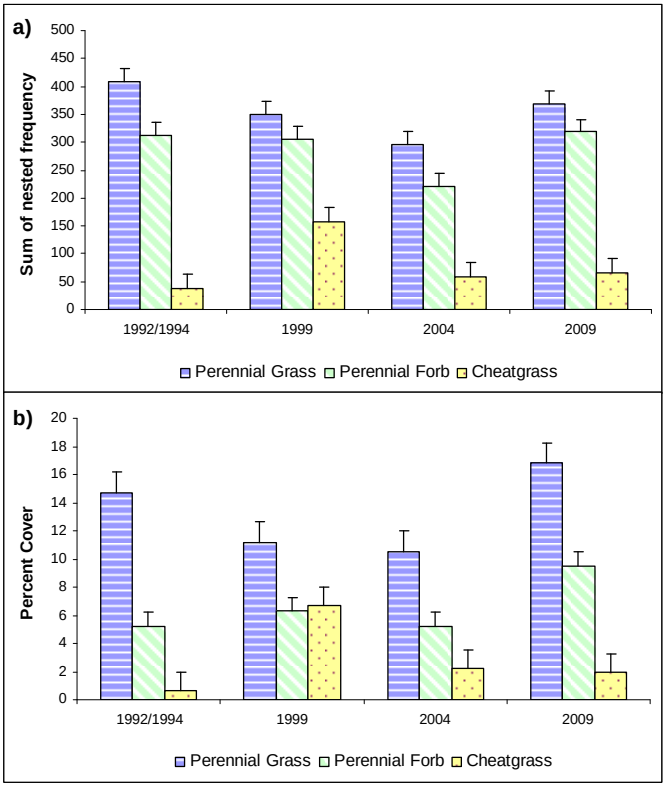


Figure 4. a) Mean perennial grass, perennial forb and cheatgrass sum of nested frequency by year for WMU 14, San Juan. **b)** Mean perennial grass, perennial forb and cheatgrass cover by year for WMU 14.

Herbaceous Understory

The median grass trend had a slight decrease from 1992/1994 to 1999 and again from 1999 to 2004, but then had a slight increase from 2004 to 2009 (Figure 5). The mean perennial grass sum of nested frequency steadily decreased from 1992/1994 to 2004 and was significantly lower in 2004 than in 1992/1994, but increased significantly from 2004 to 2009 and returned to near 1992/1994 levels (Figure 4a). The mean cover of perennial grass showed a similar trend except that cover was significantly lower in 1999 than in 1992/1994 and increased to higher than the 1992/1994 level in 2009 (Figure 4b). Cheatgrass (*Bromus tectorum*) has had a moderate presence on the unit with a significant increase in the sum of nested frequency and cover in 1999 (Figure 4a and 4b). Bulbous bluegrass (*Poa bulbosa*) was sampled repeatedly on only one site on the unit, Chippean Ridge (14-31), and therefore is not included in the unit summary. For a summary of the bulbous bluegrass trend, refer to the Chippean Ridge study discussion.

The median forb trend was down from 1999 to 2004, then was slightly up from 2004 to 2009 (Figure 5). The mean perennial forb sum of nested frequency was similar in 1992/1994, 1999 and 2009, but was significantly lower in 2004 (Figure 4a). The mean cover of perennial forbs was similar from 1994 to 2004, then increased significantly from 2004 to 2009 (Figure 4b). No noxious weeds were sampled on the studies in this herd unit.

Desirable Components Index

Ten studies in this herd unit sampled in 2009 are considered within the low potential scale for the deer Desirable Components Index (DCI): 14-1, 14-9, 14-10, 14-13, 14-14, 14-16, 14-22, 14-23, 14-24 and 14-32. The mean DCI ranking for these studies decreased markedly from 1992/1994 to 1999, but had returned to near 1992/1994 levels by 2009 (Figure 6 and Table 1). The decrease in DCI scores was primarily due to a decrease in the perennial grass cover score (Table 1). Six of the studies on deer winter range are considered to be within the mid-level potential scale for the deer DCI: 14-2, 14-8, 14-11, 14-27, 24-29 and 14-36. The mean DCI ranking for these studies has remained relatively steady at fair since 1992/1994, with a slight decrease to poor-fair in 2004 (Figure 6 and Table 2). The remaining three studies that sample deer winter range are considered to be within the high potential scale for the deer DCI: 14-12, 14-30 and 14-31. The mean DCI ranking for these studies has stayed similar since 1992/1994 at good (Figure 6 and Table 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
92/94	12.5	1.7	3.8	21.9	-0.7	3.6	0.0	**42.7**	Fair
99	10.2	2.9	2.3	15.3	-8.1	3.0	0.0	**25.6**	Poor-Fair
04	9.8	-2.9	0.8	19.8	-2.8	2.6	0.0	**27.2**	Fair
09	9.4	4.7	2.0	22.6	-2.2	2.1	0.0	**38.6**	Fair

Table 1. Low potential scale mean deer DCI scores (n=10) by year for WMU 14, San Juan. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92/94	7.7	9.7	7.8	25.5	-0.2	6.9	0.0	**57.4**	Fair
99	10.5	10.6	7.1	22.2	-0.9	5.4	0.0	**55.0**	Fair
04	12.1	8.8	6.8	15.9	0.0	4.9	0.0	**48.6**	Poor-Fair
09	13.0	9.2	6.6	19.1	-0.2	7.4	0.0	**55.1**	Fair

Table 2. Mid-level potential scale mean deer DCI scores (n=6) by year for WMU 14, San Juan. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92/94	29.3	13.2	11.0	22.4	0.0	8.8	0.0	**84.7**	Good
99	28.1	13.3	10.5	23.7	0.0	9.8	0.0	**85.4**	Good
04	27.9	10.7	8.0	16.4	0.0	9.3	0.0	**72.3**	Good
09	29.8	12.9	12.9	23.0	0.0	9.0	0.0	**87.5**	Good

Table 3. High potential scale mean deer DCI scores (n=3) by year for WMU 14 San Juan. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

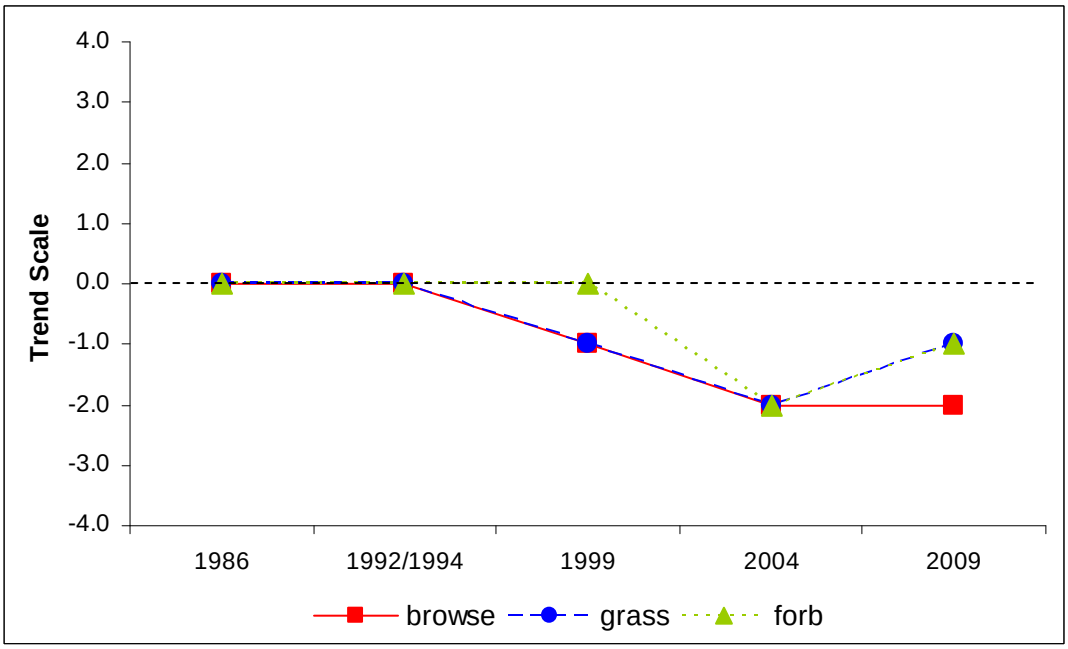


Figure 5. Cumulative median browse, grass and forb trends by year for WMU 14, San Juan.

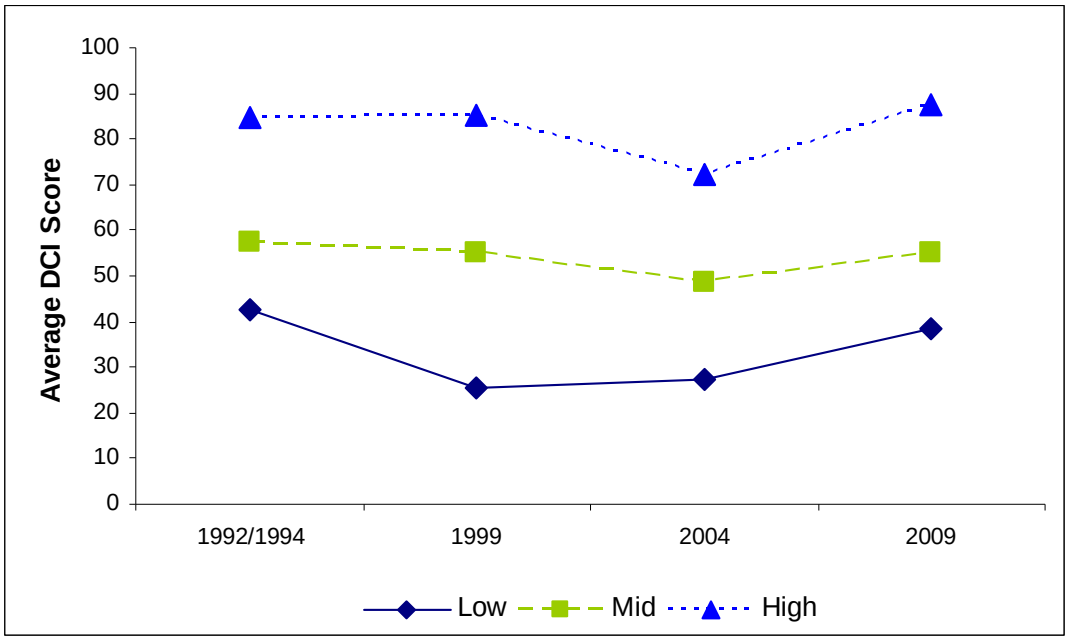
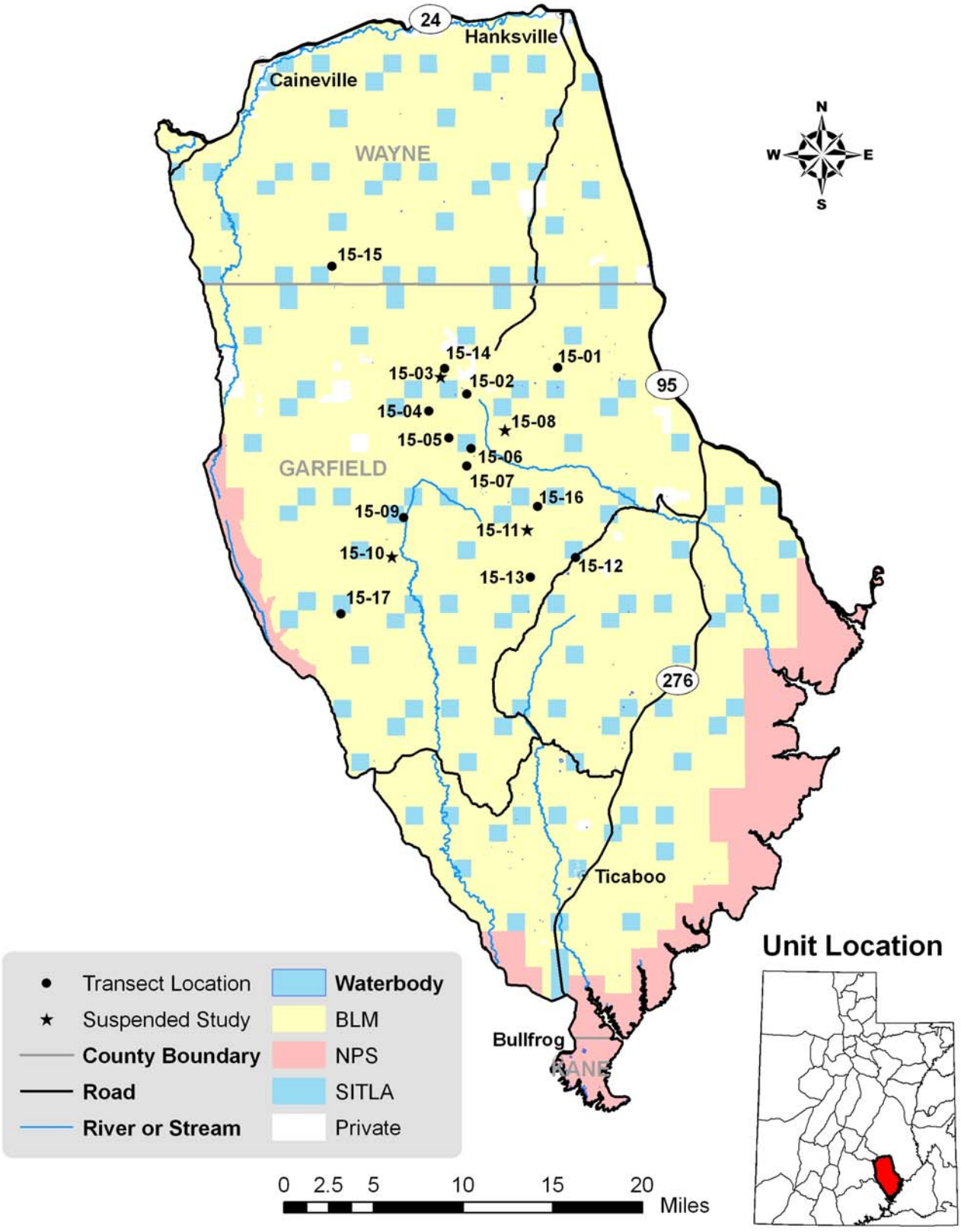


Figure 6. Mean low (n=10), mid-level (n=6) and high (n=3) potential scale deer DCI scores by year for WMU 14, San Juan. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

Management Unit 15



WILDLIFE MANAGEMENT UNIT 15 - HENRY MOUNTAINS

Boundary Description

> **Garfield and Wayne Counties** - Boundary begins in Hanksville at the junction of SR-24 and SR-95; south on SR-95 to Lake Powell; south along the west shore of Lake Powell to SR-276 at Bullfrog; north along SR-276 from Bullfrog to Notom Road; north along this road to SR-24; east on SR-24 to Hanksville.

Management Unit Description

The Henry Mountains WMU 15 encompasses approximately 856,812 acres, of which 247,645 acres are considered deer winter range and 14,966 acres are considered deer summer range. The Bureau of Land Management (BLM) manages the majority of both range types comprising 88% of winter and 81% of the summer range. The remaining winter range is comprised of 10% state land and 2% private land, while the remaining summer range is comprised of 14% state land and 5% private. The Henry Mountains lie between the waterpocket fold on the west and the canyon of the Colorado River to the east. The mountain peaks are the result of vertical intrusives of igneous rock that have penetrated from a broad basin into the sedimentary strata (Stokes 1986). The majority of the mountain rises gently upward to these peaks; which are (from north to south) Mt. Ellen (11,615 feet), Mt. Pennell (11,371 feet), Mt. Hillars (10,650 feet), Mt. Holmes (7,930 feet) and Mt. Ellsworth (8,235 feet). From the base of the peaks, gentle slopes extend out into the flat mesas and rough desert canyon lands which constitute the majority of the unit's land area.

A literature review done by Nelson (1965) on the history of ungulate use on the Henry Mountains reveals that livestock grazing began with cattle in 1878. Cattle numbers increased substantially in the 1890's. Sheep were introduced prior to 1890, but the large herds did not appear until after 1900. Livestock numbers increased sharply in response to World War I; by 1925, sheep had largely replaced cattle. All of the summer allotments, except the Pennell permittee who has taken non-use, had been converted back to cattle by the 1980's.

Big game utilizing the mountain consists of deer and bison. Occasional reports of elk sightings would indicate that perhaps a few descendants of a 1950 transplant (15 animals) may still be on the mountain or animals are coming from the eastern side of the Boulder Mountains.

Bison obtained from Yellowstone National Park were released near Robber's Roost Ranch north of the Dirty Devil River on the San Rafael Desert in 1941 (Nelson 1965). An additional release of five bulls was made in 1942 to replace those that scattered to the north. The bison left the San Rafael Desert in 1942 and most crossed the Dirty Devil River to the south and went onto the Burr Desert. Following a roundup and testing for brucellosis in 1963, the bison shifted their winter range from the Burr Desert to the foothills on the west side of the Henry Mountains. The bison continued to use the Henry Mountains during the other seasons. Bison have increased gradually since the initial transplant and have been hunted fairly consistently since 1960 (with the exception of 1964, 1965, 1972, and 1973). According to the Bison Unit Management Plan (UDWR 2007), the post-season population was managed for 275 adult and yearling animals post-season with the goal of increasing to 325 adult and yearling bison by 2012.

Since the 1960's, approximately 6,700 acres have been converted from pinyon-juniper woodland to a more productive grass-shrub type. Treatments done in these allotments represent 80% of that done in the Resource Area. Young pinyon and juniper trees have reoccupied most of the treated areas through release and/or invasion and are beginning to impact forage production. The Bison Unit Management Plan (UDWR 2007) addresses the need to maintain these treated areas to reduce tree density. Approximately 4,300 acres have been retreated or scheduled for retreatment to remove trees. Approximately 8,300 acres are currently being proposed as new treatments. Excluded from consideration for range improvements are the several wilderness study areas that have been identified within the Bison Unit Management Plan area. In 2003, two large fires, the Lonesome Beaver and Bulldog fires, burned 36,133 acres around Mt. Ellen and Mt. Pennell.

Range Trend Studies

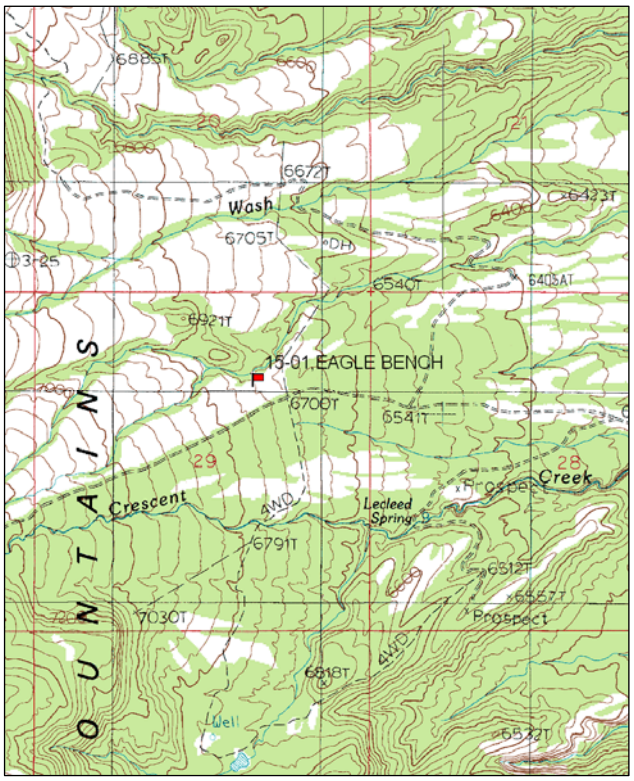
The key areas that were selected to be monitored are associated primarily with the pinyon-juniper chaining and revegetation treatments. The exceptions are other areas that are frequently used by bison and mule deer. The studies were located in areas where deer and/or bison "have demonstrated a definite pattern of use during normal climate conditions over a long period" (Interagency Range Trend Study Guidelines, 1983). Of the studies sampled in 2009, nine studies were initially established in 1987 [Eagle Bench (15-1), Nasty Flat (15-2), South Creek Chaining (15-4), Bates Knob (15-5), Box Springs Chaining (15-6), Airplane Spring (15-7), Cave Flat Chaining (15-9), Quaking Aspen Spring (15-12) and Sidehill Spring (15-13)], two studies were established in 2004 [Dugout Creek (15-14) and Steven's Mesa (15-15)] and two studies were established in 2009 [Coyote Spring (15-16) and Swap Mesa (15-17)]. Four studies [Dugout (15-3), Garden Basin (15-8), Cave Flat (15-10) and Above Coyote Bench (15-11)] have been suspended for various reasons and were not monitored in 2009.

EAGLE BENCH - TREND STUDY NO. 15-1-09

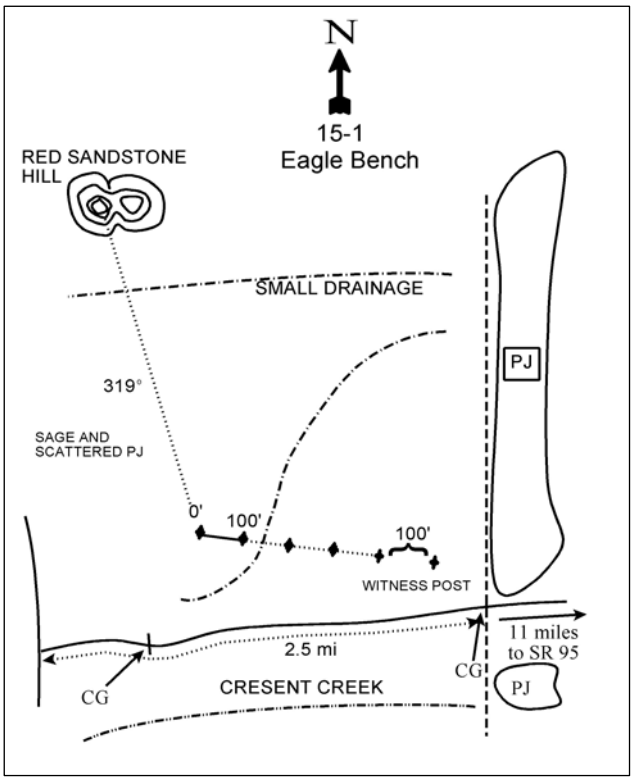
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Bison Year-Long
NRCS Ecological Site Description: Upland Loam (Pinyon-Utah Juniper), R035XY321UT
Land Ownership: BLM
Elevation: 6,640 ft (2,024 m)
Aspect: northeast
Slope: 5%
Transect bearing: 95 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
This transect is located in the Crescent Creek chaining on the east side of the Henry Mountains. It can be reached from SR 95 (approximately 11 miles through Little Egypt then west up Crescent Creek) or from the west via Copper Ridge of Granite Ridges and down Crescent Creek. From the intersection in the north part of Section 36 (T 31S, R 10E), go 0.6 miles down Crescent Creek to a cattleguard. Continue 1.95 miles to another cattleguard on the east edge of a large chaining (near section marker T 31S, R 11E, Sec. 29). On the north side of the road (NW of the cattleguard) there is a witness post out in the chaining. The transect starts with the 0-foot end of the baseline stake 500 feet to the west-northwest (275°M) at a short fence post tagged #7138.

Map Name: Raggy Canyon



Diagrammatic Sketch:



Township: 31S, Range: 11E, Section: 29

GPS: NAD 83, UTM 12S 524611 E 4215234 N

EAGLE BENCH - TREND STUDY NO. 15-1

Site Information

Site Description: The study is located in a pinyon-juniper chaining and seeding that was done in 1968. The site is located in the Crescent Creek Allotment which is managed by the BLM. Scattered pinyon and juniper were becoming reestablished within the chaining, but a lop-and-scatter treatment occurred between the 1999 and 2004 sample years removing all of the mature trees. Water for livestock and wildlife is available in Crescent Creek which is about one mile south of the study area. Pellet group data estimated light deer use in 1999 and 2004, but was moderately heavy in 2009. Estimated cattle use has been light since 1999 (Table - Pellet Group Data).

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the most abundant browse species in the area with an average cover of about 19% since 1994 (Table - Browse Trends). The majority of the sagebrush population consists of mature plants, with a decline in the recruitment of young sagebrush plants since 1999. Decadence and vigor of sagebrush has been good since the outset of the study. Sagebrush use was mostly light from 1994 to 2004, but increased to mostly heavy use in 2009 (Table - Browse Characteristics).

Other browse species on the site include broom snakeweed (*Gutierrezia sarothrae*) in relatively high density, but low cover (Table - Browse Characteristics, Table - Browse Trends). Prior to the lop-and-scatter treatment, point-center quarter data estimated 64 juniper trees/acre and 67 pinyon trees/acre, both with an average basal diameter of 3 inches in 1999. When sampled in 2004, all the pinyon and juniper within the chaining appeared to have been cut down within the past year.

Herbaceous Understory: The warm season perennial grass blue grama (*Bouteloua gracilis*) is the dominant understory grass on the site. Blue grama has maintained a fairly constant quadrat frequency for the last 15 years, around 42%. Crested wheatgrass decreased steadily from 1987 to 2004 and is now rare on the site. Bottlebrush squirreltail (*Sitanion hystrix*) is also fairly common on the site. Forbs are rare on this site and do not contribute substantially to the total herbaceous cover (Table - Herbaceous Trends).

Soil: The soil is a reddish-brown loam with a neutral pH and a fairly shallow estimated effective rooting depth. Organic matter is low and appears to be limited to the area directly beneath sagebrush plants (Table - Soil Analysis Data). There is a considerable amount of rock on the soil surface and throughout the soil profile. Bare ground cover is low with much of the protective cover being provided by rock and pavement (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 and moderate in 2009 due to pedestaling of plants, surface litter and soil movement, flow patterns, and active gullies.

Trend Assessments

Browse:

- **1987 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 vigor or decadence of sagebrush and both remained good. Recruitment of young sagebrush decreased, but remained good.
- **1994 to 1999 - stable (0):** There was little change in the density of sagebrush, though cover increased from 16% to 21%.
- **1999 to 2004 - slightly down (-1):** Density of sagebrush decreased by 17% to 5,280 plants/acre, and cover decreased to 19%. Decadence of sagebrush increased to 27% of the population and recruitment of young plants decreased to almost 0%.
- **2004 to 2009 - stable (0):** There was little change in the density and cover of sagebrush. Decadence and vigor of sagebrush improved slightly.

Grass:

- **1987 to 1994 - down (-2):** Sum of nested frequency of perennial grasses decreased by 38%. There was a significant decrease in the nested frequency of blue grama and bottlebrush squirreltail.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 11%, though cover decreased slightly. There was a significant increase in the nested frequency of bottlebrush squirreltail.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 33% and cover decreased slightly. There was a significant decrease in nested frequency of crested wheatgrass, Indian ricegrass (*Oryzopsis hymenoides*), and bottlebrush squirreltail.
- **2004 to 2009 - up (+2):** There was a 21% increase in the sum of nested frequency of perennial grasses, though cover decreased slightly. There was a significant increase in the nested frequency of bottlebrush squirreltail.

Forb:

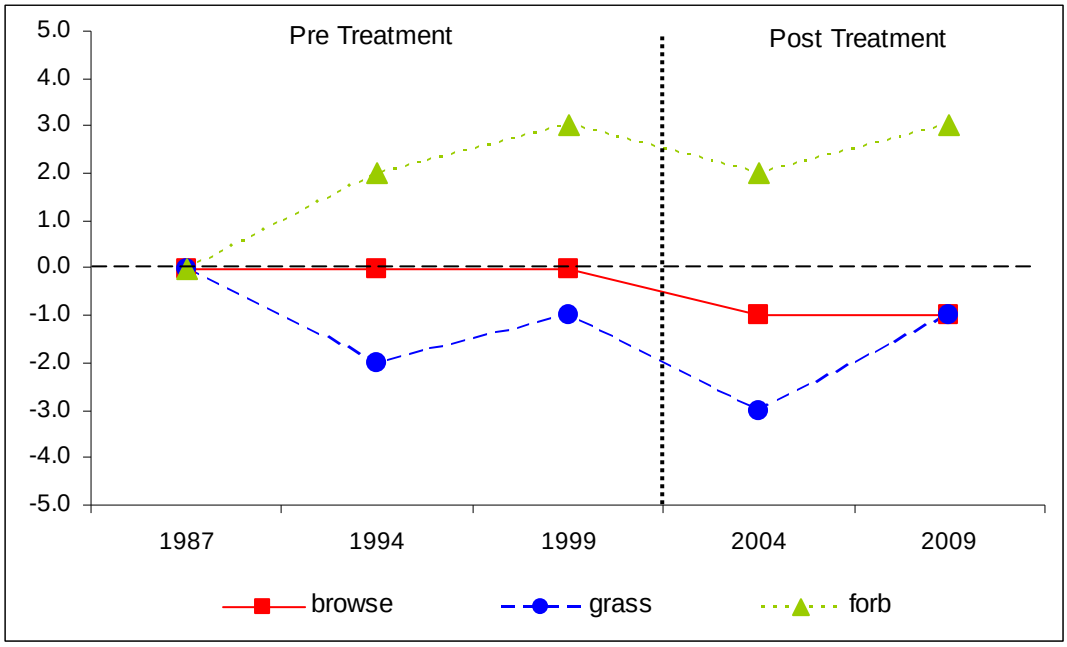
- **1987 to 1994 - up (+2):** The sum of nested frequency of perennial forbs increased markedly. Forbs are not abundant on this site.
- **1994 to 1999 - slightly up (+1):** Sum of nested frequency of perennial forbs increased by 45%, but cover decreased slightly. Forbs are not abundant on this site.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased to 1994 levels, and cover decreased slightly.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial forbs and cover increased to 1999 levels.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 15, study no: 1

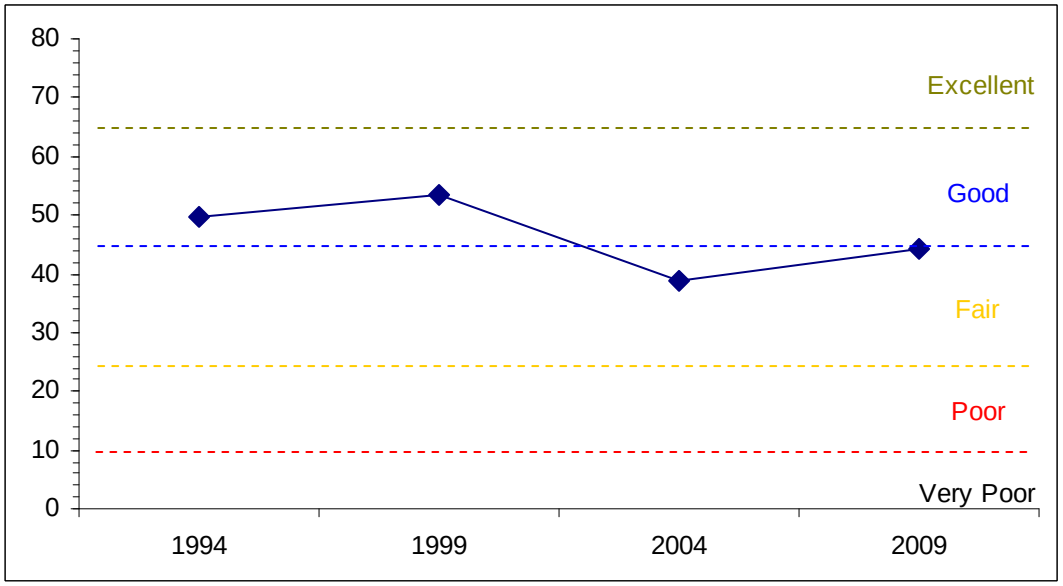
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	20.1	14.1	3.6	8.8	0.0	3.2	0.0	**49.8**	Good
99	26.9	12.3	4.0	8.4	0.0	1.9	0.0	**53.5**	Good
04	23.2	6.9	0.0	7.7	0.0	0.9	0.0	**38.7**	Fair
09	24.8	10.2	0.5	6.6	0.0	2.1	0.0	**44.2**	Fair-Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15 Study no: 1



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 15, Study no: 1



HERBACEOUS TRENDS--
Management unit 15, Study no: 1

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{c}$39	$_{bc}$34	$_{c}$31	$_{a}$3	$_{ab}$7	2.40	.68	.00	.04
G	Bouteloua gracilis	$_{b}$196	$_{a}$122	$_{a}$113	$_{a}$109	$_{a}$104	1.53	1.87	3.15	2.65
G	Bromus tectorum (a)	-	$_{a}$3	$_{b}$15	$_{a}$1	$_{a}$-	.00	.05	.00	-
G	Hilaria jamesii	-	5	-	4	-	.01	-	.06	-
G	Oryzopsis hymenoides	$_{ab}$19	$_{b}$27	$_{b}$24	$_{a}$5	$_{a}$3	.11	.31	.01	.00
G	Sitanion hystrix	$_{b}$109	$_{a}$36	$_{b}$84	$_{a}$49	$_{b}$91	.34	1.34	.60	.60
G	Stipa lettermani	-	3	-	-	-	.00	-	-	-
Total for Annual Grasses		0	3	15	1	0	0.00	0.05	0.00	0
Total for Perennial Grasses		363	227	252	170	205	4.40	4.21	3.83	3.30
Total for Grasses		363	230	267	171	205	4.41	4.26	3.84	3.30
F	Arabis sp.	$_{a}$-	$_{a}$1	$_{b}$9	$_{a}$-	$_{a}$-	.00	.05	-	-
F	Aster sp.	$_{a}$-	$_{b}$26	$_{a}$-	$_{a}$-	$_{a}$-	.05	-	-	-
F	Astragalus sp.	$_{a}$-	$_{a}$-	$_{b}$14	$_{b}$13	$_{b}$11	-	.05	.02	.03
F	Calochortus nuttallii	-	5	-	-	-	.01	-	-	-
F	Castilleja linariaefolia	-	-	-	1	-	-	-	.03	-
F	Chaenactis douglasii	-	3	-	-	-	.00	-	-	-
F	Chenopodium fremontii (a)	-	-	-	2	-	-	-	.00	-
F	Chenopodium leptophyllum(a)	-	-	-	1	-	-	-	.00	-
F	Collinsia parviflora (a)	-	$_{a}$-	$_{a}$-	$_{b}$14	$_{a}$-	-	-	.03	-
F	Cryptantha sp.	-	-	-	-	7	-	-	-	.02
F	Descurainia pinnata (a)	-	-	6	3	-	-	.01	.00	-
F	Erigeron sp.	-	6	-	-	-	.01	-	-	-
F	Eriogonum sp.	-	-	1	2	-	-	.00	.00	-
F	Gayophytum ramosissimum(a)	-	-	-	2	-	-	-	.00	-
F	Gilia sp. (a)	-	$_{b}$22	$_{ab}$16	$_{a}$6	$_{a}$-	.05	.04	.01	-
F	Hymenoxys acaulis	2	-	-	-	2	-	-	-	.00
F	Lappula occidentalis (a)	-	-	-	1	-	-	-	.00	-
F	Lesquerella kingii	$_{a}$-	$_{a}$8	$_{b}$41	$_{a}$5	$_{a}$2	.01	.22	.04	.00
F	Lupinus sp.	-	-	-	8	-	-	-	.02	-
F	Phlox austromontana	-	-	3	-	-	-	.18	-	-
F	Phlox longifolia	$_{a}$6	$_{b}$56	$_{b}$59	$_{b}$51	$_{a}$25	1.33	.18	.11	.05
F	Polygonum douglasii (a)	-	4	10	-	-	.00	.01	-	-
F	Ranunculus testiculatus (a)	-	-	1	-	-	-	.00	-	-
F	Senecio multilobatus	$_{ab}$16	$_{a}$7	$_{ab}$31	$_{b}$33	$_{c}$104	.02	.24	.18	.91
F	Townsendia incana	$_{a}$-	$_{ab}$6	$_{b}$13	$_{ab}$4	$_{b}$14	.16	.03	.01	.04
F	Unknown forb-perennial	6	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	26	33	29	0	0.05	0.07	0.07	0
Total for Perennial Forbs		30	118	171	117	165	1.61	0.95	0.43	1.06
Total for Forbs		30	144	204	146	165	1.67	1.03	0.50	1.06

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

BROWSE TRENDS--
Management unit 15, Study no: 1

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	0	1	0	0	-	-	-	-
B	Artemisia tridentata wyomingensis	89	88	85	89	16.02	21.45	18.59	19.83
B	Chrysothamnus depressus	0	0	0	0	-	-	-	-
B	Echinocactus sp.	0	0	0	1	-	-	-	-
B	Ephedra viridis	0	1	1	1	-	-	-	-
B	Eriogonum microthecum	10	7	1	3	.06	.04	.00	-
B	Gutierrezia sarothrae	41	36	37	63	1.09	.28	1.24	.66
B	Juniperus osteosperma	0	3	0	0	1.25	.63	-	-
B	Mahonia fremontii	0	0	0	0	-	-	-	-
B	Opuntia sp.	1	0	0	0	.00	-	-	-
B	Pinus edulis	0	5	0	0	1.87	2.24	-	-
Total for Browse		141	141	124	157	20.32	24.65	19.83	20.49

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 1

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	.01	.10
Artemisia tridentata wyomingensis	-	25.36	20.48
Gutierrezia sarothrae	-	1.00	.78
Juniperus osteosperma	1.20	-	-
Pinus edulis	.40	-	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 1

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.2	0.9

BASIC COVER--
Management unit 15, Study no: 1

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	4.25	23.65	29.71	24.62	26.66
Rock	23.25	22.56	23.79	26.83	26.60
Pavement	16.25	4.56	13.64	16.85	14.56
Litter	37.50	22.97	24.80	25.20	28.94
Cryptogams	0	.03	.07	.09	.05
Bare Ground	18.75	20.02	21.97	15.07	15.67

SOIL ANALYSIS DATA --

Management unit 15, Study no: 1, Study Name: Eagle Bench

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
9.4	6.6	51.3	28.2	20.6	2.4	14.5	96	0.6

PELLET GROUP DATA--

Management unit 15, Study no: 1

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	10	12	8	30
Deer	-	1	3	28
Bison/Cattle	-	2	-	1

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (2)	8 (20)	41 (101)
9 (22)	2 (5)	2 (5)

BROWSE CHARACTERISTICS--

Management unit 15, 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)
Amelanchier utahensis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	100	0	0	46/61
04	**0**	0	0	-	-	0	0	0	50/57
09	**0**	0	0	-	-	0	0	0	46/52
Artemisia tridentata wyomingensis									
87	**6864**	17	79	4	133	87	5	0	18/27
94	**6400**	7	90	3	240	0	0	4	17/26
99	**6340**	8	84	9	220	39	5	2	17/30
04	**5280**	0	73	27	400	4	0	14	16/29
09	**5540**	1	83	16	300	25	67	6	16/30
Chrysothamnus depressus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	11/21
Echinocactus sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	2/2

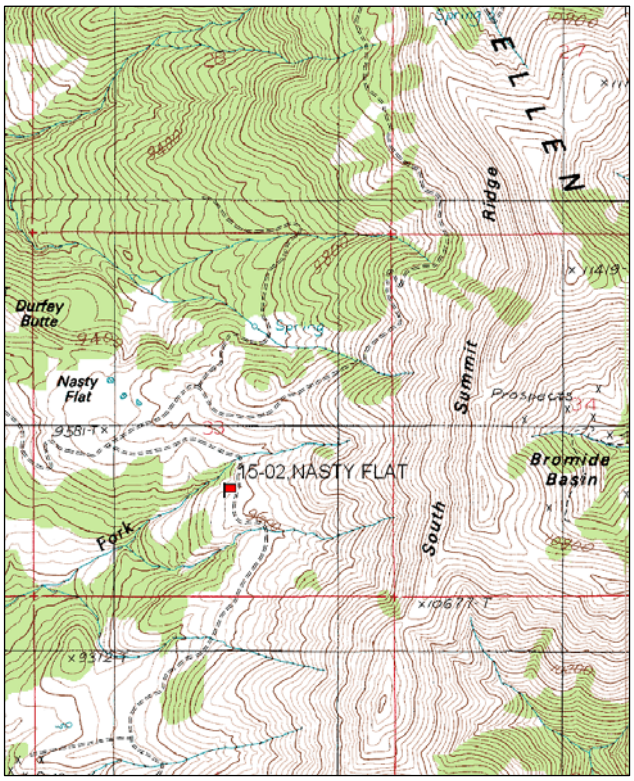
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Ephedra viridis									
87	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	10/8
99	**20**	0	100	0	-	0	0	0	6/10
04	**20**	0	0	100	-	0	0	100	10/8
09	**20**	100	0	0	-	0	0	0	5/11
Eriogonum microthecum									
87	**265**	75	25	-	-	25	0	0	3/3
94	**360**	50	50	-	-	11	17	0	3/3
99	**320**	13	88	-	80	31	13	0	3/4
04	**20**	0	100	-	-	100	0	0	4/5
09	**140**	0	100	-	-	0	0	0	2/3
Gutierrezia sarothrae									
87	**2465**	8	92	0	66	0	0	0	6/4
94	**1960**	8	89	3	80	0	0	0	5/6
99	**2080**	36	63	1	380	0	0	.96	3/3
04	**2620**	36	59	5	-	0	0	5	7/10
09	**9100**	44	55	1	3560	.43	0	.43	3/4
Juniperus osteosperma									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	100	0	-	20	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Mahonia fremontii									
87	**0**	0	0	-	66	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**20**	0	100	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	4/10
09	**0**	0	0	-	-	0	0	0	-/-
Pinus edulis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**100**	40	60	-	60	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-

NASTY FLAT - TREND STUDY NO. 15-2-09

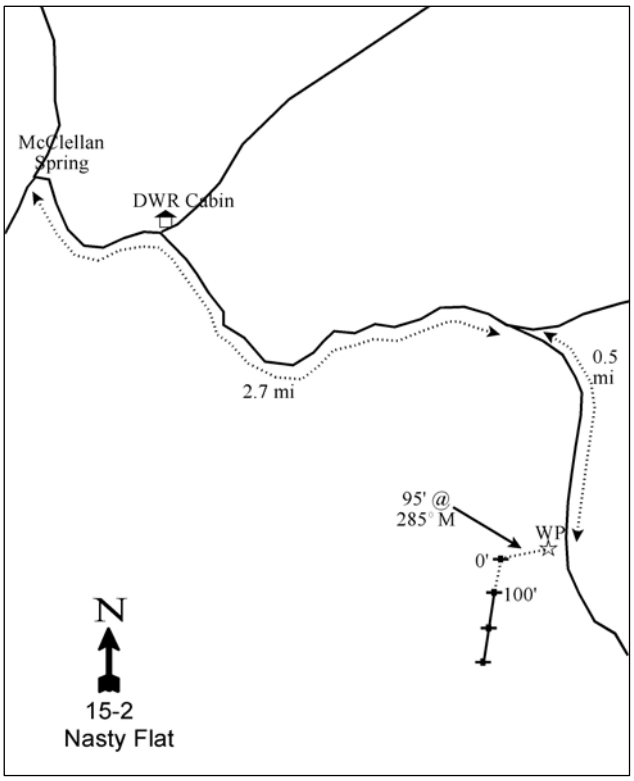
Vegetation Type: Quaking Aspen
Range Type: Crucial Deer Summer, Crucial Bison Year-Long
NRCS Ecological Site Description: Mountain Shallow Loam (Black Sagebrush), R048AY433UT
Land Ownership: BLM
Elevation: 9,500 ft (2,896 m)
Aspect: west
Slope: 33%
Transect bearing: 213 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft)

Directions:
From the McMillan (McClellan) Spring Campground (BLM), proceed east on the road past Willow Spring and the DWR cabin for 2.7 miles to a fork. Stay right and continue 0.5 miles. The transect is located in the patch of aspens below the road. A witness post is located on the right side of the road. From this fence post, walk 95 feet bearing 285° to the start of the baseline. The first stake is under the aspens, and tagged with a red browse tag, #7852.

Map Name: Mount Ellen



Diagrammatic Sketch:



Township: 31S, Range: 10E, Section: 33

GPS: NAD 83, UTM 12S 516430 E 4212885 N

NASTY FLAT - TREND STUDY NO. 15-2

Site Information

Site Description: The study samples an aspen (*Populus tremuloides*) stand in the Henry Mountains west of Kimble and Turner Peak. The aspen type is not very extensive and does not occur often within this management unit. This is a mature aspen stand with a considerable number of young aspen in the understory as well as a few conifers. In 1999, the baseline was realigned to better sample aspen regeneration and animal use near the edge of the aspen clone. Pellet group data for bison and cattle were combined due to the difficulty in differentiating between these species. Pellet group data has indicated increasing deer use from light in 1999 to moderately heavy in 2009. Estimated bison/cattle use was light to moderate in 1999 and 2004, with no sign encountered in 2009 (Table - Pellet Group Data).

Browse: Aspen is the key browse species on this site. Quadrat cover of aspen has remained fairly similar since 1999 (Table - Browse Trends), and canopy cover has been high since 1999 (Table - Canopy Cover). Strip density estimates of aspen have remained similar since 1999 (Table - Browse Characteristics) and point-quarter density estimates decreased from 1999 to 2004, but have been similar since 2004 (Table - Point-Quarter Tree Data). Decadence and vigor of aspen has mostly good over the sample years with an increase in both decadence and poor vigor during the drought year of 2004. Recruitment of young aspen has been good over the sample years. Utilization of aspen was moderate to high at the outset of the study in 1987, but has been light to moderate since 1999 (Table - Browse Characteristics). Other tree species that occur on the site in moderate cover and density are the coniferous species Douglas fir (*Pseudotsuga menziesii*) and limber pine (*Pinus flexilis*).

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was sampled more accurately in 1999 after the baseline was relocated closer to the edge of the aspen clone, but this species is not considered a key species as this site is a summer range. Cover of sagebrush has increased steadily since 1999 (Table - Browse Trends), though density decreased between 1999 and 2004. Decadence of sagebrush has also increased steadily since 1999. The sagebrush population has a high proportion of young plants and utilization has been mostly light since the outset of the study (Table - Browse Characteristics). Less abundant shrubs that were sampled on the site include snowberry (*Symphoricarpos oreophilus*) and mountain juniper (*Juniperus communis*).

Herbaceous Understory: The herbaceous understory is dominated by perennial species. The dominant grasses are mutton bluegrass (*Poa fendleriana*) and slender wheatgrass (*Agropyron trachycaulum*) which provide the majority of the total grass and herbaceous cover. Other grasses that occur in low cover and frequency include elk sedge (*Carex geyeri*), bottlebrush squirreltail (*Sitanion hystrix*), and Letterman needlegrass (*Stipa lettermani*). Forbs are fairly diverse, but not overly abundant. The forb component is dominated by the perennial species tuber starwort (*Stellaria jamesiana*) and dandelion (*Taraxacum officinale*) (Table - Herbaceous Trends).

Soil: The soil is a loam with substantial amounts of organic matter in the surface horizon, is moderately acidic, and has a moderately deep estimated effective rooting depth (Table - Soil Analysis Data). Erosion is not a problem on the site due to the high litter cover (Table - Basic Cover). Erosion control efforts have been undertaken by the BLM to limit erosion in nearby drainages with fabric check dams. Most of these have been effective in holding soil on the steep, eroded slopes of the area. The soil erosion condition was classified as stable in 2004 and slight in 2009 due primarily to surface litter movement.

Trend Assessments

Browse:

- **1987 to 1994 - stable (0):** Browse is not an important component of this summer range site. Aspen is the primary browse species on the site. No form and vigor class data was collected for this species in 1994, so comparisons cannot be made.
- **1994 to 1999 - stable (0):** The baseline was relocated in 1999, so direct comparison of browse species cannot be made. Aspen had good vigor, decadence, and recruitment of young plants. Mountain big sagebrush density increased markedly.
- **1999 to 2004 - down (-2):** Strip density estimates of both aspen and mountain big sagebrush decreased, but cover estimates remained similar. Decadence also increased in both aspen and mountain big sagebrush to 22% and 19%, respectively. Recruitment of young aspen and young sagebrush plants decreased markedly.
- **2004 to 2009 - stable (0):** Density and cover estimates remained similar for both aspen and mountain big sagebrush. Decadence of sagebrush increased to 29%.

Grass:

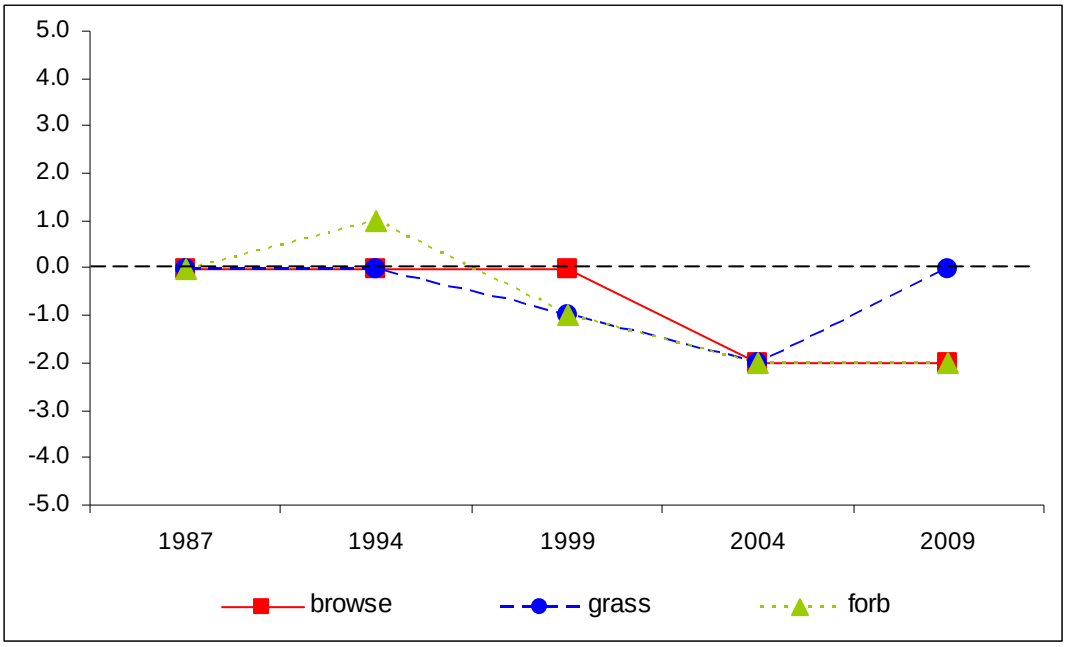
- **1987 to 1994 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial grasses. There was a significant decrease in the nested frequency of smooth brome (*Bromus inermis*) and a significant increase in the nested frequency of Letterman needlegrass.
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 9% and cover decreased from 7% to 4%. There was a significant decrease in the nested frequency of mutton bluegrass.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 11%, though cover increased to 7%. There was a significant decrease in the nested frequency of elk sedge and Letterman needlegrass, and a significant increase in nested frequency of mutton bluegrass and bottlebrush squirreltail.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased by 22% and cover increased to 10%. There was a significant increase in the nested frequency of slender wheatgrass and a significant decrease in the nested frequency of bottlebrush squirreltail.

Forb:

- **1987 to 1994 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 10%.
- **1994 to 1999 - down (-2):** the sum of nested frequency of perennial forbs decreased by 27% and cover decreased from 12% to 5%. There was a significant decrease in the nested frequency of tuber starwort.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 10%, though cover increased to 7%.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15, Study no: 2



HERBACEOUS TRENDS--
Management unit 15, Study no: 2

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron trachycaulum	ab111	a88	ab110	a76	b141	.41	1.14	.96	3.11
G	Bromus carinatus	-	-	-	2	-	-	-	.03	-
G	Bromus inermis	b51	a4	a4	a-	a-	.03	.03	-	-
G	Carex geyeri	a4	a13	b70	a24	a27	.26	1.02	.25	.58
G	Festuca ovina	5	-	2	-	-	-	.00	-	-
G	Poa fendleriana	b259	b236	a125	b183	b216	4.14	1.50	5.57	6.29
G	Sitanion hystrix	a10	a-	a10	b40	a4	-	.02	.55	.06
G	Stipa lettermani	a1	b66	b49	a5	a14	1.86	.42	.07	.20
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		441	407	370	330	402	6.71	4.15	7.44	10.25
Total for Grasses		441	407	370	330	402	6.71	4.15	7.44	10.25
F	Achillea millefolium	-	-	3	2	-	-	.00	.00	-
F	Agoseris glauca	-	6	3	11	-	.01	.00	.05	-
F	Allium sp.	a-	a-	ab4	a2	b12	-	.06	.00	.07
F	Androsace septentrionalis (a)	-	3	7	3	2	.00	.01	.00	.00
F	Arabis drummondi	13	16	19	4	-	.09	.09	.01	-
F	Astragalus sp.	a-	b69	a-	a-	a-	1.47	-	-	-
F	Calochortus nuttallii	4	-	4	-	-	-	.01	-	-
F	Castilleja linariaefolia	-	-	-	-	1	-	-	-	.00
F	Chenopodium fremontii (a)	-	5	-	7	2	.01	-	.02	.00

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
F	Cymopterus lemmonii	3	-	4	4	4	-	.01	.04	.03
F	Descurainia pinnata (a)	4	-	-	-	-	-	-	-	-
F	Erigeron eatonii	$_{a}$15	$_{ab}$27	$_{b}$66	$_{b}$62	$_{b}$67	.09	.54	.50	.61
F	Erigeron sp.	4	-	-	-	-	-	-	-	-
F	Fritillaria atropurpurea	-	-	4	-	-	-	.01	-	-
F	Lychnis drummondii	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$14	$_{a}$-	-	-	.03	-
F	Penstemon watsonii	$_{b}$41	$_{ab}$21	$_{b}$39	$_{ab}$20	$_{a}$12	.17	.34	.52	.25
F	Phlox longifolia	22	16	25	22	23	.09	.11	.07	.09
F	Physalis sp.	-	3	-	-	-	.00	-	-	-
F	Polygonum douglasii (a)	-	$_{a}$-	$_{a}$-	$_{b}$49	$_{b}$32	-	-	.09	.09
F	Sedum lanceolatum	1	-	6	3	3	-	.06	.01	.00
F	Senecio multilobatus	$_{b}$13	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$3	-	-	-	.02
F	Stellaria jamesiana	$_{b}$282	$_{b}$277	$_{a}$172	$_{a}$184	$_{a}$204	2.97	1.07	3.04	2.14
F	Taraxacum officinale	$_{b}$187	$_{b}$187	$_{ab}$141	$_{a}$110	$_{a}$111	5.84	2.45	2.48	2.20
F	Unknown forb-perennial	$_{b}$23	$_{a}$-	$_{a}$-	$_{a}$3	$_{a}$4	-	-	.00	.01
F	Unknown forb-perennial 2	-	-	-	-	6	-	-	-	.03
F	Vicia sp.	3	-	-	-	-	-	-	-	-
F	Viola sp.	$_{a}$-	$_{b}$52	$_{a}$-	$_{a}$-	$_{a}$-	1.12	-	-	-
Total for Annual Forbs		4	8	7	59	36	0.01	0.00	0.11	0.09
Total for Perennial Forbs		611	674	490	441	450	11.88	4.78	6.78	5.50
Total for Forbs		615	682	497	500	486	11.90	4.79	6.90	5.59

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

BROWSE TRENDS--
Management unit 15, Study no: 2

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata vaseyana	12	37	27	22	.16	1.01	1.26	1.56
B	Juniperus communis	1	0	3	1	1.00	-	-	.03
B	Mahonia repens	0	1	0	0	-	-	-	-
B	Pinus flexilis	0	3	3	8	.46	.56	.41	1.11
B	Populus tremuloides	0	66	62	53	2.21	1.58	1.45	1.74
B	Pseudotsuga menziesii	0	18	20	18	.85	3.06	6.50	5.56
B	Ribes velutinum velutinum	1	0	0	0	.21	-	-	-
B	Symphoricarpos oreophilus	4	4	6	6	.30	.15	.30	.33
Total for Browse		18	129	121	108	5.21	6.38	9.93	10.34

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 2

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata vaseyana	-	1.66	1.06
Juniperus communis	-	.18	.25
Pinus flexilis	2.00	.53	3.43
Populus tremuloides	61.40	67.84	47.78
Pseudotsuga menziesii	9.39	10.28	9.93
Symphoricarpos oreophilus	-	.86	.18

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 2

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	-	2.9

POINT-QUARTER TREE DATA--
Management unit 15, Study no: 2

Species	Trees per Acre		
	'99	'04	'09
Pinus flexilis	76	80	121
Populus tremuloides	4797	1512	1594
Pseudotsuga menziesii	105	137	148

Average diameter (in)		
'99	'04	'09
2	2.1	2.3
1.3	3.8	4.7
2.9	4	2.9

BASIC COVER--
Management unit 15, Study no: 2

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	4.50	24.53	15.80	24.68	28.63
Rock	1.00	.66	6.27	5.71	7.52
Pavement	0	.03	.02	.46	.09
Litter	93.75	77.49	82.88	75.55	72.00
Cryptogams	0	0	.03	0	0
Bare Ground	.75	1.26	1.17	4.59	5.50

SOIL ANALYSIS DATA --
Management unit 15, Study no: 2, Study Name: Nasty Flat

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
19.2	5.9	49.3	30.2	20.6	5.4	31.3	204.8	0.5

PELLET GROUP DATA--
Management unit 15, Study no: 2

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	-	-	-	1
Grouse	-	-	1	-
Elk	2	-	-	-
Deer	3	5	11	16
Bison/Cattle	-	1	4	-

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	-	-
-	-	2 (5)
13 (32)	22 (5)	39 (96)
15 (37)	18 (44)	-

BROWSE CHARACTERISTICS--
Management unit 15, 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 vaseyana									
87	**0**	0	0	0	-	0	0	0	-/-
94	**300**	47	47	7	-	0	0	7	8/11
99	**1460**	25	70	5	60	0	0	5	12/20
04	**1080**	4	78	19	-	17	4	9	11/19
09	**1100**	38	33	29	120	24	9	7	12/19
Juniperus communis									
87	**0**	0	0	0	-	0	0	0	-/-
94	**20**	0	100	0	-	0	0	0	14/73
99	**0**	0	0	0	-	0	0	0	-/-
04	**60**	0	67	33	-	0	0	0	-/-
09	**20**	0	100	0	-	0	0	0	-/-
Mahonia repens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**100**	0	100	-	-	0	0	0	3/17
04	**0**	0	0	-	-	0	0	0	7/8
09	**0**	0	0	-	-	0	0	0	-/-
Pinus flexilis									
87	**66**	100	0	-	66	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	67	33	-	20	0	0	0	-/-
04	**60**	67	33	-	-	0	0	0	-/-
09	**200**	60	40	-	-	0	0	10	-/-
Populus tremuloides									
87	**5131**	94	5	1	599	39	22	0	393/157
94	**0**	0	0	0	-	0	0	0	-/-
99	**2840**	75	22	3	-	0	0	3	-/-
04	**2540**	36	42	22	-	24	6	19	-/-
09	**2520**	52	40	8	120	18	12	3	-/-

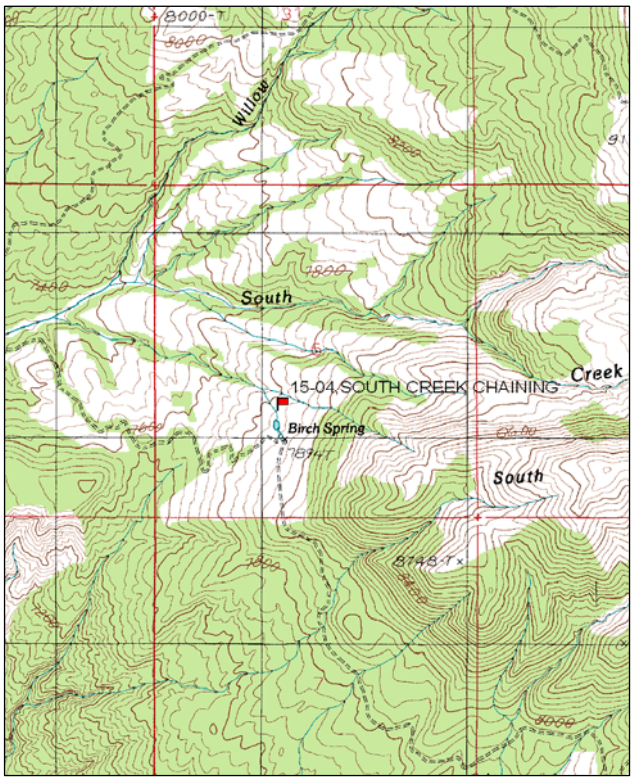
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pseudotsuga menziesii									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**500**	88	12	-	60	0	0	0	-/-
04	**460**	61	39	-	60	0	0	0	-/-
09	**500**	48	52	-	120	0	0	0	-/-
Ribes velutinum velutinum									
87	**66**	100	0	-	-	100	0	0	-/-
94	**20**	0	100	-	-	0	0	0	15/48
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	20	0	0	0	-/-
Symphoricarpos oreophilus									
87	**133**	0	100	-	-	0	100	0	14/16
94	**80**	25	75	-	-	0	0	0	19/28
99	**220**	82	18	-	-	0	0	0	20/30
04	**220**	9	91	-	-	0	0	0	19/25
09	**320**	63	38	-	-	0	0	0	20/33

SOUTH CREEK CHAINING - TREND STUDY NO. 15-4-09

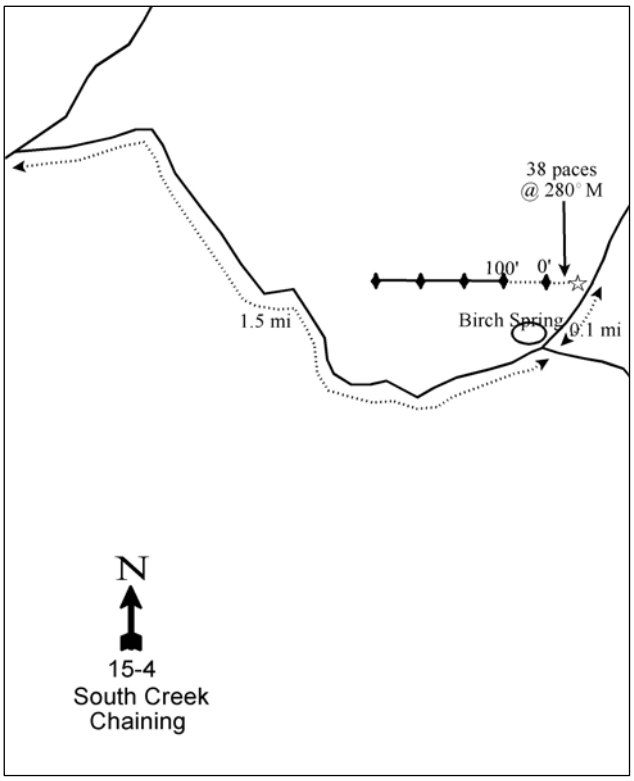
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Bison Year-Long
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R035XY318UT
Land Ownership: BLM
Elevation: 7,900 ft (2,408 m)
Aspect: north
Slope: 5%
Transect bearing: 285 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From the intersection of the Willow Creek and South Creek Roads, (T32S, R9F, Sec.1) travel 1.5 miles west-southwest to a fork by Birch Spring. Turn left and go 0.1 miles past the fenced spring, and down a faint road. A witness post (tall green fence post) is located in the P-J just west of the road. The transect starts 38 paces away at a bearing of 280°M from the witness post. Browse tag# 7127.

Map Name: Mount Ellen



Diagrammatic Sketch:



Township: 32S, Range: 10E, Section: 6

GPS: NAD 83, UTM 12S 513018 E 4211338 N

SOUTH CREEK CHAINING - TREND STUDY NO. 15-4

Site Information

Site Description: The study is located in the pinyon-juniper foothills on the west slope of the Henry Mountains. It samples a portion of the South Creek pinyon-juniper project that was completed in the mid-1960's. Water is available for livestock and wildlife at Birch Spring a few hundred yards to the south. The site is within the Nasty Flat Cattle Allotment. A lop and scatter treatment of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) was done on the site between the 1999 and 2004 samplings. Pellet group data estimated light deer use in 1999 and 2004, with a large increase in 2009. Due to difficulties distinguishing between species, bison and cattle pats were combined. Bison/cattle use was moderate to high in 1999 and 2004, but decreased in 2009 (Table - Pellet Group Data).

Browse: Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the dominant browse on this site. Mountain big sagebrush cover has steadily increased since 1994 (Table - Browse Trends). The density of sagebrush has also increased markedly over the sample years. Vigor and decadence of sagebrush have been excellent over the span of the study. Recruitment of young sagebrush plants has been high on the site with young plants comprising the majority of the sagebrush population in 2009 (Table - Browse Characteristics).

After pinyon and juniper trees became more abundant the chaining was retreated with a lop and scatter treatment in 2003. Photo transects show a decline in pinyon and juniper density in 2004, after the lop and scatter treatment. The site is bordered by pinyon and juniper, but very few trees are found within the sample area.

Herbaceous Understory: The grass understory is abundant, but not very diverse. Crested wheatgrass (*Agropyron cristatum*) is the predominant grass species, accounting for more than 93% of grass cover in all samples. Crested wheatgrass cover has varied from 11-22%. Perennial forbs are quite diverse on the site, but outside of the most abundant forb, alfalfa (*Medicago sativa*), provide limited cover (Table - Herbaceous Trends).

Soil: The soil on the site is a dark brown loam of granitic origin, with a neutral pH (6.9) with an effective rooting depth of just over 12 inches (Table - Soil Analysis Data). The soil surface is rocky as is the profile. The amount of bare ground cover has been low over the sample years with high cover of rock and pavement (Table - Basic Cover). The soil erosion condition classification was rated as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1987 to 1994 - stable (0):** Differences in density may be related to the larger sample area used in 1994; therefore, different parameters were used to determine trend. The population remains healthy with good recruitment.
- **1994 to 1999 - up (+2):** Mountain big sagebrush density increased markedly from 160 plants/acre to 2,740 plants/acre, and cover increased from 1% to 4%. Recruitment of young sagebrush plants is still excellent at 39%.
- **1999 to 2004 - up (+2):** Mountain big sagebrush density doubled to 5,400 plants/acre and cover increased to 8%. Recruitment of young sagebrush plants is still good at 19%.
- **2004 to 2009 - up (+2):** Mountain big sagebrush density more than tripled, though much of that increase is due to a large increase in young sagebrush plants. The density of mature sagebrush plants decreased slightly. Cover of sagebrush increased to over 13%.

Grass:

- **1987 to 1994 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 13%. There was a significant decrease in the nested frequency of bottlebrush squirreltail.
- **1994 to 1999 - stable (0):** There was little change in perennial grasses on the site.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 18%, and cover decreased from 22% to 11%. There was a significant decrease in the nested frequency of crested wheatgrass.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 11%, and cover increased to 16%.

Forb:

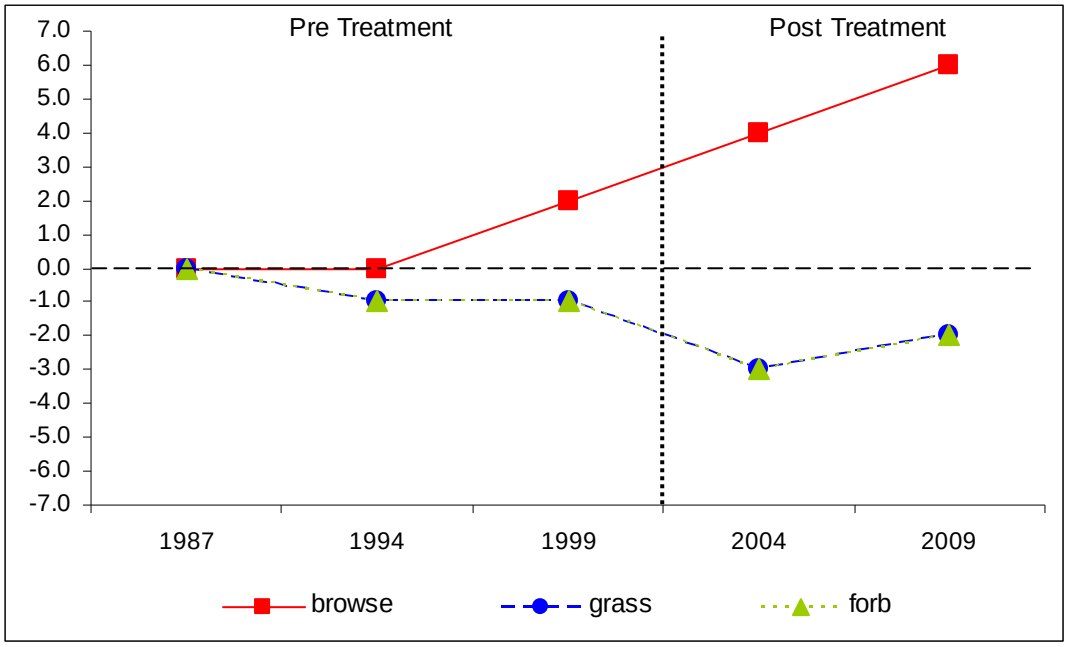
- **1987 to 1994 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 12%. There was a significant decrease in the nested frequency of alfalfa.
- **1994 to 1999 - stable (0):** There was little change in perennial forbs.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 42%, and cover decreased from 6% to 3%.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency increased by 11%, and cover increased to over 4%.

DEER DESIRABLE COMPONENTS INDEX – MID-LEVEL POTENTIAL SCALE --
Management unit 15, study no: 4

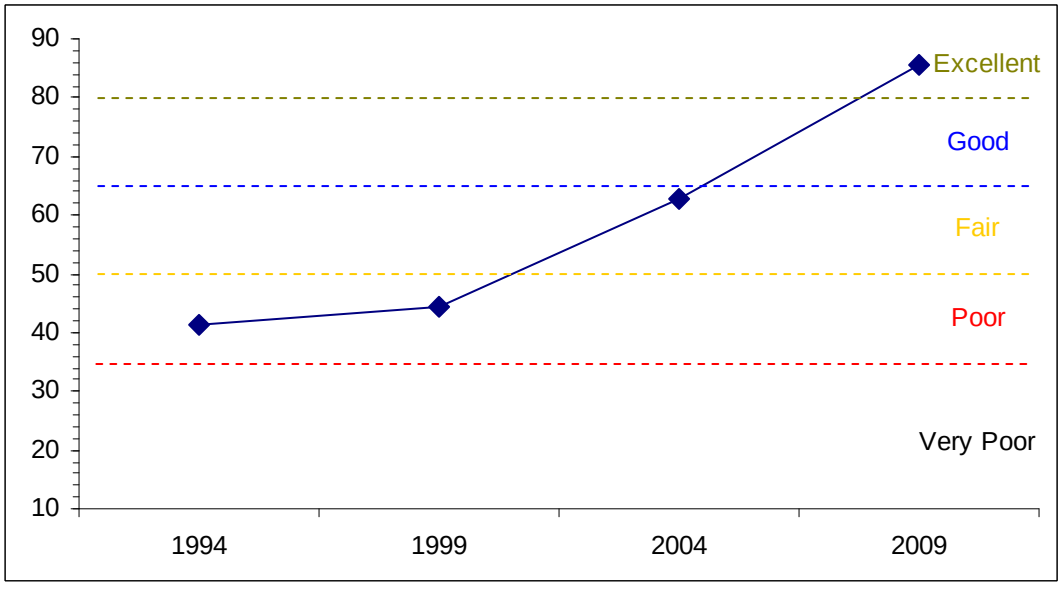
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	1.6	0	0	30	-0.2	10	0	**41.4**	Poor
99	4.8	0	0	30	-0.5	10	0	**44.4**	Poor
04	10	15	9.5	22.7	-0.3	5.9	0	**62.8**	Fair
09	16.8	15	15	30	-0.2	9	0	**85.6**	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15 Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 15, Study no: 4



HERBACEOUS TRENDS--
Management unit 15, Study no: 4

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{b}$293	$_{b}$294	$_{b}$294	$_{a}$245	$_{ab}$269	22.07	20.97	11.25	15.81
G	Agropyron smithii	5	-	13	7	11	-	.77	.06	.33
G	Bromus tectorum (a)	-	$_{a}$24	$_{b}$57	$_{b}$58	$_{a}$25	.26	.63	.43	.21
G	Poa fendleriana	3	1	2	-	3	.00	.15	-	.03
G	Sitanion hystrix	$_{b}$42	$_{a}$4	$_{a}$-	$_{a}$3	$_{a}$-	.01	-	.06	-
Total for Annual Grasses		0	24	57	58	25	0.26	0.62	0.43	0.20
Total for Perennial Grasses		343	299	309	255	283	22.08	21.89	11.37	16.17
Total for Grasses		343	323	366	313	308	22.35	22.52	11.80	16.38
F	Arabis sp.	-	-	2	-	4	-	.00	-	.01
F	Artemisia ludoviciana	3	1	6	5	6	.00	.06	.01	.03
F	Astragulus henrimontanensis	7	5	6	3	5	.01	.04	.06	.03
F	Casella bursa-pastoris	-	-	3	-	-	-	.00	-	-
F	Chaenactis douglasii	-	-	2	3	6	-	.00	.00	.01
F	Chenopodium album (a)	-	3	-	-	-	.01	-	-	-
F	Cirsium vulgare	9	-	-	-	-	-	-	-	-
F	Cryptantha sp.	-	2	-	-	-	.00	-	-	-
F	Descurainia pinnata (a)	-	$_{b}$33	$_{a}$9	$_{ab}$18	$_{a}$-	.10	.04	.04	-
F	Erigeron eatonii	-	-	-	-	-	-	-	-	.00
F	Erigeron sp.	-	-	1	-	-	-	.03	-	-
F	Eriogonum racemosum	-	-	-	2	-	-	-	.00	-
F	Gayophytum ramosissimum(a)	-	$_{a}$-	$_{a}$-	$_{b}$10	$_{a}$1	-	-	.05	.00
F	Hymenoxys acaulis	-	3	2	-	-	.00	.00	-	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{c}$64	$_{d}$157	$_{b}$19	-	.38	1.61	.07
F	Lesquerella kingii	$_{ab}$18	$_{c}$54	$_{bc}$42	$_{a}$-	$_{a}$7	.36	.25	-	.02
F	Lomatium sp.	$_{a}$-	$_{b}$16	$_{a}$-	$_{ab}$3	$_{a}$4	.43	-	.04	.01
F	Machaeranthera canescens	1	-	6	8	3	-	.18	.19	.03
F	Malcolmia africana	-	-	3	9	-	-	.38	.33	-
F	Medicago sativa	$_{b}$110	$_{a}$73	$_{a}$71	$_{a}$50	$_{a}$56	6.50	4.38	1.94	3.87
F	Microsteris gracilis (a)	-	-	-	2	-	-	-	.00	-
F	Phlox longifolia	-	13	-	10	5	.03	-	.07	.04
F	Polygonum douglasii (a)	-	$_{a}$57	$_{a}$41	$_{b}$240	$_{a}$57	.51	.11	1.37	.23
F	Ranunculus testiculatus (a)	-	-	-	5	1	-	-	.01	.00
F	Sisymbrium altissimum (a)	-	-	2	-	-	-	.00	-	-
F	Sphaeralcea coccinea	$_{b}$35	$_{ab}$20	$_{a}$17	$_{a}$12	$_{ab}$20	.14	.11	.27	.38
F	Taraxacum officinale	$_{b}$27	$_{a}$3	$_{b}$21	$_{a}$-	$_{a}$1	.00	.38	-	.03
F	Unknown forb-perennial	6	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	93	116	432	78	0.62	0.54	3.10	0.31
Total for Perennial Forbs		216	190	182	105	117	7.49	5.84	2.93	4.49
Total for Forbs		216	283	298	537	195	8.11	6.38	6.04	4.80

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

BROWSE TRENDS--
Management unit 15, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	2	1	2	3	.00	.00	.00	.00
B	Artemisia tridentata vaseyana	7	33	47	61	1.30	3.87	7.98	13.44
B	Cercocarpus montanus	0	1	1	0	-	.00	.00	-
B	Chrysothamnus depressus	0	0	1	0	-	-	.00	-
B	Chrysothamnus nauseosus graveolens	37	44	48	37	1.46	5.48	4.89	4.94
B	Juniperus osteosperma	0	0	1	0	.85	.15	.38	-
B	Pinus edulis	0	3	1	0	1.74	.85	.00	.41
B	Ribes cereum cereum	0	0	0	1	-	-	-	.00
B	Symphoricarpos oreophilus	2	2	4	7	.00	.18	.15	.81
Total for Browse		48	84	105	109	5.36	10.55	13.40	19.61

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 4

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata vaseyana	-	9.60	17.86
Cercocarpus montanus	-	.16	-
Chrysothamnus nauseosus graveolens	-	6.93	6.25
Juniperus osteosperma	1.39	.11	-
Pinus edulis	1.00	.60	.15
Symphoricarpos oreophilus	-	-	.03

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 4

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	6.6	2.6
Artemisia tridentata vaseyana	2.5	2.5

POINT-QUARTER TREE DATA--
Management unit 15, Study no: 4

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	25	<18	<18	5.8	-	-
Pinus edulis	47	<18	<18	4.9	-	-

BASIC COVER--
Management unit 15, Study no: 4

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	7.25	39.24	38.48	32.77	39.15
Rock	12.25	13.10	18.34	14.31	14.85
Pavement	9.75	3.17	6.53	6.56	7.64
Litter	49.75	22.01	28.75	33.16	48.90
Cryptogams	0	.03	.04	0	.10
Bare Ground	21.00	10.62	18.14	28.37	14.72

SOIL ANALYSIS DATA --
Management unit 15, Study no: 4, Study Name: South Creek Chaining

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.4	6.9	45.6	27.8	26.6	3.7	19.7	156.8	0.7

PELLET GROUP DATA--
Management unit 15, Study no: 4

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	31	39	15	19
Elk	-	-	-	4
Deer	6	4	2	22
Bison/Cattle	12	22	11	8

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	-	4 (10)
13 (32)	5 (13)	54 (134)
46 (112)	50 (123)	18 (45)

BROWSE CHARACTERISTICS--
Management unit 15, 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									
87	**66**	100	0	0	-	0	100	0	-/-
94	**40**	0	100	0	100	0	100	0	34/55
99	**20**	0	100	0	-	0	100	0	17/30
04	**40**	0	100	0	-	0	100	0	35/56
09	**60**	0	67	33	-	0	100	33	44/57
Artemisia tridentata vaseyana									
87	**33**	100	0	0	-	0	100	0	-/-
94	**160**	38	63	0	6120	0	0	0	16/28
99	**2740**	39	61	0	4560	9	0	0	14/22
04	**5400**	19	81	0	30460	27	31	0	13/23
09	**18720**	70	30	0	12880	23	1	.10	11/18

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Cercocarpus montanus									
87	**66**	0	100	-	-	0	100	0	8/12
94	**0**	0	0	-	-	0	0	0	9/22
99	**20**	0	100	-	-	0	100	0	9/27
04	**20**	0	100	-	-	0	100	0	22/33
09	**0**	0	0	-	-	0	0	0	29/30
Chrysothamnus depressus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Chrysothamnus nauseosus graveolens									
87	**33**	0	100	0	-	100	0	0	43/33
94	**1340**	57	40	3	3880	22	4	1	22/24
99	**3220**	58	40	2	1000	25	4	0	25/27
04	**1940**	12	78	9	6120	0	1	0	25/27
09	**1480**	20	53	27	20	1	19	18	27/26
Juniperus osteosperma									
87	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**0**	0	0	0	-	0	0	0	-/-
04	**20**	0	0	100	20	0	0	100	-/-
09	**0**	0	0	0	-	0	0	0	-/-
Opuntia sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	5/13
Pinus edulis									
87	**165**	40	60	-	-	0	0	0	64/55
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	33	67	-	-	0	0	0	-/-
04	**20**	0	100	-	20	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Ribes cereum cereum									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	20	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	68/68
04	**0**	0	0	-	-	0	0	0	62/74
09	**20**	100	0	-	-	0	0	0	25/23

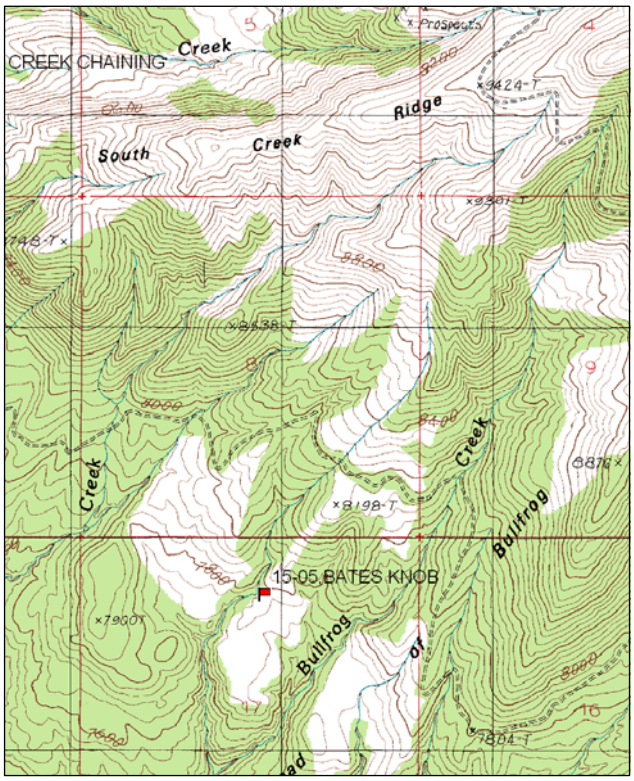
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Rosa woodsii									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	13/9
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	37/19
09	**0**	0	0	-	-	0	0	0	29/22
Symphoricarpos oreophilus									
87	**165**	60	40	-	33	0	100	0	13/24
94	**40**	100	0	-	-	0	0	0	18/33
99	**40**	50	50	-	-	0	0	0	13/21
04	**100**	60	40	-	-	0	0	0	17/31
09	**160**	0	100	-	-	0	0	0	17/22

BATES KNOB - TREND STUDY NO. 15-5-09

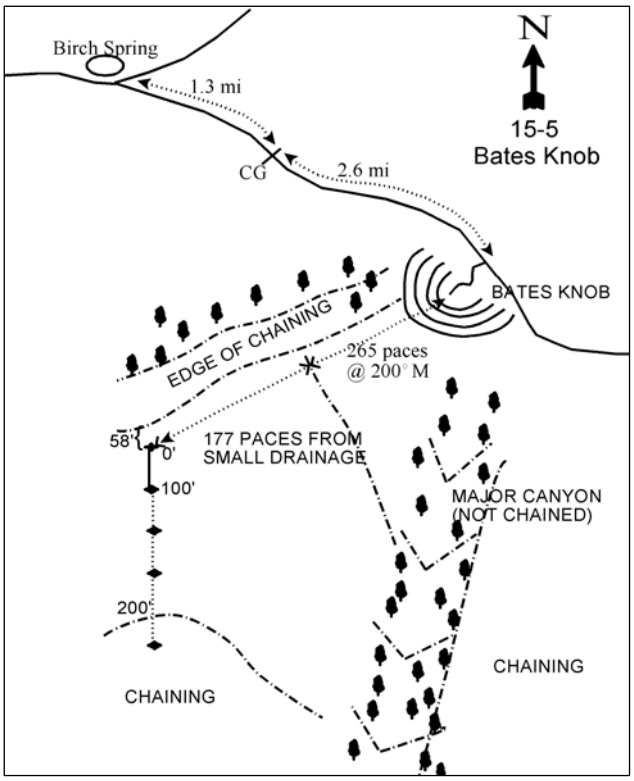
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Bison Year-Long
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R035XY318UT
Land Ownership: BLM
Elevation: 7,700 ft (2,347 m)
Aspect: southwest
Slope: 7%
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From Birch Spring (see transect 15-4-99), continue southwest on main road for 1.3 miles to a cattleguard. From the cattleguard, go 2.6 miles to a minor road which forks off to the right and goes up on top of a small hill (Bates Knob) overlooking a chaining. From the hilltop, walk down through a chained strip, over a small wash and through the chaining to the baseline stake, about 600 (265 paces) yards bearing 220°M. The transect is marked by 1 ½-foot tall fenceposts. The first baseline stake has a red browse tag, #7421, attached.

Map Name: Mount Ellen



Diagrammatic Sketch:



Township: 32S, Range: 10E, Section: 17

GPS: NAD 83, UTM 12S 514835 E 4208910 N

BATES KNOB - TREND STUDY NO. 15-5

Site Information

Site Description: The study is located on a pinyon-juniper chaining on the north end of the Pennell Allotment. Water is available seasonally in Buck Canyon, which is just south of the study site. A lop and scatter treatment of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) was done in 2008 (WRI project# 1123). There are very few pinyon or juniper trees remaining within the sample area. Bison were observed near or on the site during the 1987, 1999, and 2009 samplings. Pellet group data for bison and cattle were combined due to the difficulty in separating between the species. Bison/cattle use estimates have decreased each sample year since 1999. Deer use estimates have increased each sample year since 1999, but still only show light to moderate use (Table - Pellet Group Data).

Browse: Green rubber rabbitbrush (*Chrysothamnus nauseosus graveolens*) has been the dominant browse species on the site with an average cover of around 7% since 1994 (Table - Browse Trends). Density of rubber rabbitbrush has decreased since 1994 with a large increase in decadence and plants displaying poor vigor in 2009. Recruitment of young rubber rabbitbrush plants has steadily declined since 1994 (Table _Browse Characteristics).

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the dominant preferred browse on the site and has been increasing in cover since 1994 (Table - Browse Trends). Sagebrush is now the co-dominant species on the site with rubber rabbitbrush. Density of sagebrush has increased markedly since 1994 with very good recruitment of young sagebrush plants. Decadence and vigor of sagebrush have also been very good since 1994.

Prior to the lop and scatter treatment, pinyon and juniper had begun to reestablish and were the dominant browse species on the site. After the treatment there were few pinyon or juniper trees in the sample area, though pinyon and juniper trees were common surrounding the site. The treatment reduced pinyon density from 34 trees/acre in 2004 to 8 trees/acre in 2009. Juniper density was reduced from 32 trees/acre in 2004 to 6 trees acre in 2009. Pinyon cover was reduced from 4% to 0% in 2009.

Herbaceous Understory: The grasses on the site are abundant, but not very diverse. Crested wheatgrass (*Agropyron cristatum*) is the dominant species on the site providing over 80% of the total grass cover since 1994. Crested wheatgrass cover has varied from 5-12%. Cheatgrass (*Bromus tectorum*) has been observed on the site in moderate amounts in the past, but is currently rare on the site (Table - Herbaceous Trends).

Forbs have been quite diverse on the site, but currently they are rare and provide little cover. The dominant forb is a rhizomatous alfalfa (*Medicago sativa*) which has been declining in cover since 1994 (Table - Herbaceous Trends).

Soil: The soils at the site are a light colored, sandy clay loam of granitic origin with an estimated effective rooting depth is about 15 inches and a neutral pH (7.1) (Table - Soil Analysis Data). There is some noticeable trailing by animals through some areas. Bare ground cover has been moderate on the site over the sample years, with most protective ground cover coming from litter (Table - Basic Cover). The soil erosion condition classification was rated as stable in 2004, but was moderate in 2009 due to flow patterns, pedestaling around plants, and surface litter and soil movement.

Trend Assessments

Browse:

- **1987 to 1994 - up (+2):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Decadence of mountain big sagebrush and the proportion of sagebrush plants displaying poor vigor each decreased from 50% to 0%Recruitment of young sagebrush plants increased and is very high at 66% of the population.
- **1994 to 1999 - up (+2):** Mountain big sagebrush density increased markedly to 4,740 plants/acre, and cover increased from 2% to 4%. Recruitment of young sagebrush plants is still high at 48%.
- **1999 to 2004 – stable (0):** Mountain big sagebrush density decreased 30% to 3,320 plants/acre, though cover has increased to 6%. Recruitment of young sagebrush plants has fallen to 11% of the population. Average height and crown measurements have doubled. With the increase in size and cover of sagebrush and the decrease in density and recruitment it appears this stand is maturing and going through a period of self-thinning.
- **2004 to 2009 - up (+2):** Mountain big sagebrush density increased to 8,520 plants/acre, the highest value since sampling began. Cover of sagebrush increased to 8% and recruitment of young sagebrush has increased to 28%. Sagebrush now provides nearly as much cover as green rubber rabbitbrush. Pinyon cover was reduced from 4% to 0% by the lop and scatter treatment.

Grass:

- **1987 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 20%. There was a significant decrease in the nested frequency of crested wheatgrass and bottlebrush squirreltail.
- **1994 to 1999 - stable (0):** There was little change in the nested frequency of perennial grasses, though cover increased slightly.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 43%, and cover decreased from 12% to 5%. There was a significant decrease in nested frequency of crested wheatgrass and cheatgrass.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased by 44%, and cover increased to 8%. There was a significant increase in nested frequency of crested wheatgrass.

Forb:

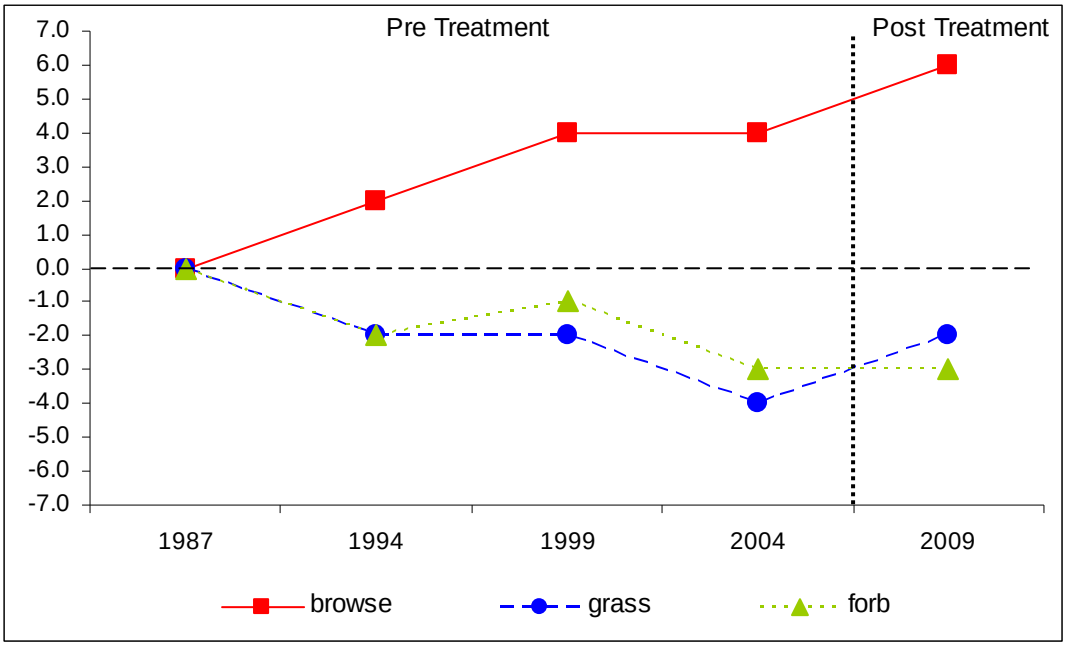
- **1987 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased by 60%. There was a significant decrease in the nested frequency of alfalfa.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased, but cover decreased slightly.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased markedly, but cover remained similar.
- **2004 to 2009 - stable (0):** There was no change in the sum of nested frequency of perennial forbs, but cover decreased to less than 1%.

DEER DESIRABLE COMPONENTS INDEX – MID-LEVEL POTENTIAL SCALE --
Management unit 15, study no: 5

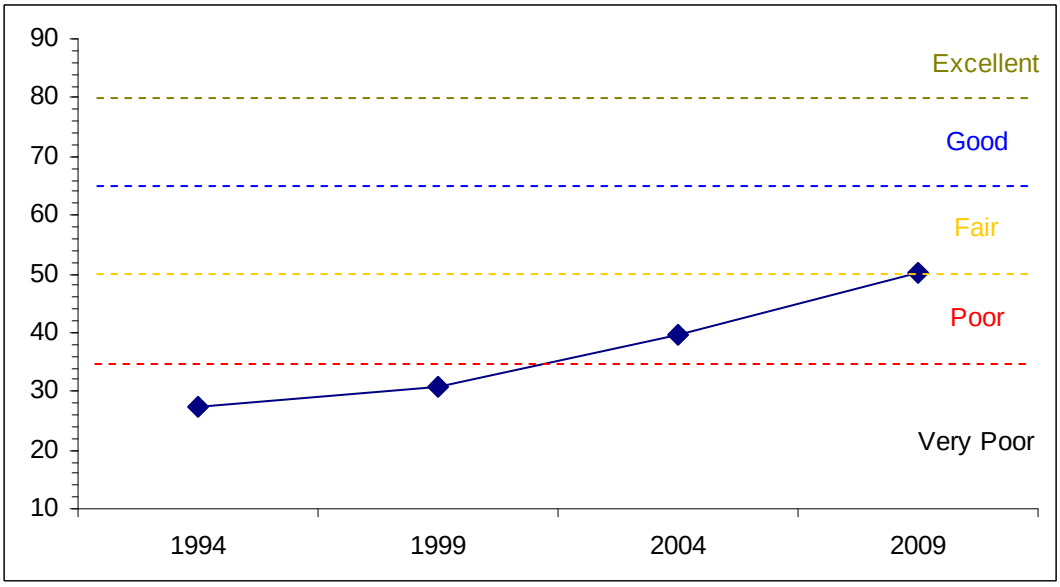
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	2.2	0	0	20.9	-0.5	4.8	0	**27.4**	Very Poor
99	4.5	0	0	24	-1.7	3.9	0	**30.7**	Very Poor
04	6.9	13.8	5.5	9.5	0	3.8	0	**39.5**	Poor
09	10.0	14.7	7.9	16.2	0.0	1.5	0.0	**50.3**	Poor-Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15 Study no: 5



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 15, Study no: 5



HERBACEOUS TRENDS--
Management unit 15, Study no: 5

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{d}$300	$_{bc}$253	$_{cd}$269	$_{a}$153	$_{b}$221	10.38	11.92	4.75	8.06
G	Agropyron intermedium	3	-	-	-	-	-	-	-	-
G	Bouteloua gracilis	-	1	2	-	5	.00	.03	-	.03
G	Bromus tectorum (a)	-	$_{b}$41	$_{c}$112	$_{ab}$7	$_{a}$-	.71	2.20	.02	-
G	Oryzopsis hymenoides	1	-	-	-	-	-	-	-	-
G	Sitanion hystrix	$_{b}$24	$_{a}$8	$_{a}$5	$_{a}$5	$_{a}$-	.04	.04	.01	-
G	Sporobolus cryptandrus	1	1	2	-	1	.00	.00	-	.00
Total for Annual Grasses		0	41	112	7	0	0.71	2.20	0.01	0
Total for Perennial Grasses		329	263	278	158	227	10.44	12.00	4.76	8.10
Total for Grasses		329	304	390	165	227	11.15	14.20	4.78	8.10
F	Arabis sp.	-	3	4	-	-	.00	.01	-	-
F	Artemisia ludoviciana	$_{b}$38	$_{a}$2	$_{a}$-	$_{a}$-	$_{a}$-	.03	-	.03	-
F	Aster sp.	-	1	-	-	-	.00	-	-	-
F	Astragalus sp.	-	5	2	5	6	.04	.00	.03	.02
F	Astragalus utahensis	-	4	1	6	2	.01	.00	.03	.03
F	Chaenactis douglasii	3	1	3	-	-	.00	.01	-	-
F	Chenopodium album (a)	-	10	-	-	3	.02	-	-	.03
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{a}$-	$_{b}$15	$_{a}$-	-	-	.09	-
F	Cymopterus purpureus	-	2	-	-	-	.00	-	-	-
F	Descurainia pinnata (a)	-	$_{c}$47	$_{b}$24	$_{ab}$3	$_{a}$1	.25	.07	.01	.00
F	Eriogonum alatum	$_{b}$26	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$3	-	-	-	.03
F	Gayophytum ramosissimum(a)	-	$_{ab}$18	$_{a}$1	$_{b}$32	$_{a}$-	.03	.00	.09	-
F	Hymenoxys acaulis	9	-	-	2	-	-	-	.00	-
F	Lappula occidentalis (a)	-	$_{c}$88	$_{ab}$15	$_{b}$26	$_{a}$1	.77	.03	.13	.01
F	Lesquerella kingii	$_{b}$21	$_{bc}$26	$_{c}$43	$_{a}$-	$_{b}$11	.09	.30	-	.05
F	Machaeranthera canescens	4	8	2	-	4	.01	.01	.00	.03
F	Medicago sativa	$_{b}$109	$_{a}$30	$_{a}$49	$_{a}$23	$_{a}$23	2.13	1.48	1.62	.55
F	Penstemon sp.	-	-	3	3	-	-	.00	.06	-
F	Petradoria pumila	-	-	6	-	-	-	.09	-	-
F	Phlox longifolia	-	2	5	6	-	.03	.01	.06	-
F	Polygonum douglasii (a)	-	$_{b}$49	$_{a}$1	$_{ab}$7	$_{ab}$17	.25	.00	.02	.03
F	Senecio multilobatus	-	3	-	2	1	.03	-	.03	.03
F	Sisymbrium altissimum (a)	-	$_{b}$21	$_{ab}$7	$_{a}$-	$_{a}$-	.24	.04	-	-
F	Tragopogon dubius	1	1	-	3	-	.00	-	.00	-
F	Unknown forb-perennial	9	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	233	48	83	22	1.57	0.15	0.35	0.08
Total for Perennial Forbs		220	88	118	50	50	2.41	1.93	1.89	0.75
Total for Forbs		220	321	166	133	72	3.99	2.09	2.24	0.84

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

BROWSE TRENDS--
Management unit 15, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemesia carruthii	6	5	5	4	.00	.06	.18	.38
B	Artemisia tridentata vaseyana	20	34	29	66	1.77	3.59	5.52	7.86
B	Atriplex canescens	0	0	0	0	-	-	-	.15
B	Chrysothamnus nauseosus graveolens	73	78	56	64	5.67	7.78	7.45	8.20
B	Chrysothamnus viscidiflorus viscidiflorus	3	1	0	0	.17	.00	-	-
B	Gutierrezia sarothrae	13	29	22	23	.00	.64	.66	1.00
B	Juniperus osteosperma	0	1	0	1	-	.38	.38	.00
B	Pinus edulis	0	4	4	1	1.79	1.79	3.51	.00
Total for Browse		115	152	116	159	9.42	14.25	17.72	17.60

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 5

Species	Percent Cover		
	'99	'04	'09
Artemesia carruthii	-	.15	.03
Artemisia tridentata vaseyana	-	7.66	16.70
Chrysothamnus nauseosus graveolens	-	9.21	9.48
Gutierrezia sarothrae	-	.20	2.00
Pinus edulis	1.00	3.58	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 5

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.7	1.8

POINT-QUARTER TREE DATA--
Management unit 15, Study no: 5

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	20	32	8
Pinus edulis	16	34	6

Average diameter (in)		
'99	'04	'09
5.3	5.6	4.7
3.8	4.2	4.0

BASIC COVER--
Management unit 15, Study no: 5

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	6.00	25.36	28.06	23.93	25.42
Rock	5.25	5.65	7.41	7.75	9.02
Pavement	5.50	.68	1.61	2.55	3.06
Litter	57.50	39.38	47.73	31.77	53.77
Cryptogams	0	0	.21	.04	.04
Bare Ground	25.75	18.68	19.11	27.37	22.60

SOIL ANALYSIS DATA --
Management unit 15, Study no: 5, Study Name: Bates Knob

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15	7.1	46	25.4	28.6	2.8	16.9	121.6	0.7

PELLET GROUP DATA--
Management unit 15, Study no: 5

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	14	20	2	36
Deer	3	8	3	10
Bison/Cattle	14	10	5	4

Days use per acre (ha)		
'99	'04	'09
-	-	-
3 (7)	7 (18)	15 (36)
64 (158)	26 (62)	8 (20)

BROWSE CHARACTERISTICS--
Management unit 15, 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									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	47/23
09	**0**	0	0	-	-	0	0	0	-/-
Artemesia carruthii									
87	**0**	0	0	0	-	0	0	0	-/-
94	**740**	11	89	0	20	0	0	0	5/9
99	**860**	77	21	2	260	0	0	2	2/3
04	**240**	17	83	0	-	0	0	0	7/8
09	**440**	14	86	0	-	0	0	0	2/1

		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	**66**	50	0	50	-	50	0	50	-/-
94	**1780**	66	34	0	4480	0	0	0	14/20
99	**4740**	48	50	2	220	42	2	0	9/15
04	**3320**	11	85	4	3160	31	6	.60	18/29
09	**5860**	16	83	1	140	0	3	0	14/23
Chrysothamnus nauseosus graveolens									
87	**365**	55	45	0	299	9	0	0	26/37
94	**6100**	52	40	7	20320	15	.32	7	22/28
99	**5860**	21	74	4	80	47	13	.68	27/29
04	**2300**	19	72	9	12280	0	0	3	27/34
09	**2680**	3	63	34	-	15	5	25	26/29
Chrysothamnus viscidiflorus viscidiflorus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**80**	0	100	-	440	0	0	0	5/6
99	**20**	0	100	-	-	0	0	0	6/10
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
87	**199**	0	100	0	-	0	0	0	8/5
94	**400**	45	55	0	20	10	0	0	20/31
99	**1620**	11	85	4	80	0	0	2	7/9
04	**860**	5	86	9	60	0	0	9	9/10
09	**1900**	7	93	0	120	0	0	0	9/10
Juniperus osteosperma									
87	**33**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	100	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**20**	100	0	-	-	0	0	0	-/-
Opuntia sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	7/9
Pinus edulis									
87	**33**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**80**	0	100	-	-	0	0	0	-/-
04	**140**	29	71	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-

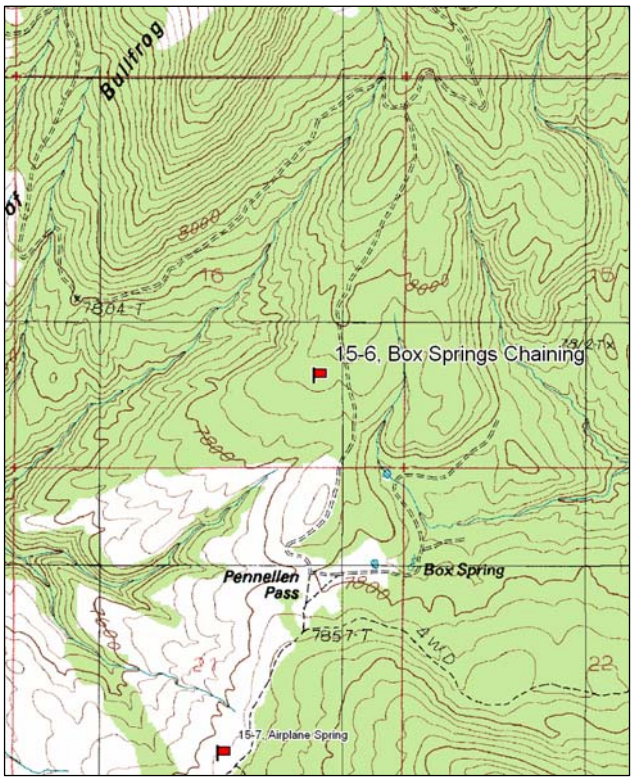
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Sambucus cerulea									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	53/79
09	**0**	0	0	-	-	0	0	0	-/-
Shepherdia sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	103/108

BOX SPRINGS CHAINING - TREND STUDY NO. 15-6-09

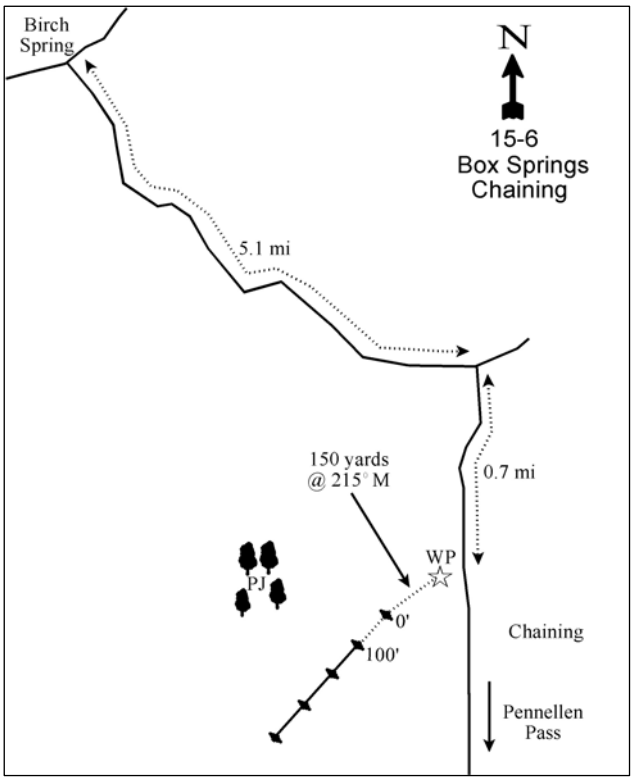
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Spring/Fall/Summer, Crucial Bison Year-Long
NRCS Ecological Site Description: Upland Shallow Loam (Pinyon-Utah Juniper), R035XY315UT
Land Ownership: SITLA
Elevation: 7,900 ft (2,408 m)
Aspect: south
Slope: 5%
Transect bearing: 204 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From Birch Spring (T32S, R10E, Sec. 6), proceed southeast for 5.1 miles to a major intersection. Turn right (south) towards Pennellen Pass, and go 0.7 miles. A witness post on the right side of the road marks the transect location in the chaining. The 0-foot baseline stake, a 2-foot tall fence post, is approximately 150 yards from the road and is marked by a red browse tag, #7134. This study runs approximately southwest but since it follows the line of a study established in dense P-J before the chaining.

Map Name: Mount Ellen



Diagrammatic Sketch:



Township: 32S, Range: 10E, Section: 16

GPS: NAD 83, UTM 12S 516816 E 4207948 N

BOX SPRING CHAINING - TREND STUDY NO. 15-6

Site Information

Site Description: The study monitors is located on state land that was chained and seeded in 1984. Prior to the chaining, the site supported a dense stand of tall, mature pinyon pine (*Pinus edulis*) with a few Utah juniper (*Juniperus osteosperma*). A lop and scatter retreatment was done in 2008 to remove pinyon and juniper trees that had reestablished on the site (WRI project# 1123). Water is available for livestock and wildlife at Box Springs which is located about a quarter mile southeast of the study. The state land is included within the Pennell Allotment (BLM) grazing program and is leased by the Division of Wildlife Resources. The chaining is a key use area for bison, which utilize the area mostly during the late spring and summer. Pellet data for bison and cattle were combined due to difficulties in distinguishing between species. Bison/cattle use was estimated to be heavy to moderate since 1999. Deer use was estimated to be mostly light since 1999 (Table - Pellet Group Data).

Browse: Browse species are not common on this site. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) are the preferred browse found on the site, but both are found in low densities and cover. Density of mountain big sagebrush has increased and density of bitterbrush has remained similar since 1994 (Table - Browse Characteristics). Mountain big sagebrush cover has steadily increased since 1994, but is still low. Antelope bitterbrush has consistently provided less than 1% cover in all samples (Table - Browse Trends).

Prior to the lop and scatter treatment, pinyon and juniper had begun to reestablish and were the dominant browse species on the site. After the treatment there were few pinyon or juniper trees in the sample area, though pinyon and juniper trees were common surrounding the site. The treatment reduced pinyon density from 94 trees/acre in 2004 to 15 trees/acre in 2009. Juniper density was reduced from 50 trees/acre in 2004 to 19 trees acre in 2009. Total cover of trees was reduced from 10% to 0%.

Herbaceous Understory: Three seeded species dominate the grass component on this site. Crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*A. intermedium*) and sheep fescue (*Festuca ovina*) combined have accounted for between 82% and 95% of the total grass cover in all sample years. Smooth brome (*Bromus inermis*) and orchard grass (*Dactylis glomerata*) are also common, but have decreased in frequency and cover since 1994 (Table - Herbaceous Trends). Forbs are very rare on the site.

Soil: Soil texture is a gravelly, sandy clay loam with an estimated effective rooting depth of nearly 16 inches and a neutral pH (7.3) (Table - Soil Analysis Data). Rocks and small boulders are abundant on the soil surface and throughout the upper sections of the profile. The soil surface is well protected by rock and pavement, vegetation, and litter cover (Table - Basic Cover). The soil erosion condition classification was rated as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1987 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 rare on this site. Mountain big sagebrush vigor and decadence remained good.. Antelope bitterbrush recruitment of young bitterbrush increased 33%.
- **1994 to 1999 - stable (0):** Mountain big sagebrush density is decreased to 40 plants/acre, though cover increased to over 1%. Vigor and decadence of sagebrush remained good. Antelope bitterbrush density decreased slightly, but cover increased. Recruitment of young bitterbrush plants decreased with no young plants sampled.

- **1999 to 2004 – stable (0):** Mountain big sagebrush density increased to 80 plants/acre and cover increased to 2%. and recruitment is at 25%. Antelope bitterbrush density increased slightly to 120 plants/acre. No young bitterbrush plants were sampled.
- **2004 to 2009 - slightly up (+1):** Mountain big sagebrush density increased four-fold to 320 plants/acre, and cover increased to near 3%. Recruitment of young sagebrush was good and comprised half of the population. Antelope bitterbrush density decreased 33% to 80 plants/acre. Pinyon-juniper were removed from the site by a lop and scatter treatment. Few live pinyon or juniper trees remain within the study area.

Grass:

- **1987 to 1994 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 9%. There was a significant increase in the nested frequency of sheep fescue.
- **1994 to 1999 - stable (0):** There was little change in perennial grasses on this site.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 16% and cover decreased from 23% to 21%. There was a significant decrease in the nested frequency of smooth brome.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 13% and cover decreased to 19%.

Forb:

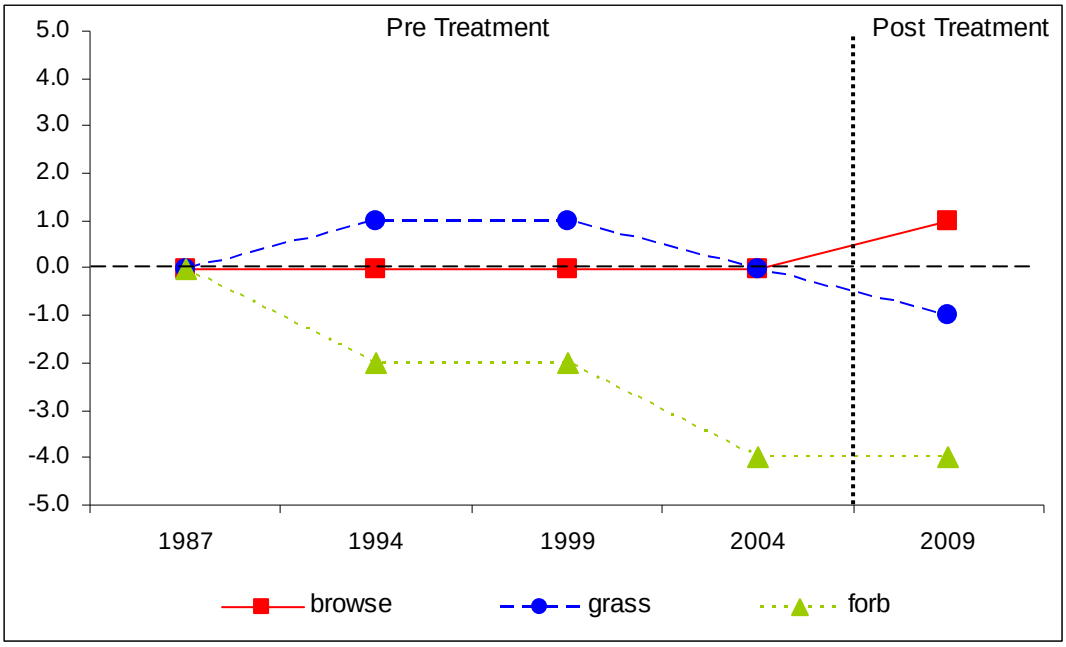
- **1987 to 1994 - down (-2):** Forbs are rare on this site. There was a large decrease in the sum of nested frequency of perennial forbs. There was a significant decrease in the nested frequency of alfalfa and small burnet.
- **1994 to 1999 - stable (0):** There was little change in perennial forbs.
- **1999 to 2004 - down (-2):** There was a large decrease in the sum of nested frequency of perennial forbs and there was no marked cover.
- **2004 to 2009 - stable (0):** There was a slight increase in the sum of nested frequency of perennial forbs, but forbs remained extremely rare.

DEER DESIRABLE COMPONENTS INDEX – MID-LEVEL POTENTIAL SCALE --
Management unit 15, study no: 6

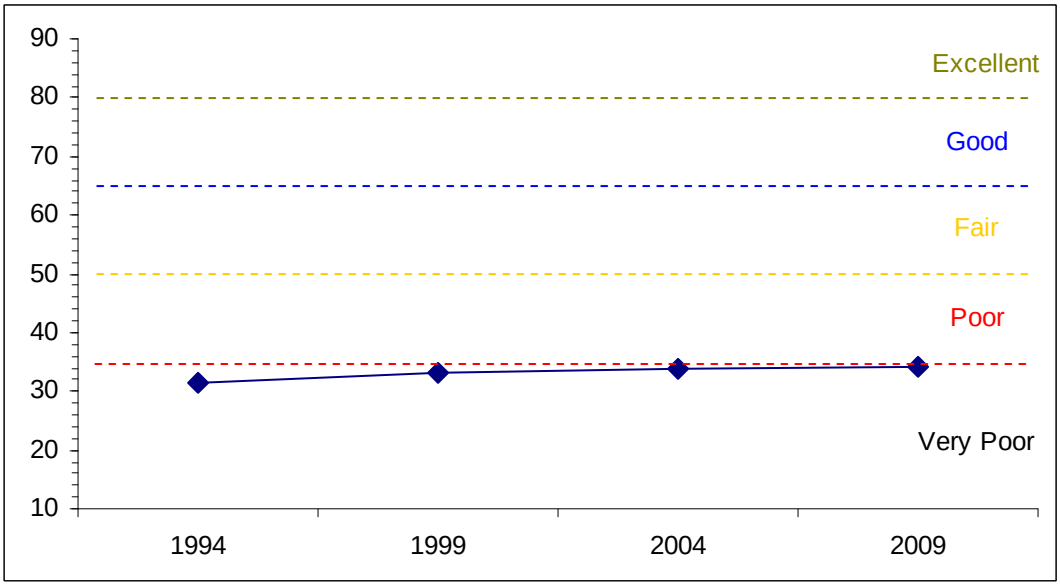
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	0.5	0	0	30	0	0.9	0	**31.4**	Very Poor
99	2.4	0	0	30	0	0.8	0	**33.2**	Very Poor-Poor
04	3.9	0	0	30	0	0	0	**33.9**	Very Poor-Poor
09	3.9	0	0	30	0	0.1	0	**34.0**	Very Poor-Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15 Study no: 6



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 15, Study no: 6



HERBACEOUS TRENDS--
Management unit 15, Study no: 6

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	167	187	186	204	176	6.28	6.65	10.50	9.02
G	Agropyron intermedium	$_{c}$227	$_{c}$216	$_{bc}$198	$_{ab}$163	$_{a}$120	7.56	6.84	4.85	2.50
G	Bromus inermis	$_{b}$78	$_{b}$94	$_{b}$97	$_{a}$37	$_{a}$16	2.31	2.99	.72	.38
G	Dactylis glomerata	$_{b}$39	$_{a}$21	$_{a}$10	$_{a}$3	$_{a}$9	1.59	.07	.15	.45
G	Elymus cinereus	-	5	6	7	17	.18	.33	.18	.43
G	Festuca ovina	$_{a}$62	$_{b}$101	$_{b}$139	$_{b}$121	$_{b}$128	5.35	6.50	4.24	6.07
G	Sitanion hystrix	1	-	2	-	1	-	.00	-	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		574	624	638	535	467	23.30	23.39	20.67	18.87
Total for Grasses		574	624	638	535	467	23.30	23.39	20.67	18.87
F	Arabis sp.	6	7	4	1	-	.01	.01	.00	-
F	Aster sp.	-	3	-	-	3	.00	-	-	.03
F	Astragalus cicer	1	7	6	1	-	.04	.12	.00	-
F	Chaenactis douglasii	-	6	3	-	-	.04	.06	-	-
F	Descurainia pinnata (a)	-	-	3	-	-	-	.00	-	-
F	Hymenoxys acaulis	-	1	1	-	-	.00	.00	-	-
F	Ipomopsis aggregata	-	-	3	-	-	-	.00	-	.00
F	Lappula occidentalis (a)	-	2	-	-	-	.00	-	-	-
F	Lesquerella kingii	$_{bc}$19	$_{ab}$8	$_{c}$36	$_{a}$-	$_{b}$14	.01	.16	-	.03
F	Machaeranthera canescens	-	3	3	-	-	.03	.03	-	-
F	Medicago sativa	$_{b}$66	$_{a}$1	$_{a}$1	$_{a}$-	$_{a}$-	.03	.00	-	-
F	Onobrychis viciaefolia	-	5	-	-	-	.09	-	-	-
F	Penstemon palmeri	1	-	-	-	-	-	-	-	-
F	Polygonum douglasii (a)	-	2	-	3	-	.00	-	.00	-
F	Sanguisorba minor	$_{b}$32	$_{a}$3	$_{a}$1	$_{a}$-	$_{a}$-	.19	.00	-	-
F	Senecio multilobatus	-	-	-	-	3	-	-	-	.00
F	Tragopogon dubius	-	-	-	-	1	-	-	-	.00
Total for Annual Forbs		0	4	3	3	0	0.00	0.00	0.00	0
Total for Perennial Forbs		125	44	58	2	21	0.47	0.40	0.00	0.07
Total for Forbs		125	48	61	5	21	0.48	0.40	0.01	0.07

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

BROWSE TRENDS--
Management unit 15, Study no: 6

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata vaseyana	4	2	3	13	.18	1.28	1.97	2.63
B	Echinocereus sp.	0	1	0	0	-	.00	-	-
B	Gutierrezia sarothrae	7	7	7	8	.18	.06	.33	.01
B	Juniperus osteosperma	0	4	6	2	3.15	2.34	4.30	.00
B	Opuntia sp.	0	0	1	1	-	-	.00	.00
B	Pinus edulis	0	4	5	0	.06	1.32	2.65	-
B	Purshia tridentata	6	5	4	4	.15	.56	.93	.39
B	Sclerocactus sp.	0	0	1	0	-	-	.00	-
Total for Browse		17	23	27	28	3.73	5.58	10.19	3.05

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 6

Species	Percent Cover	
	'04	'09
Artemisia tridentata vaseyana	2.01	2.65
Gutierrezia sarothrae	.40	-
Juniperus osteosperma	3.18	-
Opuntia sp.	-	.01
Pinus edulis	6.76	-
Purshia tridentata	1.01	.86

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 6

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.3	1.6
Purshia tridentata	2.6	1.2

POINT-QUARTER TREE DATA--
Management unit 15, Study no: 6

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	45	50	19
Pinus edulis	82	94	15

Average diameter (in)		
'99	'04	'09
3.2	5.1	1.1
3.5	3.4	2.2

BASIC COVER--
Management unit 15, Study no: 6

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	11.25	26.25	32.29	32.18	25.34
Rock	1.50	5.50	5.53	5.85	4.59
Pavement	.50	1.02	6.64	5.84	6.65
Litter	73.25	50.34	59.68	48.47	60.89
Cryptogams	0	0	.03	0	.01
Bare Ground	13.50	11.39	10.23	19.49	16.23

SOIL ANALYSIS DATA --
Management unit 15, Study no: 6, Study Name: Box Springs Chaining

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.8	7.3	48	23.4	28.6	3.7	13.1	137.6	1

PELLET GROUP DATA--
Management unit 15, Study no: 6

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	6	34	15	32
Deer	1	12	3	20
Bison/Cattle	7	10	4	8

Days use per acre (ha)		
'99	'04	'09
-	-	-
5 (13)	7 (17)	16 (40)
53 (132)	24 (57)	36 (88)

BROWSE CHARACTERISTICS--
Management unit 15, 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)
Amelanchier utahensis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	12/19
Artemisia tridentata vaseyana									
87	**0**	0	0	-	-	0	0	0	-/-
94	**80**	0	100	-	-	0	0	0	18/20
99	**40**	0	100	-	-	50	0	0	25/33
04	**80**	25	75	-	20	25	0	0	33/48
09	**320**	50	50	-	-	6	0	0	24/38

		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 graveolens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	40/18
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	61/58
09	**0**	0	0	-	-	0	0	0	66/47
Echinocereus sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	100	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
87	**99**	0	100	0	-	0	0	0	10/6
94	**800**	40	60	0	20	0	0	0	7/8
99	**620**	29	52	19	120	0	0	19	4/5
04	**640**	0	97	3	-	0	0	0	7/9
09	**700**	49	51	0	60	0	0	0	5/5
Juniperus osteosperma									
87	**66**	100	0	-	33	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**80**	75	25	-	-	0	0	0	-/-
04	**120**	17	83	-	-	0	0	0	-/-
09	**40**	0	100	-	-	0	0	50	-/-
Opuntia sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**40**	0	100	-	-	0	0	0	3/8
09	**60**	0	100	-	-	0	0	0	4/16
Pinus edulis									
87	**232**	86	14	-	33	0	0	0	169/79
94	**0**	0	0	-	-	0	0	0	-/-
99	**80**	50	50	-	20	0	0	0	-/-
04	**100**	20	80	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Purshia tridentata									
87	**0**	0	0	0	266	0	0	0	-/-
94	**120**	33	67	0	-	67	0	0	4/9
99	**100**	0	100	0	-	0	80	0	4/17
04	**120**	0	50	50	-	0	33	0	6/23
09	**80**	0	100	0	-	0	75	0	9/26

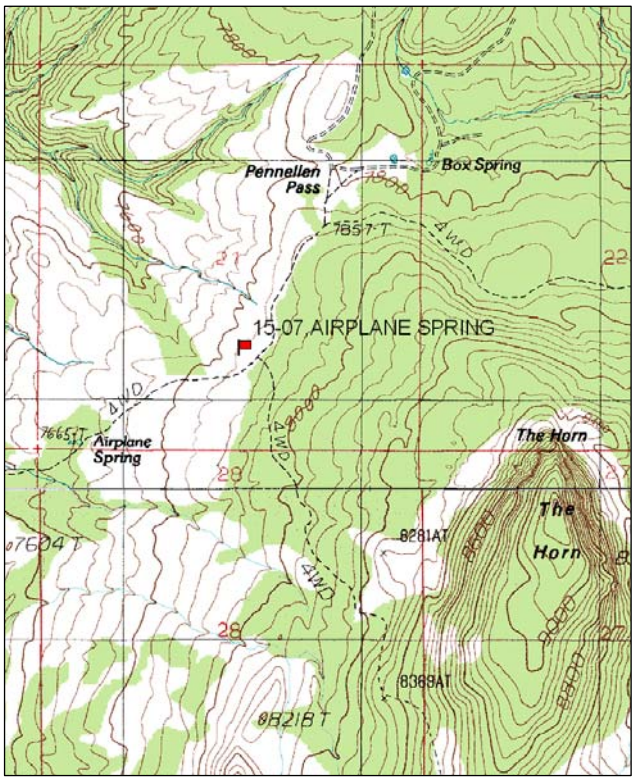
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Sclerocactus sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	1/2
09	**0**	0	0	-	-	0	0	0	1/2

AIRPLANE SPRING - TREND STUDY NO. 15-7-09

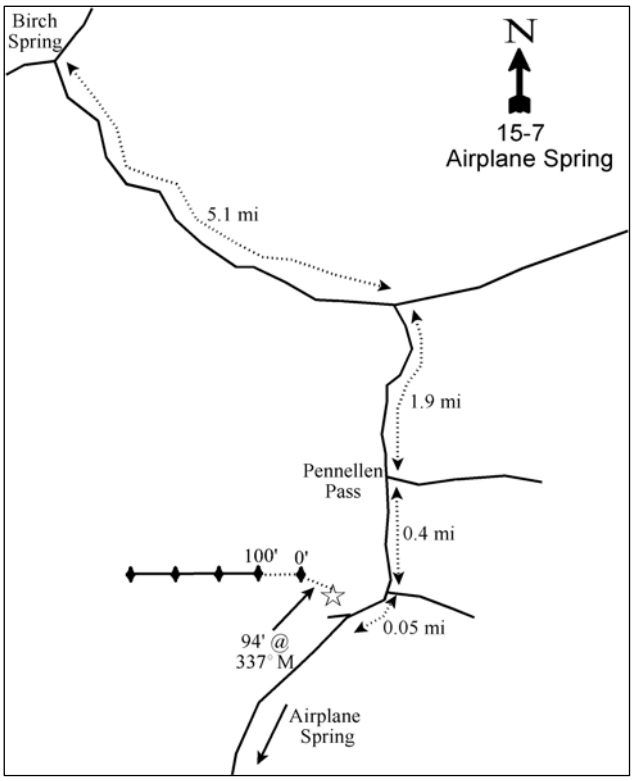
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Year-Long, Crucial Bison Year-Long
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R035XY318UT
Land Ownership: BLM
Elevation: 7,800 ft (2,377 m)
Aspect: southwest
Slope: 18%-20%
Transect bearing: 263 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From Birch Spring (T32S, R10E, Sec. 6), travel southeast for 5.1 miles. Turn right, go 1.9 miles past Box Springs to a major intersection at Pennellen Pass. Bear right, and go 0.4 miles to another intersection. Bear right towards Airplane Spring, but go only about 0.05 miles (200 feet) to a pullout on the right. A witness post is located 117 feet off the main road. The first baseline stake is 94 feet northwest (at 337° M) of the witness post. The transect stakes are 2-foot tall fence posts, the first one is marked with browse tag #7174.

Map Name: Mount Ellen



Diagrammatic Sketch:



Township: 32S, Range: 10E, Section: 21

GPS: NAD 83, UTM 12S 516424 E 4206393 N

AIRPLANE SPRING - TREND STUDY NO. 15-7

Site Information

Site Description: The study site is located within a chaining project that was completed during the mid-1960's. The Bulldog fire, which burned in 2003, burned the area just west of this site, but not directly on the study area. A lop and scatter retreatment was done in 2008 to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees that had reestablished on the site (WRI project# 1123). This portion of the chaining is in the Pennell Allotment and is a key area for bison and deer. The nearest water source is Airplane Spring which is one-half mile downslope from the site. The study site is within a few hundred feet of the road that links Airplane Springs with Box Springs. Pellet group data for bison and cattle were combined due to difficulties in differentiating between these species. Bison/cattle use was estimated to be moderate to light since 1999. Deer use was estimated to be light in 1999 and 2004, but increased to moderately heavy use in 2009 (Table - Pellet Group Data).

Browse: Preferred browse species are diverse in this area. The dominant preferred browse species is black sagebrush (*Artemisia nova*) which has provided an average cover of 6% since 1999 (Table - Browse Trends). Vigor, decadence, and recruitment of young black sagebrush plants have been good over the study years. Use of black sagebrush has been mostly light (Table - Browse Characteristics). Other more highly preferred browse species that occur in limited numbers on the site include true mountain mahogany (*Cercocarpus montanus*), Utah serviceberry (*Amelanchier utahensis*), and antelope bitterbrush (*Purshia tridentata*). Utilization of these species has been very high with some moderate use over the course of the study (Table - Browse Characteristics).

In 2004, prior to the lop and scatter treatment, pinyon and juniper were the dominant browse species on the site. Tree density was reduced from 57 juniper/acre in 2004 to 14 juniper/acre in 2009 and 78 pinyon/acre in 2004 to 8 pinyon/acre in 2009 (Table- Point-Quarter Tree Data), though they are still common surrounding the site. Tree cover was reduced from nearly 16% in 2004 to nearly 0% in 2009.

Herbaceous Understory: Grasses are abundant on the site, but diversity is low. The most common grasses on the site have been the seeded species, crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*A. intermedium*). The nested frequency and cover of intermediate wheatgrass decreased steadily over the years and is now rare on the site. Crested wheatgrass remains the dominant species. Grass cover has varied between 11% and 20% (Table - Herbaceous Trends).

Forbs are rare on the site. Cover of forbs has steadily deceased since 1994. Alfalfa (*Medicago sativa*) was the dominant forb at the outset of the study, but is now sampled only rarely (Table - Herbaceous Trends).

Soil: The soil is a reddish brown, clay loam with an effective rooting depth estimated at just over 11 inches and a neutral pH (7.0) (Table - Soil Analysis Data). The site is very rocky both on the soil surface and throughout the profile. Bare ground cover has been low on the site with protective soil cover being provided primarily from rock and litter cover (Table - Basic Cover). The soil erosion condition classification was rated as stable in 2004 and slight in 2009 due primarily to pedestaling of plants and flow patterns.

Trend Assessments

Browse:

- **1987 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. Vigor and decadence of black sagebrush and true mountain mahogany remained good. Recruitment of young black sagebrush plants remained good.
- **1994 to 1999 - up (+2):** Density of the dominant preferred browse species black sagebrush increased 45% to 5,100 plants/acre, and cover increased from 4% to 7%. Decadence and vigor of black

sagebrush improved slightly and recruitment of young plants increased. Density of true mountain mahogany increased by 89% to 340 plants/acre, while cover has remained stable.

- **1999 to 2004 - slightly up (+1):** Density of black sagebrush increased by 16% to 5,940 plants/acre. Recruitment of young black sagebrush plants decreased, but remained good. There was a slight decrease in the density of true mountain mahogany and Utah serviceberry.
- **2004 to 2009 – stable (0):** Density of black sagebrush decreased by 12% to 5,220 plants/acre, but cover remained stable. Density of true mountain mahogany and serviceberry increased slightly. Preferred browse cover remained similar at 10%.

Grass:

- **1987 to 1994 - down (-2):** The sum of nested frequency for perennial grasses decreased 32%. There was a significant decrease in the nested frequency of crested wheatgrass, intermediate wheatgrass, and bottlebrush squirreltail (*Sitanion hystrix*).
- **1994 to 1999 - stable (0):** The sum of nested frequency for perennial grasses decreased slighty, however, perennial grass cover increased from 13% to 20% with crested wheatgrass being the predominant species.
- **1999 to 2004 – slightly down (-1):** The sum of nested frequency of perennial grasses declined 19% and cover decreased from 20% to 15%.
- **2004 to 2009 – slightly up (+1):** The sum of nested frequency of perennial grasses increased 11%, although it is only about half of nested frequency value form 1987. Perennial grass cover dipped from 15% to 11%. There was a significant increase in nested frequency of bottlebrush squirreltail.

Forb:

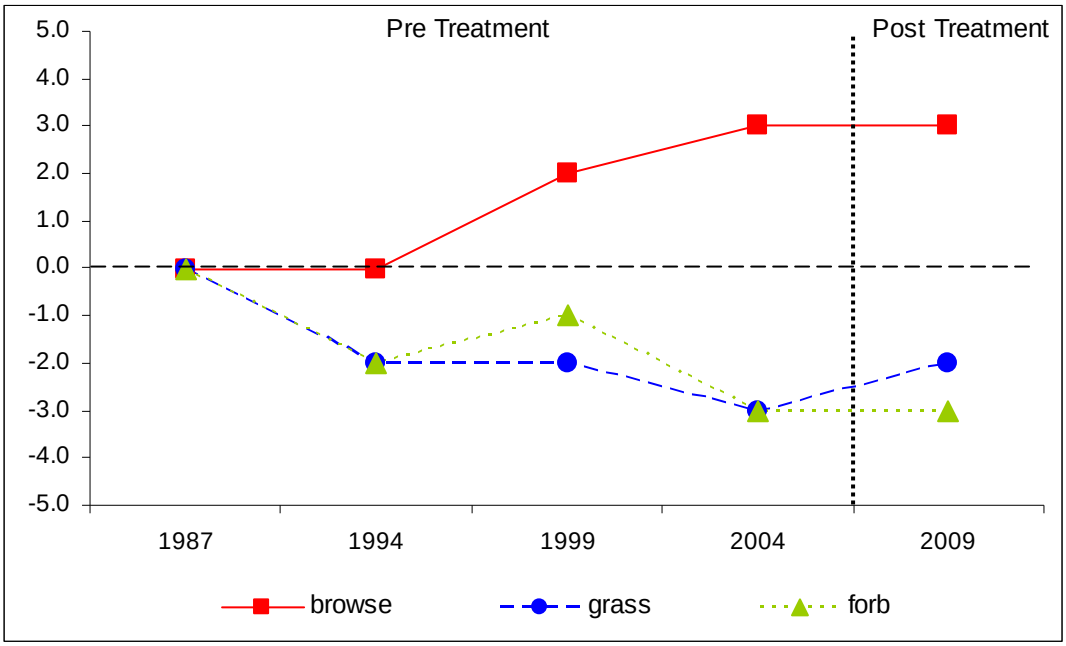
- **1987 to 1994 - down (-2):** Forbs are rare on this site. The sum of nested frequency for perennial forbs decreased 22%. Forbs provide less than 2% cover. There was a significant decrease in the nested frequency of alfalfa.
- **1994 to 1999 – slightly up (+1):** The sum of nested frequency for perennial forbs increased 15% while annual species declined slightly. Forbs provide just over 1% cover.
- **1999 to 2004 - down (-2):** The sum of nested frequency for perennial forbs declined 54%. Forbs provide less than 1% cover.
- **2004 to 2009 – stable (0):** The increase in the sum of nested frequency of perennial forbs is 75%, but forbs occur so infrequently that any improvement provides a large percent increase. Total forb cover is still less than 1%

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 15, study no: 7

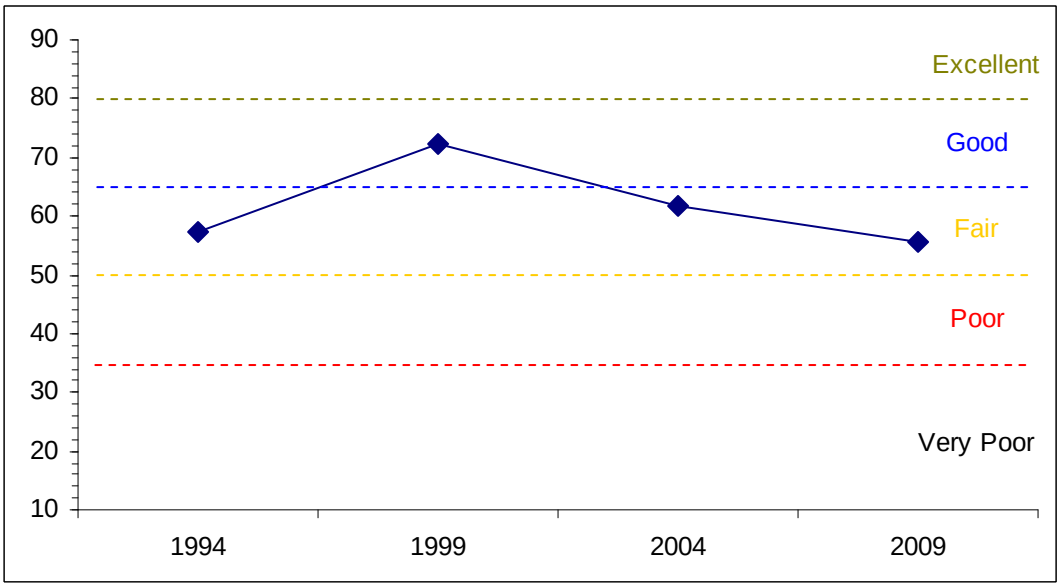
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	9.4	11.9	6.6	26.1	0.0	3.4	0.0	**57.3**	Fair
99	11.8	12.5	15.0	30.0	0.0	2.9	0.0	**72.2**	Good
04	12.3	13.0	4.7	30.0	0.0	1.6	0.0	**61.7**	Fair
09	13.4	12.7	5.4	22.8	0.0	1.2	0.0	**55.5**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15 Study no: 7



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 15, Study no: 7



HERBACEOUS TRENDS--
Management unit 15, Study no: 7

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	$_{c}$306	$_{ab}$238	$_{bc}$264	$_{a}$233	$_{ab}$245	11.67	19.07	14.83	10.69
G	Agropyron intermedium	$_{c}$122	$_{b}$58	$_{ab}$28	$_{a}$7	$_{a}$-	1.04	.64	.04	-
G	Bouteloua gracilis	1	5	-	1	-	.01	-	.03	-
G	Bromus tectorum (a)	-	6	-	3	6	.01	-	.01	.04
G	Festuca ovina	2	-	8	4	-	-	.24	.04	-
G	Oryzopsis hymenoides	-	-	2	-	-	-	.03	-	-
G	Poa fendleriana	$_{a}$-	$_{b}$19	$_{ab}$10	$_{a}$3	$_{b}$26	.15	.10	.03	.44
G	Sitanion hystrix	$_{c}$73	$_{b}$28	$_{a}$1	$_{ab}$7	$_{ab}$11	.15	.01	.07	.27
Total for Annual Grasses		0	6	0	3	6	0.00	0	0.01	0.03
Total for Perennial Grasses		504	348	313	255	282	13.03	20.11	15.05	11.41
Total for Grasses		504	354	313	258	288	13.05	20.11	15.07	11.45
F	Arabis sp.	-	-	11	-	-	-	.02	-	-
F	Aster sp.	-	4	-	-	4	.01	-	-	.15
F	Astragalus sp.	$_{a}$3	$_{a}$-	$_{a}$2	$_{a}$3	$_{b}$11	-	.03	.00	.13
F	Astragalus utahensis	-	-	-	1	-	-	-	.00	-
F	Castilleja sp.	-	-	4	-	5	-	.03	.00	.03
F	Chenopodium fremontii (a)	-	-	-	5	1	-	-	.04	.00
F	Cymopterus sp.	-	3	-	-	1	.01	-	-	.00
F	Erigeron eatonii	$_{b}$27	$_{b}$29	$_{ab}$15	$_{a}$6	$_{a}$5	.29	.09	.01	.01
F	Eriogonum umbellatum	$_{a}$-	$_{a}$3	$_{a}$2	$_{ab}$9	$_{b}$10	.03	.03	.06	.05
F	Gayophytum ramosissimum(a)	-	$_{ab}$12	$_{a}$-	$_{b}$19	$_{a}$5	.02	-	.04	.03
F	Hedysarum boreale	-	2	-	-	-	.03	-	-	-
F	Hymenoxys acaulis	14	8	10	5	8	.02	.05	.01	.04
F	Hymenoxys richardsonii	-	-	6	2	-	-	.01	.03	.00
F	Lappula occidentalis (a)	-	$_{b}$19	$_{a}$5	$_{ab}$18	$_{a}$3	.05	.02	.06	.01
F	Lesquerella kingii	$_{a}$2	$_{ab}$4	$_{b}$19	$_{a}$-	$_{ab}$13	.01	.06	-	.05
F	Lomatium sp.	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$12	-	-	-	.05
F	Machaeranthera canescens	-	-	-	-	2	-	-	-	.01
F	Machaeranthera grindelioides	-	-	-	-	1	-	-	-	.00
F	Medicago sativa	$_{b}$49	$_{a}$9	$_{a}$19	$_{a}$6	$_{a}$2	.90	.96	.45	.03
F	Orthocarpus sp. (a)	3	-	-	-	-	-	-	-	-
F	Penstemon sp.	-	9	1	9	3	.01	.00	.13	.03
F	Phlox longifolia	-	10	9	3	5	.02	.05	.00	.01
F	Polygonum douglasii (a)	-	7	1	12	5	.01	.00	.03	.01
F	Schoencrambe linifolia	$_{b}$15	$_{a}$3	$_{a}$-	$_{a}$-	$_{a}$2	.00	-	-	.00
F	Sphaeralcea coccinea	3	7	7	4	-	.33	.07	.07	-
F	Tragopogon dubius	3	-	-	-	-	-	-	-	-
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		3	38	6	54	14	0.08	0.02	0.18	0.06
Total for Perennial Forbs		117	91	105	48	84	1.68	1.44	0.79	0.62
Total for Forbs		120	129	111	102	98	1.77	1.46	0.97	0.69

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

BROWSE TRENDS--
Management unit 15, Study no: 7

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	9	6	4	6	1.11	1.01	.06	.68
B	Artemisia nova	41	54	55	49	3.51	6.68	6.87	7.08
B	Artemisia tridentata vaseyana	3	0	0	1	.38	-	.15	.00
B	Cercocarpus montanus	9	11	12	11	1.62	1.25	2.03	1.50
B	Chrysothamnus depressus	4	10	4	5	.15	.03	.03	.00
B	Chrysothamnus nauseosus graveolens	2	3	2	2	.00	.00	.00	.00
B	Chrysothamnus viscidiflorus viscidiflorus	4	5	2	0	.03	.00	.03	-
B	Gutierrezia sarothrae	14	12	13	18	.38	.21	.41	.15
B	Juniperus osteosperma	0	5	4	0	1.25	2.00	2.36	.03
B	Opuntia sp.	2	1	1	2	.00	.00	.00	.00
B	Pinus edulis	0	6	7	1	4.11	6.48	8.69	.00
B	Purshia tridentata	1	1	0	1	.15	.00	-	.00
B	Quercus gambelii	0	1	0	1	-	.00	-	.00
B	Ribes leptanthum	0	1	1	0	-	.03	.30	1.00
B	Sclerocactus sp.	0	1	1	0	-	.03	.00	-
B	Symphoricarpos oreophilus	2	2	2	2	.16	.03	.03	.00
Total for Browse		91	119	108	99	12.90	17.80	20.98	10.48

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 7

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	.20	1.14	1.66
Artemisia nova	-	7.13	8.26
Artemisia tridentata vaseyana	-	.23	-
Cercocarpus montanus	.40	2.54	2.81
Chrysothamnus viscidiflorus viscidiflorus	-	.21	-
Gutierrezia sarothrae	-	.71	-
Juniperus osteosperma	1.00	2.26	-
Opuntia sp.	-	-	.05
Pinus edulis	7.19	13.26	.33
Purshia tridentata	-	-	.78
Ribes leptanthum	-	1.39	1.54
Symphoricarpos oreophilus	-	.85	.36

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 7

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	2.2	1.4
Artemisia nova	1.7	1.1
Cercocarpus montanus	3.1	1.5

POINT-QUARTER TREE DATA--
Management unit 15, Study no: 7

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	60	57	14
Pinus edulis	80	78	8

Average diameter (in)		
'99	'04	'09
3.9	4.5	1.8
3.9	4.2	2.2

BASIC COVER--
Management unit 15, Study no: 7

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	6.50	28.12	37.69	36.76	24.17
Rock	19.50	22.58	28.07	25.61	22.22
Pavement	4.25	2.94	9.41	7.90	7.46
Litter	57.50	33.31	28.98	32.45	46.80
Cryptogams	.50	.18	.25	.12	.06
Bare Ground	11.75	11.27	12.93	14.67	11.31

SOIL ANALYSIS DATA --
Management unit 15, Study no: 7, Study Name: Airplane Spring

Effective rooting depth (in)	pH	clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.2	7	44	27.4	28.6	5.2	17.7	156.8	0.7

PELLET GROUP DATA--
Management unit 15, Study no: 7

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	18	61	14	43
Deer	8	12	19	25
Bison/Cattle	-	6	1	3

Days use per acre (ha)		
'99	'04	'09
-	-	-
4 (10)	13 (33)	40 (99)
21 (51)	26 (62)	14 (34)

BROWSE CHARACTERISTICS--
Management unit 15, 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									
87	**166**	20	80	0	-	0	100	0	33/22
94	**220**	9	82	9	-	27	9	9	46/58
99	**220**	9	91	0	20	36	9	0	57/56
04	**100**	0	100	0	-	0	100	0	59/57
09	**200**	10	80	10	-	30	0	0	63/52
Artemisia nova									
87	**1665**	64	34	2	4033	8	2	2	14/21
94	**3520**	20	68	13	3400	0	0	18	11/17
99	**5100**	35	55	10	5440	15	9	.39	12/24
04	**5940**	13	78	9	100	0	0	3	10/17
09	**5220**	13	77	10	380	12	0	7	9/18
Artemisia tridentata vaseyana									
87	**132**	75	25	-	133	0	0	0	17/13
94	**60**	33	67	-	300	0	0	0	16/26
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	21/34
09	**60**	100	0	-	40	0	0	0	20/46
Cercocarpus montanus									
87	**66**	0	100	0	-	50	50	0	21/30
94	**180**	0	100	0	-	22	44	0	31/28
99	**340**	24	71	6	-	6	47	0	42/38
04	**240**	0	100	0	100	17	83	0	35/41
09	**260**	8	92	0	-	31	54	0	43/45
Chrysothamnus depressus									
87	**432**	85	8	8	33	85	0	0	4/10
94	**100**	0	100	0	-	0	0	0	6/14
99	**280**	0	71	29	-	36	50	7	3/6
04	**140**	0	100	0	-	57	29	0	6/8
09	**140**	14	86	0	-	29	0	0	2/4
Chrysothamnus nauseosus graveolens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**40**	0	100	-	40	50	50	50	20/28
99	**60**	0	100	-	-	0	0	0	26/30
04	**40**	50	50	-	-	0	0	0	35/42
09	**40**	0	100	-	-	0	0	0	32/40

		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 viscidiflorus									
87	**0**	0	0	0	-	0	0	0	-/-
94	**180**	0	78	22	-	0	0	0	3/6
99	**140**	29	57	14	-	0	0	0	9/12
04	**40**	0	100	0	-	0	0	0	11/16
09	**0**	0	0	0	-	0	0	0	-/-
Eriogonum microthecum									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	5/13
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
87	**1399**	60	40	0	-	0	0	0	10/8
94	**740**	27	65	8	100	0	0	8	6/7
99	**1000**	48	48	4	260	0	0	2	6/8
04	**780**	5	95	0	-	0	0	0	7/8
09	**660**	12	82	6	-	0	0	6	5/5
Juniperus osteosperma									
87	**99**	100	0	-	33	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**100**	80	20	-	-	0	0	0	-/-
04	**80**	25	75	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**40**	50	50	-	-	0	0	0	0/1
99	**20**	0	100	-	-	0	0	0	4/4
04	**20**	0	100	-	-	0	0	0	-/-
09	**60**	0	100	-	-	0	0	0	5/6
Pinus edulis									
87	**99**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**160**	13	88	-	-	0	0	0	-/-
04	**160**	25	75	-	-	0	0	0	-/-
09	**20**	100	0	-	-	0	0	0	-/-
Purshia tridentata									
87	**0**	0	0	0	-	0	0	0	-/-
94	**20**	0	0	100	-	0	100	0	6/24
99	**20**	0	100	0	-	0	100	0	74/76
04	**0**	0	0	0	-	0	0	0	12/28
09	**60**	0	100	0	-	0	100	0	17/101

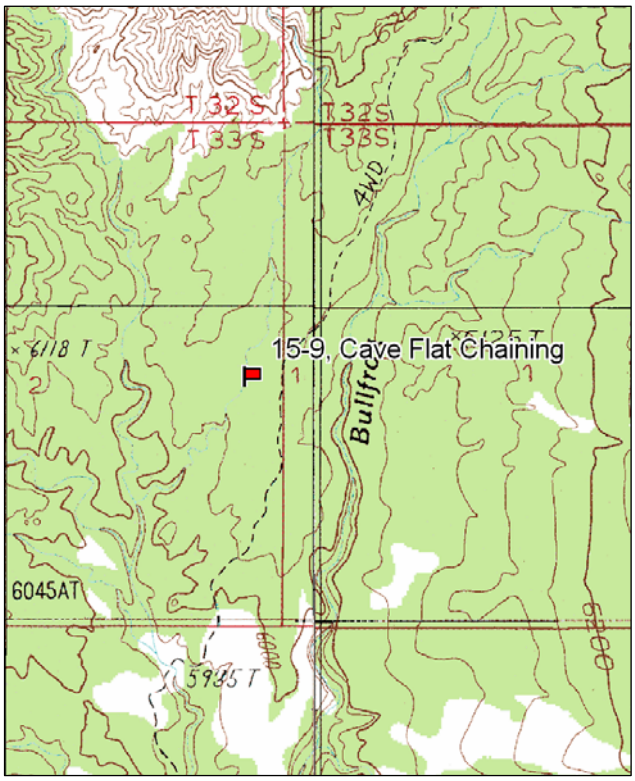
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Quercus gambelii									
87	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**160**	50	38	13	120	0	0	0	18/22
04	**0**	0	0	0	-	0	0	0	12/24
09	**40**	0	100	0	-	0	0	0	10/12
Ribes leptanthum									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	60/96
99	**20**	0	100	-	-	0	0	0	64/67
04	**20**	0	100	-	-	0	0	0	56/66
09	**0**	0	0	-	-	0	0	0	42/31
Sclerocactus sp.									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	3/3
04	**20**	0	100	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Symphoricarpos oreophilus									
87	**565**	53	41	6	66	24	47	0	21/20
94	**40**	50	50	0	40	50	0	0	10/21
99	**40**	50	50	0	-	0	0	0	28/66
04	**40**	0	100	0	-	50	0	0	21/50
09	**80**	75	0	25	-	0	0	25	25/63

CAVE FLAT CHAINING - TREND STUDY NO. 15-9-09

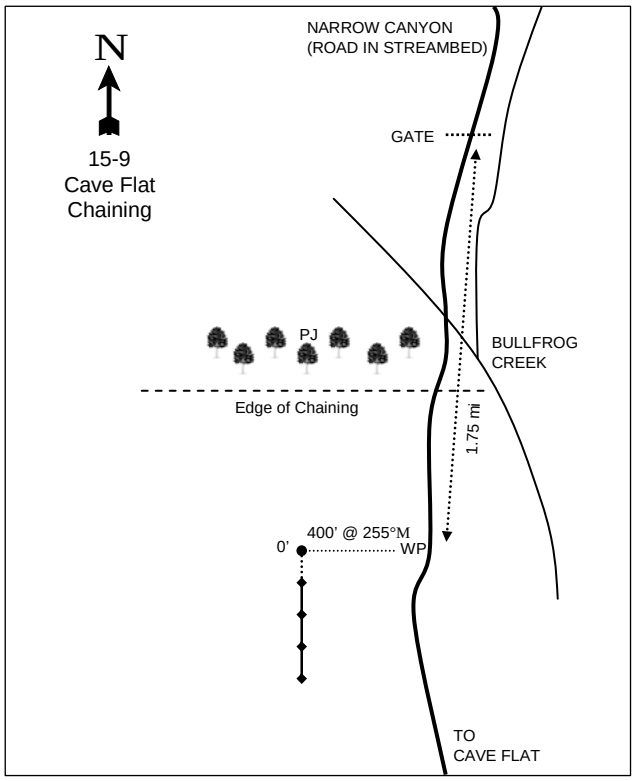
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Bison Year-Long
NRCS Ecological Site Description: Semi-desert Shallow Sandy Loam (Shadscale), R035XY230UT
Land Ownership: DWR
Elevation: 6,100 ft (1,859 m)
Aspect: southwest
Slope:
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From Pennellen Pass (T32S, R10E, Sec. 21) drive south for 0.4 miles to an intersection. Stay right towards Airplane Spring and go 3.5 miles to an intersection. Turn left, travel along Bullfrog Creek for 1.35 miles to a gate. Continue past the gate and up out of the creek, going 1.75 miles to a witness post on the right side of the road in the chaining. The transect starts 400 feet west (bearing of 255°M) of the witness post. Browse tag#7136.

Map Name: Cave Flat



Diagrammatic Sketch:



Township: 33S, Range: 9E, Section: 2

GPS: NAD 83, UTM 510698 E 4201940 N

CAVE FLAT CHAINING - TREND STUDY NO. 15-9

Site Information

Site Description: The study is located east of Cave Flat in a pinyon-juniper chaining and seeding project that was done on state land by the Division of Wildlife Resources in the fall of 1983. The chaining is within the Steele Butte allotment. The study was not accessible in 2004, but was sampled again in 2009. Pellet group data for bison and cattle were combined due to the difficulties in distinguishing between these two species. Bison/cattle use was estimated to be moderately heavy in 1999, but decreased to light use in 2009. Deer use was estimated to be minimal on the site (Table - Pellet Group Data).

Browse: Browse species are lacking on this site. Slender bush eriogonum (*Eriogonum microthecum*) is the only preferred browse species currently sampled on the site, but has produced less than 1% cover since 1994. Broom snakeweed (*Gutierrezia sarothrae*) provided the most cover of any browse species, averaging about 4% cover since 1994 (Table - Browse Trends). Green ephedra (*Ephedra viridis*) was sampled in low numbers until 1994, but has not been sampled since (Table - Browse Characteristics).

Herbaceous Understory: A variety of seeded and native grasses grow on the site. The seeded species crested and intermediate wheatgrass (*Agropyron cristatum* and *A. intermedium*) have historically been the dominant perennial grass species on the site, but have decreased in cover since 1994. Sand dropseed (*Sporobolus cryptandrus*) now provides more cover than both of the two seeded species combined. Cheatgrass (*Bromus tectorum*) was the dominant grass species on the site between 1994 and 1999, but frequency and cover decreased markedly in 2009. Forbs are rare on the site and are dominated by weedy annuals such as Russian thistle (*Salsola iberica*) (Table - Herbaceous Trends).

Soil: The soil is a sandy loam with estimated effective rooting depth of 15 inches and a slightly alkaline pH (7.7). Phosphorus has limited availability for plant growth and development at 5.8 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is fairly high on the site with most of the protective soil cover coming from litter (Table - Basic Cover). The soil erosion condition classification was rated as slight in 2009 primarily due to pedestaling of plants and soil movement.

Trend Assessments

Browse:

- **1987 to 1994 - stable (0):** Browse species are rare on this site. Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Vigor, decadence, and recruitment of young remained good for the preferred browse species, slender bush eriogonum.
- **1994 to 1999 - stable (0):** Slender bush eriogonum density increased 10% to 860 plants/acre while recruitment remained good at 18%. The only other preferred browse species that had been sampled on the site, green ephedra, was not sampled.
- **1999 to 2009 - slightly down (-1):** Slender bush eriogonum density decreased 21% and no young plants were sampled. Cover of eriogonum remained similar.

Grass:

- **1987 to 1994 – up (+2):** The sum of nested frequency for perennial grasses increased 72%. There was a significant increase in the nested frequency of intermediate wheatgrass and a significant decrease in the nested frequency of Indian ricegrass (*Oryzopsis hymenoides*). Perennial grasses provide 9% cover and annual grasses provide 10%.
- **1994 to 1999 – slightly up (+1):** The sum of nested frequency of perennial grasses increased 10%, though cover decreased to 5%.
- **1999 to 2009 – slightly up (+1):** There was little change in perennial grasses. Cheatgrass decreased significantly in nested frequency and cover decreased from 9% to less than 1%.

Forb:

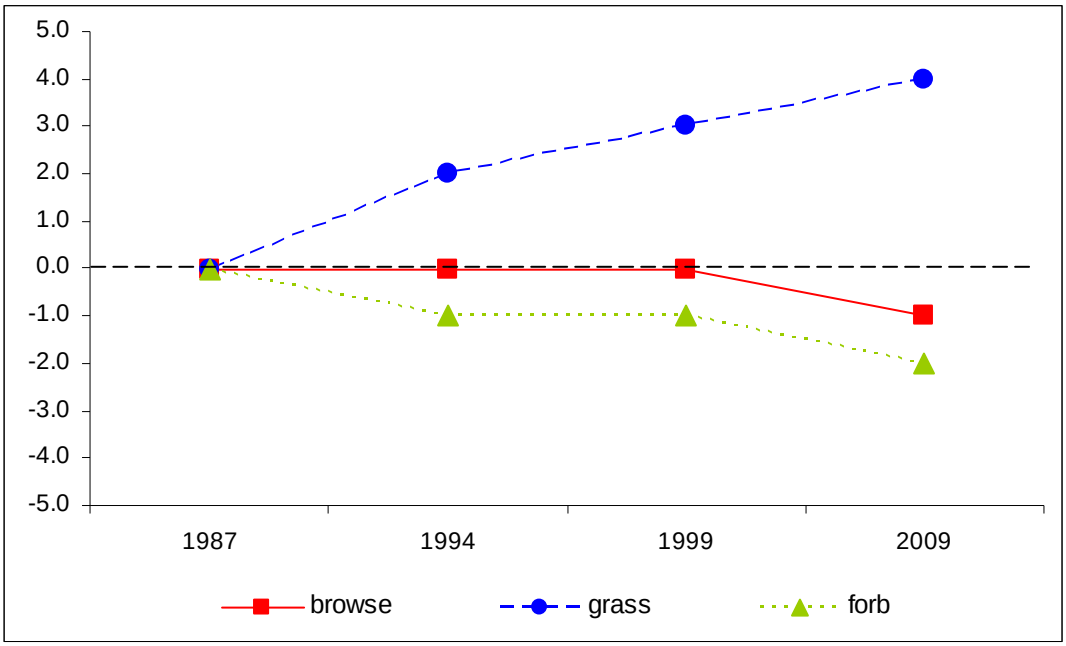
- **1987 to 1994 - slightly down (-1):** The sum of nested frequency for perennial forbs is down 32%, but forbs are rare on this site. Weedy annual species, especially Russian thistle, have doubled in frequency. There was a significant decrease in the nested frequency of yellow sweet clover (*Melilotus officinalis*). Perennial forb cover is low at 1%.
- **1994 to 1999 – stable (0):** The sum of nested frequency for perennial forbs is similar to the last sample, but weedy annual species have declined. Total forb cover is 2%
- **1999 to 2009 - slightly down (-1):** The sum of nested frequency for perennial forbs is down 41% while weedy annual forbs have increased four-fold. Cover of perennial forbs decreased to less than 1%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 15 Study no: 9

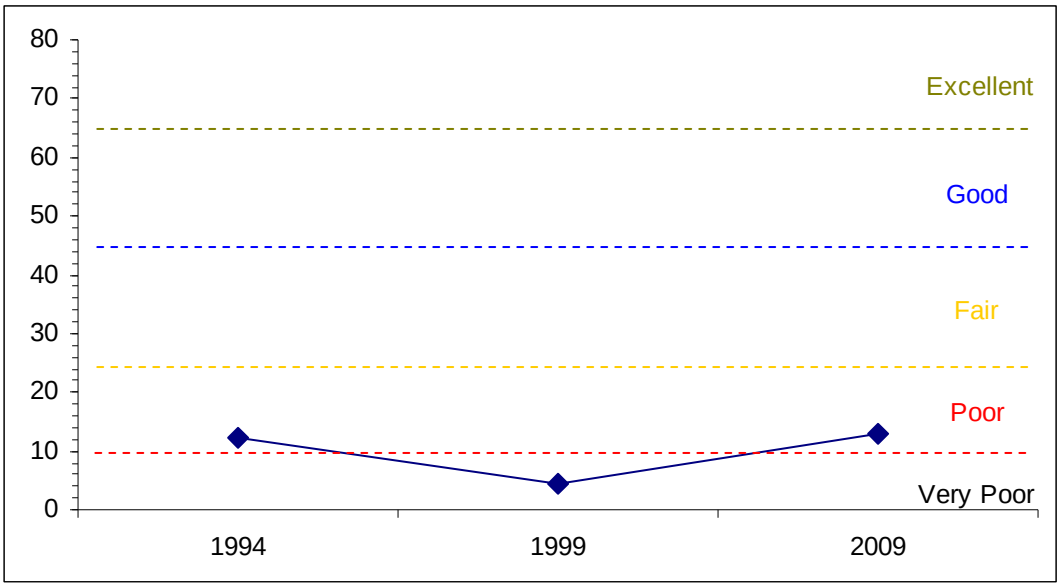
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	0.1	0	0	17.7	-7.4	1.8	0	**12.2**	Very Poor
99	0.1	0	0	9.1	-6.9	2.1	0	**4.5**	Very Poor
09	0.2	0	0	11.7	-0.5	1.5	0	**12.9**	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15, Study no: 9



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 15, Study no: 9



HERBACEOUS TRENDS--
Management unit 15, Study no: 9

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'09	'94	'99	'09
G	Agropyron cristatum	b38	b32	b43	a6	2.09	.73	.04
G	Agropyron intermedium	a21	b127	c175	b125	4.76	3.35	1.75
G	Aristida purpurea	b12	a-	ab3	b19	-	.04	.26
G	Bouteloua gracilis	-	-	1	4	-	.00	.01
G	Bromus tectorum (a)	-	b234	b273	a85	8.77	9.21	.68
G	Elymus junceus	-	7	3	7	.42	.00	.07
G	Oryzopsis hymenoides	c25	ab16	a12	ab12	.13	.15	.10
G	Sitanion hystrix	b31	b40	ab9	a3	1.25	.22	.03
G	Sporobolus cryptandrus	a7	a8	a6	b91	.16	.04	3.59
G	Vulpia octoflora (a)	-	b34	a-	a-	1.10	-	-
Total for Annual Grasses		0	268	273	85	9.87	9.21	0.68
Total for Perennial Grasses		134	230	252	267	8.84	4.56	5.86
Total for Grasses		134	498	525	352	18.72	13.77	6.55
F	Astragalus moencopensis	-	-	-	3	-	-	.00
F	Astragalus mollissimus	b19	a6	ab16	a-	.04	.15	-
F	Chaenactis douglasii	a-	a-	b10	a3	-	.07	.00
F	Cryptantha humilis	a4	b33	ab17	b29	.60	.51	.70
F	Descurainia pinnata (a)	-	b25	b27	a-	.35	.47	-
F	Eriogonum cernuum (a)	-	-	-	4	-	-	.02
F	Eriogonum sp.	4	-	-	-	-	-	-
F	Erodium cicutarium (a)	-	-	4	-	-	.03	-
F	Holosteum umbellatum (a)	-	4	-	-	.01	-	-
F	Lactuca serriola	7	-	-	-	-	-	-
F	Lappula occidentalis (a)	-	1	7	2	.00	.18	.00

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'09	'94	'99	'09
F	Medicago sativa	2	4	-	-	.00	-	-
F	Melilotus officinalis	$_{b}$60	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Penstemon sp.	$_{a}$4	$_{b}$22	$_{ab}$13	$_{a}$-	.22	.28	-
F	Penstemon speciosus	-	-	-	4	-	-	.04
F	Plantago patagonica (a)	-	-	3	-	-	.01	-
F	Psilostrophe sparsiflora	2	-	-	-	-	-	-
F	Salsola iberica (a)	$_{b}$76	$_{b}$122	$_{a}$2	$_{c}$191	1.83	.00	2.30
F	Streptanthus cordatus	-	3	-	-	.00	-	-
F	Townsendia incana	-	1	10	-	.00	.04	-
Total for Annual Forbs		76	152	43	197	2.20	0.70	2.33
Total for Perennial Forbs		102	69	66	39	0.89	1.06	0.75
Total for Forbs		178	221	109	236	3.10	1.77	3.08

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

BROWSE TRENDS--
Management unit 15, Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'09	'94	'99	'09
B	Chrysothamnus nauseosus graveolens	3	7	8	.00	.15	1.00
B	Chrysothamnus viscidiflorus	0	1	0	-	.00	-
B	Ephedra viridis	1	0	0	.00	-	-
B	Eriogonum microthecum	20	18	11	.11	.10	.12
B	Gutierrezia sarothrae	70	93	85	1.62	5.50	3.81
B	Juniperus osteosperma	0	0	0	-	-	.15
B	Opuntia sp.	1	0	0	.03	-	-
B	Pinus edulis	0	1	1	.15	.00	.15
Total for Browse		95	120	105	1.91	5.77	5.23

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 9

Species	Percent Cover '09
Chrysothamnus nauseosus graveolens	3.09
Eriogonum microthecum	.06
Gutierrezia sarothrae	3.53
Pinus edulis	.85

POINT-QUARTER TREE DATA--
Management unit 15, Study no: 9

Species	Trees per Acre '09	Average diameter (in) '09
Juniperus osteosperma	28	7.1
Pinus edulis	21	2.3

BASIC COVER--
Management unit 15, Study no: 9

Cover Type	Average Cover % '87	'94	'99	'09
Vegetation	2.50	23.29	21.92	15.56
Rock	3.75	4.23	4.46	6.12
Pavement	3.00	.99	1.56	3.67
Litter	47.50	31.52	29.63	30.60
Cryptogams	0	.01	.27	.06
Bare Ground	43.25	30.29	43.31	52.56

SOIL ANALYSIS DATA --
Management unit 15, Study no: 9, Study Name: Cave Flat Chaining

Effective rooting depth (in)	pH	sandy loam %sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.1	7.7	65.3	18.2	16.6	1.2	5.8	128	0.6

PELLET GROUP DATA--
Management unit 15, Study no: 9

Type	Quadrat Frequency '94	'99	'09	Days use per acre (ha) '99	'09
Rabbit	12	29	31	-	-
Deer	1	1	2	-	3 (8)
Bison/Cattle	-	24	7	52 (128)	9 (22)

BROWSE CHARACTERISTICS--
Management unit 15, 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)
Chrysothamnus nauseosus graveolens									
87	**33**	100	0	0	-	0	0	0	-/-
94	**60**	67	0	33	-	0	0	33	18/27
99	**200**	50	50	0	40	20	10	0	23/28
09	**160**	0	88	13	-	13	25	13	30/34
Chrysothamnus viscidiflorus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	100	0	0	3/6
09	**0**	0	0	-	-	0	0	0	-/-
Cowania mexicana stansburiana									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	61/69
Ephedra viridis									
87	**66**	0	100	-	-	50	50	0	15/16
94	**40**	0	100	-	-	0	100	0	11/23
99	**0**	0	0	-	-	0	0	0	20/36
09	**0**	0	0	-	-	0	0	0	32/44
Eriogonum microthecum									
87	**1432**	16	81	2	133	0	0	0	7/6
94	**780**	18	77	5	80	15	0	3	4/7
99	**860**	30	53	16	160	16	12	2	3/4
09	**680**	0	97	3	-	0	26	0	3/5
Gutierrezia sarothrae									
87	**2666**	46	54	0	5166	0	0	0	13/16
94	**7180**	43	55	2	1480	0	0	2	46/39
99	**21540**	27	71	2	2480	2	0	.74	7/9
09	**7260**	8	67	25	-	0	0	24	6/7
Juniperus osteosperma									
87	**66**	50	50	-	-	0	0	0	98/47
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	20	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
87	**33**	0	100	-	-	0	0	0	4/4
94	**20**	0	100	-	-	0	0	0	3/14
99	**0**	0	0	-	-	0	0	0	4/11
09	**0**	0	0	-	-	0	0	0	-/-

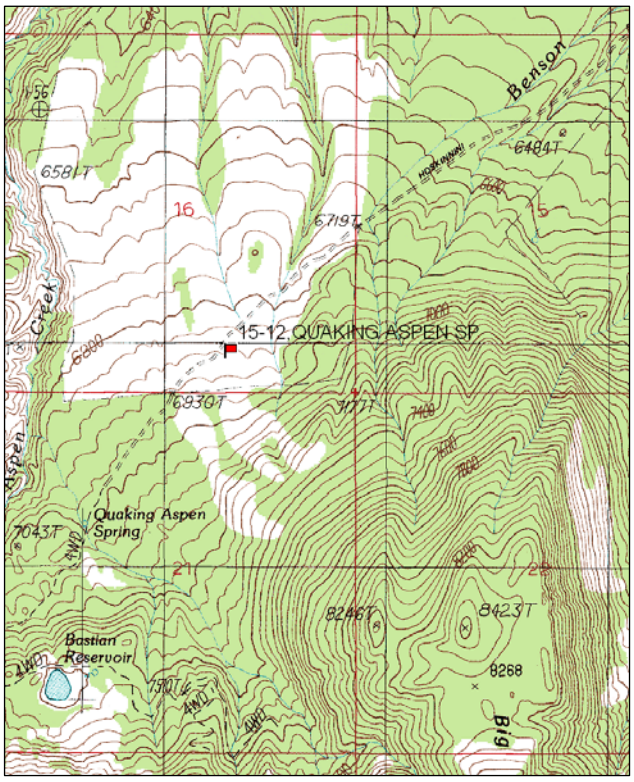
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pinus edulis									
87	**33**	100	0	-	33	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	100	0	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-
Shepherdia rotundifolia									
87	**66**	100	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	6/48
99	**0**	0	0	-	-	0	0	0	28/35
09	**0**	0	0	-	-	0	0	0	31/47

QUAKING ASPEN SPRING - TREND STUDY NO. 15-12-09

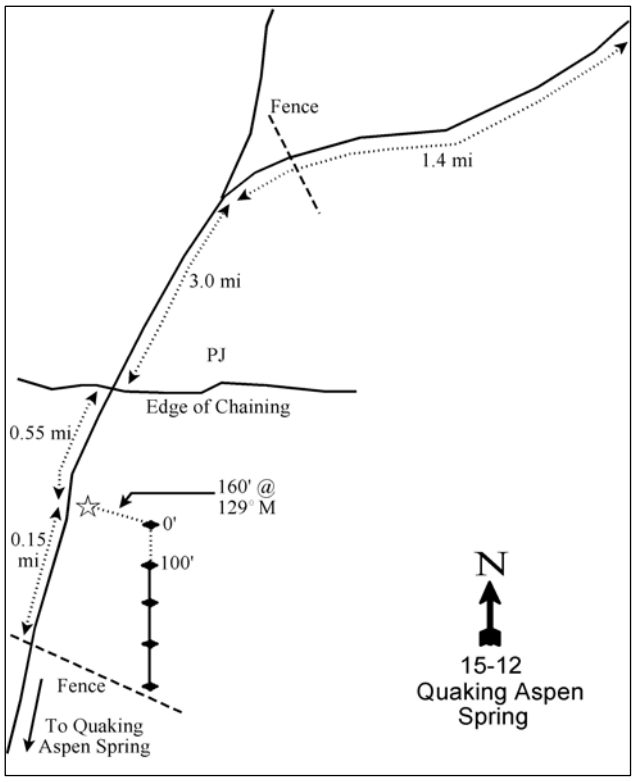
Vegetation Type: Chained, Seeded P-J
Range Type: Crucial Deer Winter, Crucial Bison Year-Long
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R035XY318UT
Land Ownership: SITLA
Elevation: 6,800 ft (2,073 m)
Aspect: north
Slope: 8%-12%
Transect bearing: 165 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From the intersection of highways 95 and 276, go 4.7 miles south down SR 276 to a gravel road. Turn right and travel 3.1 miles to an abandoned cabin near the creek. Continue 0.6 miles to a fork. Stay right, cross the creek and go 0.8 miles to some mining cabins. Keep left on the main road. Continue 1.2 miles to a fence. Continue 0.2 miles to a fork. Take the left fork towards Quaking Aspen Spring. Go 3 miles to the edge of a chaining. Continue 0.55 miles to a witness post on the left side of the road. The 0-foot baseline stake, a 1 ½ foot tall fence post, is 160 feet southeast of witness post and is marked by a red browse tag #7135.
Alternate route- From study number 15-13, go 2.2 miles to a fork. Stay left and continue 1.6 miles to another fork. Stay left again and go 1.2 miles (you will go through Stanton Pass and pass Quaking Aspen Spring) passing through a fence to a witness post on the right.

Map Name: Cass Creek Peak



Diagrammatic Sketch:



Township: 33S, Range: 11E, Section: 21

GPS: NAD 83, UTM 12S 526219 E 4198142 N

QUAKING ASPEN SPRING - TREND STUDY NO. 15-12

Site Information

Site Description: The study is located in the foothills on the north slope of Mt. Hillars and about two-thirds of a mile from Quaking Aspen Spring. The area has historically been a pinyon-juniper vegetation type. It was chained years ago and trees were regaining their dominance of the area, until the Bulldog fire of 2003 burned all trees and browse on the site. The area was chained and seeded after the fire for fire rehabilitation (Table - Seed Mix). Water is available for wildlife and livestock at Quaking Aspen Spring and Quaking Aspen Creek. Pellet group data for bison and cattle were combined due to the difficulty of distinguishing between these species. Bison/cattle use was estimated to be light in 1999 prior to the fire, with no sign encountered in 2004 after the fire, but increasing to moderate use in 2009. Deer use was estimated to be light in 1999 and 2004, but increased to moderate use in 2009, as well. There was minimal elk use estimated in 2009 (Table - Pellet Group Data).

Browse: Prior to the fire in 2003, the dominant browse species were black sagebrush (*Artemisia nova*), pinyon pine (*Pinus edulis*), and Utah juniper (*Juniperus osteosperma*). None of these three species was sampled in 2004, after the fire, and only one juniper tree was sampled by point-quarter in 2009 (Table - Browse Characteristics, Table - Point-Quarter Tree Data).

Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) was seeded as part of the fire rehabilitation and has been increased in cover since 2004 (Table - Browse Trends). Density of Wyoming big sagebrush has also been increasing since 2004 and the population has had some heavy use. Some true mountain mahogany (*Cercocarpus montanus*) survived the fire at low densities. Mountain mahogany had moderate to heavy use in 2009. Broom snakeweed (*Gutierrezia sarothrae*) has become the dominant browse since the fire (Table - Browse Characteristics).

Herbaceous Understory: The grasses on the site are diverse and abundant, but are dominated by the seeded species crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*A. intermedium*). Native species have become rare on the site. These two species currently provide over 90% of the total grass cover on the site. Prior to the fire, most grasses occurred infrequently and most perennial grasses had been decreasing in frequency since the initial reading in 1987. Cheatgrass (*Bromus tectorum*) had also shown an increase in frequency and density since 1994. After the fire and subsequent reseeding in 2003, several new species were established and have increased in frequency and density since 2004. Cheatgrass frequency has decreased since the fire and reseeding (Table - Herbaceous Trends)

Forbs are also diverse and abundant on the site. The seeded species, alfalfa (*Medicago sativa*), is the dominant forb on the site. Perennial forb cover has been increasing since 1994, but showed a more dramatic increase in 2004, after the fire (Table - Herbaceous Trends).

The transect is located near the BLM/SITLA border. It appears that seed from the BLM WSA seed mix drifted onto the transect as slender wheatgrass, (*A. trachycaulum*), mountain brome (*Bromus carinatus*) and western yarrow (*Achillea millefolium*) were sampled after the fire (Table - Herbaceous Trends).

Soil: The soil is a rocky, sandy clay loam with an estimated effective rooting depth of just over 12 inches and a slightly alkaline pH (7.5). Nutrient levels are low with phosphorus and potassium both below the minimum levels determined necessary for normal plant development (Tiedemann and Lopez 2004). Organic matter is fairly low overall (Table - Soil Analysis Data). A calcium carbonate layer exists about four inches down in the profile. Bare ground cover has been moderately low over the span of the study with most protective soil cover coming from rock and litter cover (Table - Basic Cover). The soil erosion condition classification was rated as stable in 2004 and 2009.

SEED MIX -- DWR MIX FOR THE BULLDOG FIRE 2003
Management unit 15, study no. 12

Project name: Henry Mnts. Low Elevation			Project name: Henry Mnts. Dribbler		
Mix lot #: m-ser-lm-hmlo-04	Size (acre):	2200	Mix Lot #: m-ser-hmD-04	Size (acre):	900
Seed type	lbs in mix	lbs/acre	Seed type	lbs in mix	lbs/acre
Arizona Fescue "Redondo"	1250	0.57	Bitterbrush	350	0.39
Crested Wheatgrass "Hycrest"	2200	1.00	Fourwing Saltbush	450	0.50
Intermediate Wheatgrass	2200	1.00	Utah Serviceberry	50	0.06
Orchardgrass "Paiute"	1100	0.50	BULK POUNDS PER ACRE:		0.94
Pubescent Wheatgrass	2200	1.00	PLS POUNDS PER ACRE:		0.57
Russian Wildrye "Bozoisky"	1927	0.88			
Russian Wildrye "Bozoisky"	273	0.12			
Thickspike Wheatgrass "Critana"	2200	1.00			
Prairie Junegrass	350	0.16			
Alfalfa "Ranger"	242	0.11			
Alalfa "Ladak+"	2050	0.93			
Blue Flax "Appar"	500	0.23			
Rocky Mountain Beeplant	587	0.27			
Rocky Mountain Beeplant	500	0.23			
Sainfoin	2300	1.05			
Small Burnet "Delar"	2632	1.20			
Sagebrush, Wyoming	1120	0.51			
Sagebrush, Mountain	600	0.27			
BULK POUNDS PER ACRE:		11.01			
PLS POUNDS PER ACRE:		9.48			

Trend Assessments

Browse:

- **1987 to 1994 - slightly down (-1):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Black sagebrush plants displaying poor vigor increased from 2% to 17%, and decadence increased from 12% to 21%. Recruitment of young black sagebrush plants declined markedly.
- **1994 to 1999 - slightly down (-1):** Density of black sagebrush decreased 11% to 12,600 plants/acre, and cover decreased from 18% to 17%.
- **1999 to 2004 - down (-2):** The fire has removed almost all of the browse species from this site. Young plants and seedlings of the seeded species Wyoming big sagebrush were encountered in low numbers.
- **2004 to 2009 - slightly up (+1):** Browse species are still rare on this site. Wyoming big sagebrush density increased to 960 plants/acre, with many of those being mature, established plants. Cover of Wyoming big sagebrush also increased slightly. There was also a large increase in the density and cover of the undesirable species, broom snakeweed, which is currently the dominant browse species on the site.

Grass:

- **1987 to 1994 - down (-2):** The sum of nested frequency for perennial grasses decreased 34%. There was a significant decrease in the nested frequency of crested wheatgrass, blue grama, and bottlebrush squirreltail.
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency for perennial grasses decreased 17% while cover remained similar to 1994 levels. There was a significant increase in the nested frequency of crested wheatgrass and Indian ricegrass (*Oryzopsis hymenoides*) and a significant decrease in nested

frequency of mutton bluegrass (*Poa fendleriana*) and bottlebrush squirreltail. Cheatgrass (*Bromus tectorum*) also increased significantly in nested frequency and cover increased from near 0% to 3%.

- **1999 to 2004 - stable (0):** After the fire and subsequent reseeding, the sum of nested frequency of perennial grasses was similar to 1999 levels while cover increased from 3% to 5% in only the first growing season after the fire. Cheatgrass decreased significantly in nested frequency and cover decreased from 3% to 1%.There was a significant increase in nested frequency of the seeded species crested wheatgrass, and intermediate wheatgrass. Mountain brome, slender wheatgrass, orchard grass (*Dactylis glomerata*), and Russian wildrye (*Elymus junceus*) were sampled for the first time. There was a significant decrease in the nested frequency of the native species Indian ricegrass and mutton bluegrass.
- **2004 to 2009 - up (+2):** Nested frequency of perennial grasses increased 56% and cover increased from 5% to 17%. Cheatgrass decreased significantly in nested frequency, is infrequent and provides almost no cover. There was a significant increase in the nested frequency of the seeded species: crested wheatgrass, intermediate wheatgrass, and Russian wildrye, and a significant decrease in the nested frequency of mountain brome. Crested and intermediate wheatgrass now dominate the site.

Forb:

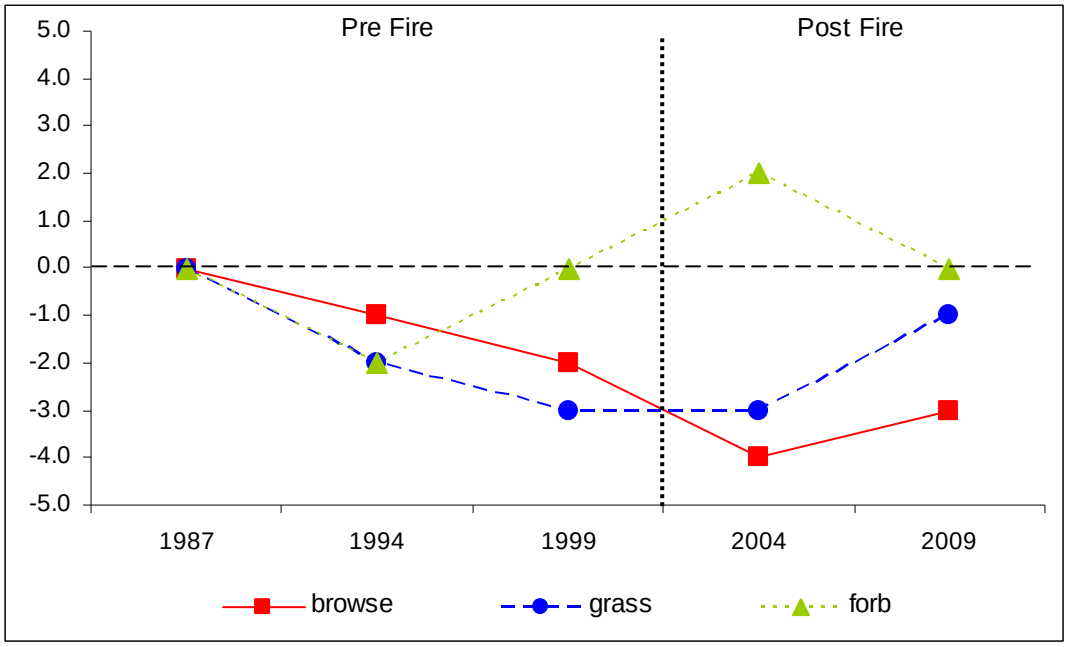
- **1987 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased 34%.
- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial forbs increased 27% and cover doubled to 3%.
- **1999 to 2004 - up (+2):** The sum of nested frequency of perennial forbs increased 28% and cover doubled to 6%. The introduction of seeded species such as alfalfa (*Medicago sativa*) and small burnett (*Sanguisorba minor*) helped the increases in forbs. As a caveat, weedy annual species increased greatly, annual cover increased from near 0% to 7.5%.
- **2004 to 2009 - down (-2):** The sum of nested frequency of perennial forbs decreased 34%, though cover remained similar to 2004 levels. Annual forbs decreased markedly as they now provide less than 1% cover and nested frequency decreased 95%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 15, study no: 12

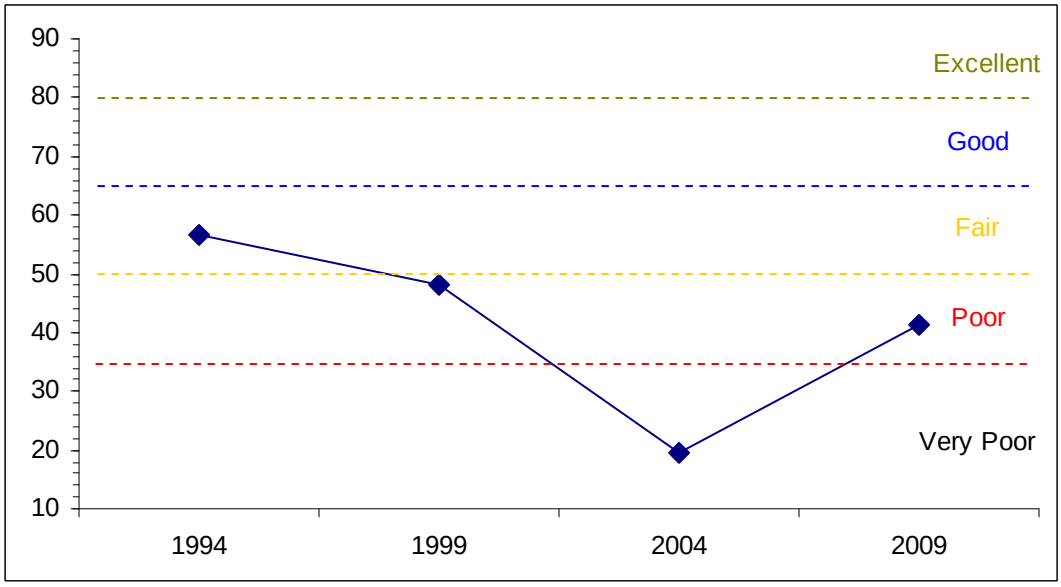
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	25.96	9.4	11.2	7.1	-0.1	3.1	0	**56.6**	Fair
99	25.3	9.1	3.6	6.3	-2.6	6.4	0	**48.1**	Poor-Fair
04	0.2	0	0	10.2	-1	10	0	**19.42**	Very Poor
09	1.3	0	0	30	0	10	0	**41.3**	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15 Study no: 12



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 15, Study no: 12



HERBACEOUS TRENDS--
Management unit 15, Study no: 12

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	bc63	a9	b46	c98	d200	.19	.66	2.43	8.93
G	Agropyron intermedium	a-	a-	a-	c85	b156	-	-	1.44	6.82
G	Agropyron trachycaulum	-	-	-	7	6	-	-	.04	.30
G	Bouteloua gracilis	c174	b118	b97	a-	a2	1.62	.93	-	.00
G	Bromus carinatus	a-	a-	a-	c35	a7	-	-	.70	.07
G	Bromus tectorum (a)	-	ab23	c177	b54	a11	.08	3.40	1.33	.02
G	Dactylis glomerata	-	-	-	9	1	-	-	.04	.03
G	Elymus junceus	a-	a-	a-	a7	b19	-	-	.19	.37
G	Koeleria cristata	-	-	1	-	-	-	.00	-	-
G	Oryzopsis hymenoides	a-	a1	b57	a8	a1	.03	.46	.01	.00
G	Poa fendleriana	c101	c95	b61	a8	a6	1.25	.88	.10	.09
G	Sitanion hystrix	c163	b113	a14	a12	a13	.43	.17	.12	.11
G	Sporobolus cryptandrus	-	-	-	-	6	-	-	-	.06
G	Stipa comata	4	-	3	-	3	-	.00	-	.03
Total for Annual Grasses		0	23	177	54	11	0.08	3.40	1.33	0.02
Total for Perennial Grasses		505	336	279	269	420	3.54	3.14	5.10	16.84
Total for Grasses		505	359	456	323	431	3.63	6.54	6.44	16.86
F	Achillea millefolium	a-	a-	a-	b24	b39	-	-	.11	.86
F	Agoseris glauca	a-	a3	b14	a-	a-	.03	.10	-	-
F	Allium sp.	2	-	-	-	-	-	-	-	-
F	Arabis demissa	b31	a8	ab25	a3	a-	.02	.09	.03	-
F	Aster sp.	-	4	-	-	-	.01	-	-	-
F	Astragalus moencopensis	a-	b12	a-	a-	c35	.03	-	-	.43
F	Astragalus sp.	b16	ab6	ab6	a-	a-	.04	.12	-	-
F	Astragalus utahensis	a-	a-	a-	b47	b33	-	-	.44	.25
F	Calochortus nuttallii	-	6	8	3	-	.02	.01	.00	-
F	Castilleja chromosa	c40	ab9	bc23	a-	a2	.05	.70	-	.03
F	Chenopodium fremontii (a)	-	-	-	3	-	-	-	.63	-
F	Chenopodium leptophyllum(a)	-	a-	a-	b24	a-	-	-	3.62	-
F	Cleome sp. (a)	-	-	-	4	-	-	-	.06	-
F	Comandra pallida	a-	ab14	a-	a6	b23	.11	-	.07	.46
F	Crepis acuminata	-	2	1	-	2	.00	.01	-	.01
F	Cryptantha sp.	-	-	3	-	1	-	.03	-	.00
F	Descurainia pinnata (a)	-	2	-	2	-	.01	-	.00	-
F	Erigeron eatonii	-	-	-	3	2	-	-	.00	.06
F	Erigeron pumilus	19	19	19	14	30	.22	.09	.05	.42
F	Eriogonum sp.	-	-	3	-	-	-	.00	-	-
F	Eriogonum umbellatum	7	-	2	-	-	-	.00	-	-
F	Gayophytum ramosissimum(a)	-	b28	a-	b27	a1	.07	-	.72	.00
F	Gilia sp. (a)	-	-	-	3	-	-	-	.03	-
F	Halogeton glomeratus (a)	-	-	-	-	3	-	-	-	.00
F	Haplopappus acaulis	-	-	1	-	-	-	.00	.00	-
F	Hymenoxys acaulis	b44	b29	b29	a2	a-	.10	.15	.00	-

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
F	Lappula occidentalis (a)	-	$_{b}$20	$_{a}$-	$_{b}$16	$_{a}$-	.12	-	.25	-
F	Lesquerella kingii	$_{c}$40	$_{bc}$16	$_{d}$86	$_{a}$-	$_{b}$15	.04	.54	-	.17
F	Linum lewisii	$_{cd}$51	$_{bc}$43	$_{ab}$21	$_{d}$71	$_{a}$9	.13	.34	.57	.09
F	Lomatium sp.	-	-	1	-	-	-	.00	-	-
F	Lygodesmia spinosa	20	14	3	7	12	.17	.01	.33	1.06
F	Machaeranthera canescens	3	-	-	-	3	-	-	.00	.03
F	Medicago sativa	$_{a}$-	$_{a}$-	$_{a}$-	$_{c}$107	$_{b}$43	-	-	1.42	1.22
F	Nicotiana attenuata (a)	-	-	-	6	-	-	-	.07	-
F	Onobrychis viciaefolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$26	$_{a}$-	-	-	.38	-
F	Penstemon comarrhenus	2	6	3	-	-	.18	.01	-	-
F	Phlox longifolia	$_{c}$167	$_{b}$116	$_{b}$119	$_{b}$88	$_{a}$-	.33	.66	1.50	-
F	Physaria sp.	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$21	$_{a}$-	-	-	.15	-
F	Polygonum douglasii (a)	-	$_{b}$47	$_{a}$8	$_{b}$59	$_{a}$3	.10	.02	2.10	.01
F	Sanguisorba minor	$_{a}$-	$_{a}$-	$_{a}$-	$_{c}$67	$_{b}$43	-	-	1.06	.77
F	Senecio multilobatus	$_{bc}$21	$_{a}$1	$_{c}$25	$_{ab}$7	$_{c}$26	.00	.25	.02	.61
F	Sphaeralcea coccinea	$_{a}$1	$_{a}$2	$_{a}$-	$_{ab}$9	$_{b}$12	.00	-	.10	.11
F	Unknown forb-perennial	3	-	-	-	-	-	-	-	-
F	Zigadenus paniculatus	2	1	2	-	3	.00	.03	-	.00
Total for Annual Forbs		0	97	8	144	7	0.30	0.01	7.51	0.01
Total for Perennial Forbs		469	311	394	505	333	1.53	3.21	6.29	6.63
Total for Forbs		469	408	402	649	340	1.83	3.23	13.81	6.65

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

BROWSE TRENDS--
Management unit 15, Study no: 12

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	4	3	0	0	.03	.03	-	-
B	Artemisia nova	96	94	0	0	18.32	16.84	-	-
B	Artemisia tridentata wyomingensis	0	0	3	31	-	-	.08	.84
B	Atriplex canescens	0	0	1	0	-	-	.03	-
B	Cercocarpus montanus	17	13	4	6	1.15	2.04	.03	.15
B	Chrysothamnus depressus	15	19	0	0	.39	.31	-	-
B	Chrysothamnus nauseosus	5	0	0	1	.18	-	-	.03
B	Coryphantha vivipara arizonica	0	0	0	0	-	.01	-	-
B	Eriogonum microthecum	63	26	3	4	.64	.59	.03	.01
B	Gutierrezia sarothrae	12	4	16	54	.01	.04	.11	2.35
B	Juniperus osteosperma	0	18	0	0	2.73	6.50	-	-
B	Opuntia sp.	4	1	0	0	.00	.00	-	-
B	Pinus edulis	0	12	0	0	3.24	7.62	-	-
B	Tetradymia canescens	1	0	0	2	.00	-	-	.00
Total for Browse		217	190	27	98	26.71	34.00	0.29	3.40

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 12

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata wyomingensis	-	-	1.14
Cercocarpus montanus	-	-	.20
Eriogonum microthecum	-	.03	.01
Gutierrezia sarothrae	-	.01	1.75
Juniperus osteosperma	4.80	-	-
Pinus edulis	8.39	-	-

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 12

Species	Average leader growth (in)
	'09
Artemisia tridentata wyomingensis	1.2
Cercocarpus montanus	1.4

POINT-QUARTER TREE DATA--
Management unit 15, Study no: 12

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	128	<18	18
Pinus edulis	252	<18	<18

Average diameter (in)		
'99	'04	'09
2.1	-	1.6
3.2	-	-

BASIC COVER--
Management unit 15, Study no: 12

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	7.75	33.40	39.97	18.57	29.25
Rock	18.50	22.14	24.27	29.15	27.43
Pavement	2.25	2.52	6.59	7.19	6.70
Litter	57.00	30.12	35.56	25.75	35.61
Cryptogams	.25	.00	1.26	0	0
Bare Ground	14.25	12.17	12.61	31.50	19.21

SOIL ANALYSIS DATA --
Management unit 15, Study no: 12, Study Name: Quaking Aspen Spring

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.3	7.5	51.3	22.2	26.6	2.1	6.6	44.8	0.6

PELLET GROUP DATA--
Management unit 15, Study no: 12

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	17	28	16	34
Elk	-	-	2	1
Deer	9	16	2	10
Bison/Cattle	1	3	-	6

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	-	1 (3)
118 (44)	1 (3)	25 (63)
3 (7)	-	24 (59)

BROWSE CHARACTERISTICS--
Management unit 15, 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)
Amelanchier utahensis									
87	**66**	100	0	-	199	100	0	0	-/-
94	**80**	25	75	-	-	0	0	0	32/51
99	**60**	0	100	-	-	0	100	0	34/45
04	**0**	0	0	-	-	0	0	0	29/36
09	**0**	0	0	-	-	0	0	0	26/44
Artemisia nova									
87	**12332**	23	64	12	4333	28	9	2	9/10
94	**14160**	5	74	21	360	0	.42	17	11/18
99	**12600**	6	72	22	60	18	.63	.79	12/19
04	**0**	0	0	0	-	0	0	0	-/-
09	**0**	0	0	0	-	0	0	0	-/-
Artemisia tridentata wyomingensis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**60**	100	0	-	840	0	0	0	8/6
09	**960**	8	92	-	120	6	15	0	10/10
Atriplex canescens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	5/7
09	**0**	0	0	-	-	0	0	0	-/-
Cercocarpus montanus									
87	**799**	17	83	-	66	25	67	0	22/30
94	**440**	23	77	-	20	45	18	0	33/26
99	**400**	15	85	-	-	25	55	0	36/41
04	**160**	0	100	-	140	0	0	0	17/12
09	**160**	0	100	-	-	13	38	0	20/29

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus									
87	**1465**	14	77	9	333	9	14	0	6/6
94	**580**	14	83	3	120	0	0	0	4/7
99	**660**	12	79	9	40	9	0	6	4/9
04	**0**	0	0	0	-	0	0	0	-/-
09	**0**	0	0	0	-	0	0	0	-/-
Chrysothamnus nauseosus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**120**	0	100	-	-	0	0	0	3/7
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-
Coryphantha vivipara arizonica									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	40	0	0	0	3/4
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Eriogonum microthecum									
87	**1932**	31	69	0	799	28	0	0	5/4
94	**3380**	11	88	1	80	0	0	2	5/6
99	**1640**	11	60	29	-	38	2	2	3/5
04	**120**	0	100	0	-	0	0	0	4/9
09	**200**	70	30	0	220	0	0	0	2/3
Gutierrezia sarothrae									
87	**998**	13	80	7	199	0	0	7	7/6
94	**320**	6	63	31	-	0	0	6	8/7
99	**120**	50	33	17	60	0	0	0	5/5
04	**360**	39	61	0	20	0	0	0	6/5
09	**3300**	33	64	3	220	.60	0	2	8/10
Juniperus osteosperma									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**400**	60	40	-	40	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
87	**399**	0	100	-	-	0	0	0	6/9
94	**80**	25	75	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	6/15
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	2/5

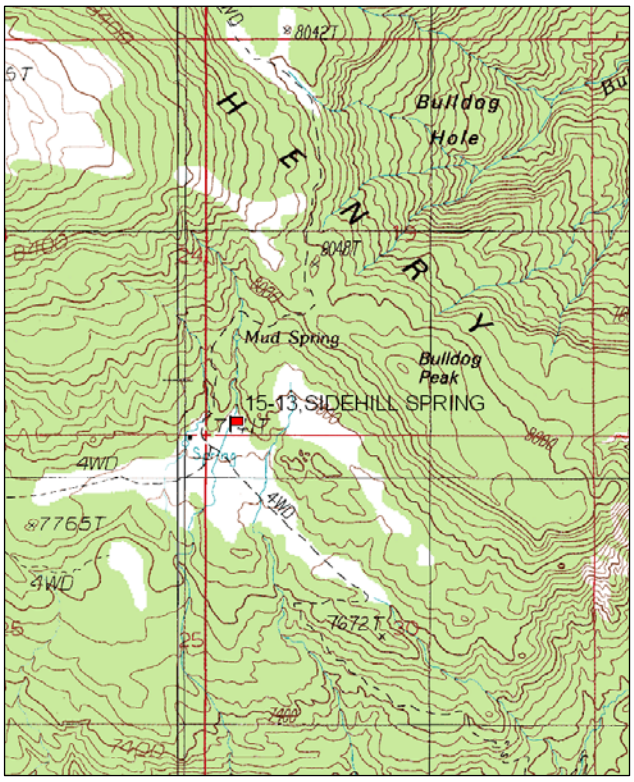
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pinus edulis									
87	**532**	88	12	-	-	0	0	0	55/43
94	**0**	0	0	-	-	0	0	0	-/-
99	**280**	21	79	-	20	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Tetradymia canescens									
87	**0**	0	0	0	-	0	0	0	-/-
94	**20**	0	100	0	-	0	0	0	1/99
99	**0**	0	0	0	-	0	0	0	-/-
04	**0**	0	0	0	-	0	0	0	-/-
09	**40**	0	50	50	20	0	50	50	4/7

SIDEHILL SPRING - TREND STUDY NO. 15-13-09

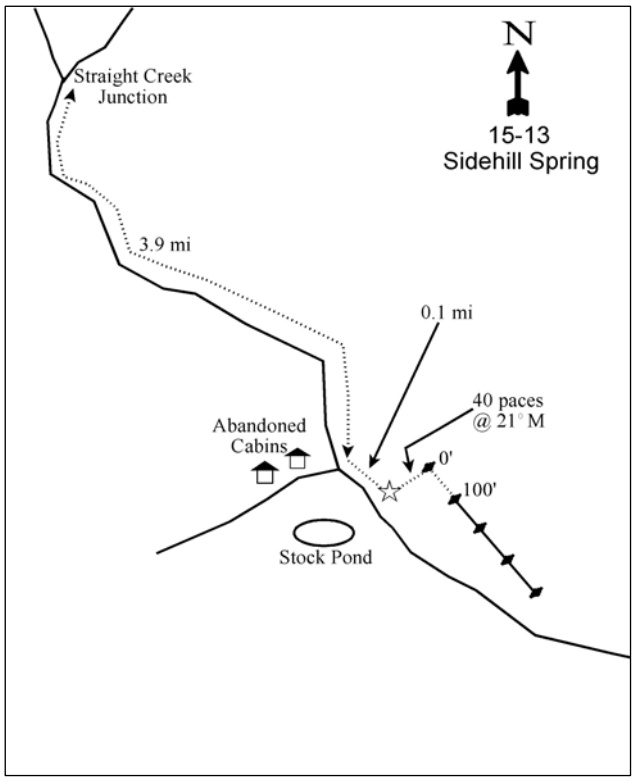
Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Year-Long, Crucial Bison Year-Long
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 7,700 ft (2,347 m)
Aspect: southeast
Slope: 5%
Transect bearing: 170 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From Straight Creek Junction (T33S, R10E, Sec. 12), proceed south on the main road for 0.3 miles to Straight Creek. Continue 3.6 miles to a minor fork by a spring, stock pond and some abandoned cabins. Bear left on the main road, cross a small wash and less than 0.1 miles into the sage flat where a witness post for the transect is found on the left side of the road. The study area is northeast of the witness post. The 0-foot stake has browse tag #271 attached, and is 40 paces away at a bearing of 21°M from the witness post.

Map Name: Cass Creek Peak



Diagrammatic Sketch:



Township: 33S, Range: 11E, Section: 19

GPS: NAD 83, UTM 12S 522131 E 4196390 N

SIDEHILL SPRING - TREND STUDY NO. 15-13

Site Information

Site Description: The Sidehill Spring study is located one-half mile west of Bulldog Peak and halfway between Mt. Pennell and Mt. Hillars. This area was a sagebrush flat surrounded by a pinyon-juniper/oak woodland with young trees scattered throughout the flat, but it burned in 2003 in the Bulldog fire. The site was seeded and chained by the BLM to rehabilitate the area after the fire (Table - Seed Mix). The area is within the Pennell Allotment, and water is available for livestock and wildlife in a nearby spring, creek, and stock pond. There is evidence of past mining activity; a cabin, pump house, and old mining equipment are located near the spring. Pellet group data for bison and cattle were combined due to the difficulty in differentiating between these species. Bison/cattle use was moderate before the fire in 1999, with no sign sampled in 2004 after the fire, but increasing to heavy use in 2009. Deer use was estimated to be moderate before the fire, but has been minimal since the fire (Table - Pellet Group Data).

Browse: A dense stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated the site prior to the 2003 Bulldog wildfire. Sagebrush density had been increasing in each sampling until 1999. Cover of sagebrush was relatively stable at nearly 19% in 1994 and 1999. The fire removed most of the browse on the site in 2004 and sagebrush was not reseeded, but sagebrush has reestablished on the site with a large increase in density and cover in 2009 (Table - Browse Trends, Table - Browse Characteristics). Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) had begun to invade the site in moderate numbers, but were almost entirely removed by the fire (Table - Point-Quarter Tree Data). There was only one small juniper tree sampled by the point-quarter method in 2009.

Herbaceous Understory: Grasses are dominated by the introduced species crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*A. intermedium*) which were seeded after the fire. Native species are rare on the site. Cheatgrass (*Bromus tectorum*) is still common on the site, but has decreased in cover and frequency since the fire. Forbs are fairly diverse, but not very abundant on the site. Prior to the fire, silky lupine (*Lupinus sericeus*) and segolily (*Calochortus nuttallii*) were the dominant forb species. After the fire and reseeding, western yarrow (*Achillea millefolium*) and thorn skeletonplant (*Lygodesmia spinosa*) are now the dominant perennial forb species on the site (Table - Herbaceous Trends).

Soil: The soil is a fairly deep loam soil with an estimated effective rooting depth of over 15 inches and slightly alkaline pH (7.4). Bare ground cover has been fairly high since the fire in 2003 (Table - Basic Cover). There was very little rock or pavement on or near the soil surface, about 5-8%. Black sagebrush was present in small scattered patches on the site before the burn indicating that at least some rocky and/or shallow hardpan exists within the soil profile. Some active gullies were noted in 1999. The soil erosion condition classification was rated as slight in 2004, following the fire, due to litter movement, flow patterns, gullies, and rills. The erosion condition classification was rated as stable in 2009.

SEED MIX -- BLM BULLDOG FIRE (NON-WSA)
Management unit 15, study no. 13

Seed Type
Crested Wheatgrass, Hycrest
Pubescent Wheatgrass, Luna
Russian Wild Rye, Bozoisky
Tall Wheatgrass, Alkar
Indian Ricegrass, Rimrock
Alfalfa, Ladak
Lewis Flax, Appar
Fourwing Saltbush

Trend Assessments

Browse:

- **1987 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. Mountain big sagebrush decadence has increased to 29%, but vigor improved in the population. Recruitment of young sagebrush plants has remained good.
- **1994 to 1999 - stable (0):** Mountain big sagebrush density, cover, and recruitment are similar to the last reading, and decadence has decreased noticeably.
- **1999 to 2004 - down (-2):** This area burned in 2003 and was then seeded and chained. All of the mountain big sagebrush sampled on the site were young plants.
- **2004 to 2009 - up (+2):** The mountain big sagebrush population has rebounded well from the fire as density has increased four-fold to 2,240 plants/acre, and cover increased to over 6%. Recruitment of young sagebrush plants remained good.

Grass:

- **1987 to 1994 - stable (0)**: The sum of nested frequency of perennial grasses stayed similar to 1987 levels. There was a significant decrease in the nested frequency of Indian ricegrass (*Oryzopsis hymenoiedes*).
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial grasses decreased 33%, while the nested frequency of cheatgrass had a significant increase. Cheatgrass cover increased dramatically from 1% to 17%.
- **1999 to 2004 - up (+2):** After the fire, the sum of nested frequency for perennial grasses increased 19% and cover increased from 2% to 9%. Many of the grass species seeded after the fire have become established and are now the dominant grass species on the site. Cheatgrass decreased from 17% cover to 2% and with a significant decrease in nested frequency.
- **2004 to 2009 - up (+2)**: The sum of nested frequency for perennial grasses increased 37% and cover increased from to 13%. Cheatgrass nested frequency and cover remained at levels similar to 2004.

Forb:

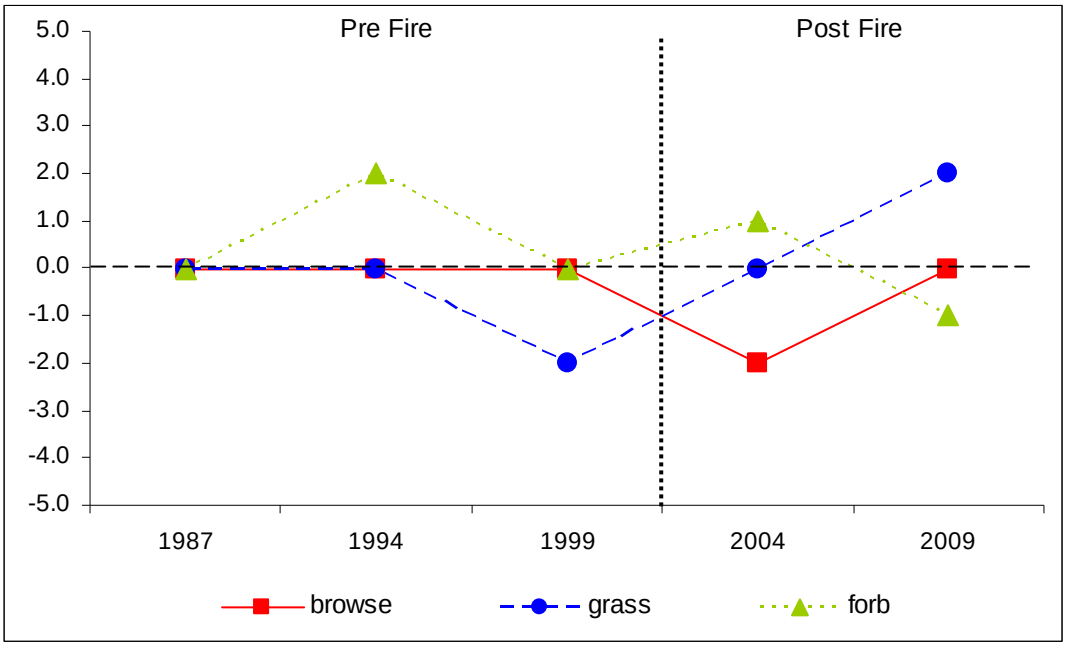
- **1987 to 1994 - up (+2):** The sum of nested frequency for perennial forbs increased 133%, mostly due to a significant increase in nested frequency of silky lupine and sego lily.
- **1994 to 1999 - down (-2):** The sum of nested frequency for perennial forbs decreased 43%, and cover decreased slightly. There was a significant decrease in the nested frequency of silky lupine.
- **1999 to 2004 – slightly up (+1):** After the fire, the sum of nested frequency for perennial forbs increased 21% and cover increased from 4% to 5%. Annual forbs increased from 0% cover to 6%. Much of the perennial forb cover is provided by species seeded after the fire including yarrow and alfalfa (*Medicago sativa*).
- **2004 to 2009 - down (-2):** Sum of nested frequency for perennial forbs is down 39%, and cover decreased to 4%. Annual forb frequency and cover also decreased. The seeded species, yarrow, is now the dominant forb on the site.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE -
Management unit 15, study no: 13

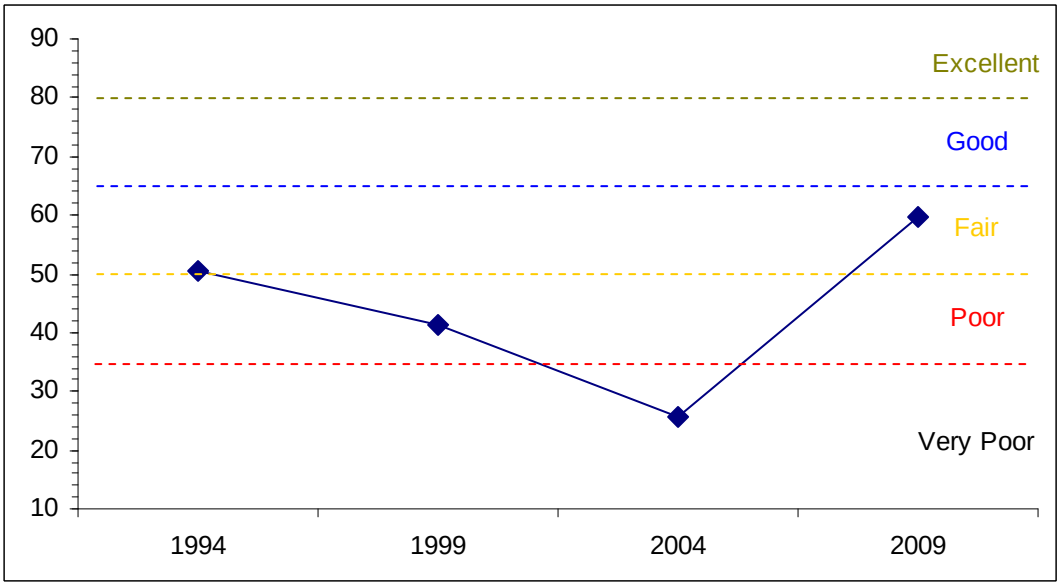
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
94	24.2	6.3	7.5	3.1	-0.6	10	0	**50.5**	Poor-Fair
99	24	11.5	6.9	4.3	-12.6	7.3	0	**41.3**	Poor
04	0.4	0	0	17.3	-1.6	9.6	0	**25.6**	Very poor
09	7.8	15	5.5	25.3	-1.6	7.5	0	**59.5**	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15 Study no: 13



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 15, Study no: 13



HERBACEOUS TRENDS--
Management unit 15, Study no: 13

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	a-	a-	a-	b75	c196	-	-	1.84	7.42
G	Agropyron intermedium	a-	a-	a-	b89	c146	-	-	2.33	3.64
G	Agropyron sp.	9	-	-	-	-	-	-	-	-
G	Agropyron spicatum	a-	a-	a-	a3	b17	-	.01	.00	.55
G	Agropyron trachycaulum	a-	a-	a-	c69	b16	-	-	1.83	.11
G	Bouteloua gracilis	-	4	3	3	7	.00	.00	.15	.21
G	Bromus carinatus	a-	a-	a-	c41	b11	-	-	.98	.06
G	Bromus tectorum (a)	-	b163	c326	a55	a54	.80	16.80	2.17	2.14
G	Dactylis glomerata	-	-	-	5	-	-	-	.18	-
G	Elymus junceus	a-	a-	a-	b18	c39	-	-	.45	.49
G	Hilaria jamesii	2	-	-	-	-	-	-	-	-
G	Oryzopsis hymenoides	b33	a13	ab16	a10	a6	.13	.17	.07	.09
G	Poa interior	-	4	2	-	-	.03	.00	-	-
G	Poa secunda	-	-	-	-	4	-	-	-	.00
G	Sitanion hystrix	c138	c138	b88	a13	a6	1.36	1.94	.75	.04
G	Stipa lettermani	-	6	1	-	-	.01	.03	-	-
Total for Annual Grasses		0	163	326	55	54	0.80	16.80	2.17	2.14
Total for Perennial Grasses		182	165	110	326	448	1.55	2.16	8.63	12.64
Total for Grasses		182	328	436	381	502	2.35	18.97	10.81	14.78
F	Achillea millefolium	a-	a-	a-	b22	b36	-	-	.77	1.92
F	Agastache sp.	-	-	-	-	-	-	-	-	.15
F	Astragalus sp.	-	-	-	3	1	-	.00	.01	.00
F	Calochortus nuttallii	a7	b54	b41	ab11	a-	.14	.29	.03	-
F	Castilleja linariaefolia	-	-	3	-	3	-	.41	-	.00
F	Chenopodium album (a)	-	-	-	2	-	-	-	.18	-
F	Chenopodium leptophyllum(a)	-	a-	a-	b17	a3	-	-	1.94	.00
F	Gayophytum ramosissimum(a)	-	ab9	a-	b17	a-	.02	-	.47	-
F	Ipomopsis aggregata	b11	a-	a-	a-	a-	-	-	-	-
F	Lappula occidentalis (a)	-	4	-	4	8	.01	-	.18	.04
F	Linum lewisii	a5	a3	a-	b17	a-	.00	-	.28	-
F	Lomatium sp.	-	3	6	-	3	.03	.06	-	.03
F	Lupinus sericeus	b58	c160	b71	a14	a7	4.92	2.67	.78	.57
F	Lygodesmia spinosa	a-	a-	a-	a8	b28	-	-	1.21	.61
F	Medicago sativa	-	-	-	8	3	-	-	.51	.03
F	Nicotiana attenuata (a)	-	a-	a-	b10	a-	-	-	.49	-
F	Penstemon comarrhenus	5	2	4	2	4	.00	.02	.15	.38
F	Penstemon sp.	-	-	-	-	-	-	-	.00	-
F	Phlox longifolia	ab12	a-	a5	b72	a-	-	.01	.83	-
F	Polygonum douglasii (a)	-	a-	a-	b33	a7	-	-	1.62	.01
F	Ranunculus testiculatus (a)	-	-	-	6	6	-	-	.01	.15
F	Solanum triflorum (a)	-	-	-	2	-	-	-	.89	-
F	Sphaeralcea coccinea	-	-	1	2	12	-	.15	.21	.05
F	Zigadenus paniculatus	-	6	-	-	-	.01	.01	-	-

Type	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
Total for Annual Forbs		0	13	0	91	24	0.02	0	5.80	0.21
Total for Perennial Forbs		98	228	131	159	97	5.11	3.63	4.80	3.77
Total for Forbs		98	241	131	250	121	5.14	3.63	10.60	3.99

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

BROWSE TRENDS--
Management unit 15, Study no: 13

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	2	2	0	1	.03	.00	-	.00
B	Artemisia nova	0	2	0	1	-	.41	-	.00
B	Artemisia tridentata vaseyana	93	89	15	49	19.32	18.78	.30	6.26
B	Atriplex canescens	0	0	2	1	-	-	.00	.00
B	Chrysothamnus viscidiflorus viscidiflorus	77	66	10	14	6.09	7.08	.26	.22
B	Juniperus osteosperma	0	5	0	0	4.61	7.52	-	-
B	Opuntia sp.	5	5	0	0	.00	.00	-	-
B	Pinus edulis	0	3	0	0	1.61	2.62	-	-
B	Quercus gambelii	0	0	1	1	-	-	.00	.00
B	Rosa woodsii	0	0	1	0	-	-	.00	-
B	Symphoricarpos oreophilus	10	7	1	2	.33	.18	.00	.18
Total for Browse		187	179	30	69	32.02	36.63	0.57	6.67

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 13

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	-	.03
Artemisia tridentata vaseyana	-	.11	5.76
Atriplex canescens	-	.18	-
Chrysothamnus viscidiflorus viscidiflorus	-	.08	.06
Juniperus osteosperma	3.79	-	-
Pinus edulis	3.40	-	-
Quercus gambelii	-	-	.53
Symphoricarpos oreophilus	-	.16	.01

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 13

Species	Average leader growth (in)
	'09
Amelanchier utahensis	2.0
Artemisia tridentata vaseyana	1.7

POINT-QUARTER TREE DATA--
Management unit 15, Study no: 13

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	29	<18	19	4.5	-	2.8
Pinus edulis	17	<18	<18	4.5	-	-

BASIC COVER--
Management unit 15, Study no: 13

Cover Type	Average Cover %				
	'87	'94	'99	'04	'09
Vegetation	7.25	40.99	53.78	20.81	27.87
Rock	.25	2.09	1.99	4.44	2.66
Pavement	2.00	.50	.99	3.35	6.24
Litter	62.75	32.65	39.14	10.51	19.11
Cryptogams	0	.18	.38	0	0
Bare Ground	27.75	25.28	24.26	68.29	55.54

SOIL ANALYSIS DATA --
Management unit 15, Study no: 13, Study Name: Sidehill Spring

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.4	7.3	37.6	37.8	24.6	2.1	13.6	252.8	0.6

PELLET GROUP DATA--
Management unit 15, Study no: 13

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	19	24	19	29	-	-	-
Elk	1	-	1	-	-	-	-
Deer	12	5	3	3	18 (44)	1 (3)	1 (3)
Bison/Cattle	-	2	-	42	25 (630	-	88 (217)

BROWSE CHARACTERISTICS--
Management unit 15, 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)
Amelanchier utahensis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**60**	0	100	-	-	33	0	0	17/143
99	**40**	0	100	-	-	0	0	0	48/44
04	**0**	0	0	-	-	0	0	0	25/48
09	**20**	0	100	-	-	0	0	0	26/37
Artemisia nova									
87	**1532**	48	52	-	1733	9	0	17	9/8
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	0	100	-	-	0	0	0	19/31
04	**0**	0	0	-	-	0	0	0	-/-
09	**20**	0	100	-	-	100	0	0	11/22
Artemisia tridentata vaseyana									
87	**4798**	47	50	3	466	26	0	17	20/19
94	**5600**	15	56	29	3020	2	.71	9	51/54
99	**5920**	14	74	12	240	2	0	6	24/36
04	**520**	100	0	0	1560	0	0	0	14/26
09	**2240**	11	89	0	-	12	0	.89	16/21
Atriplex canescens									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**60**	100	0	-	60	0	0	0	14/8
09	**20**	100	0	-	-	0	100	0	2/1
Cercocarpus montanus									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	12/9
09	**0**	0	0	-	-	0	0	0	5/15
Chrysothamnus viscidiflorus viscidiflorus									
87	**11332**	34	66	0	199	0	0	4	4/8
94	**8340**	9	90	1	3960	.47	.23	0	31/22
99	**11000**	13	87	1	200	0	0	.18	5/10
04	**340**	0	100	0	-	0	0	0	7/9
09	**440**	36	64	0	20	5	14	0	6/10

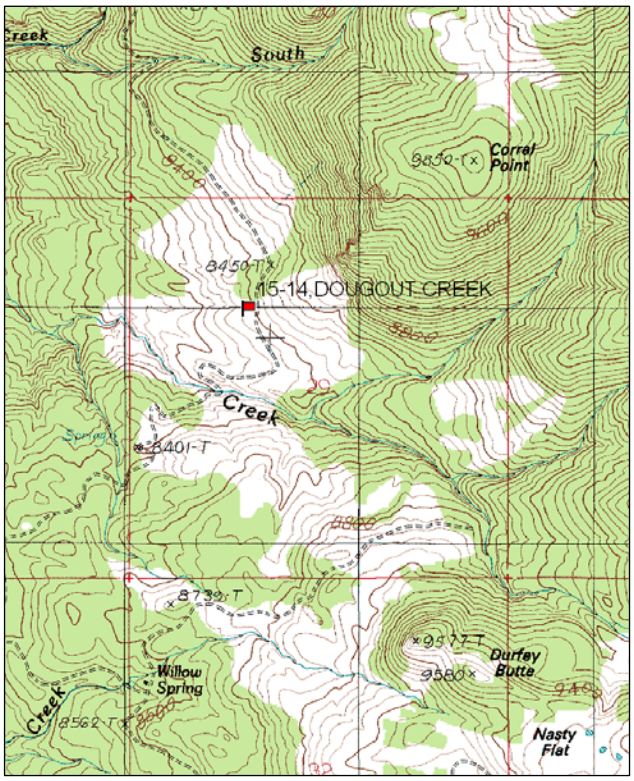
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
87	**865**	8	92	-	-	0	0	0	9/5
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Juniperus osteosperma									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**100**	0	100	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia sp.									
87	**132**	50	50	-	133	0	0	0	4/7
94	**200**	40	60	-	-	0	0	0	5/16
99	**100**	0	100	-	-	0	0	0	4/7
04	**0**	0	0	-	-	0	0	0	7/7
09	**0**	0	0	-	-	0	0	0	-/-
Pinus edulis									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**60**	33	67	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Quercus gambelii									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**40**	0	100	-	-	0	0	0	25/19
09	**20**	0	100	-	-	0	0	0	83/53
Rosa woodsii									
87	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	10/13
09	**0**	0	0	-	-	0	0	0	21/23
Symphoricarpos oreophilus									
87	**0**	0	0	0	-	0	0	0	-/-
94	**260**	15	69	15	20	15	0	0	9/46
99	**280**	57	43	0	-	0	0	0	17/24
04	**40**	0	100	0	-	0	0	100	15/36
09	**80**	0	100	0	20	100	0	0	8/15

DUGOUT CREEK - TREND STUDY NO. 15-14-09

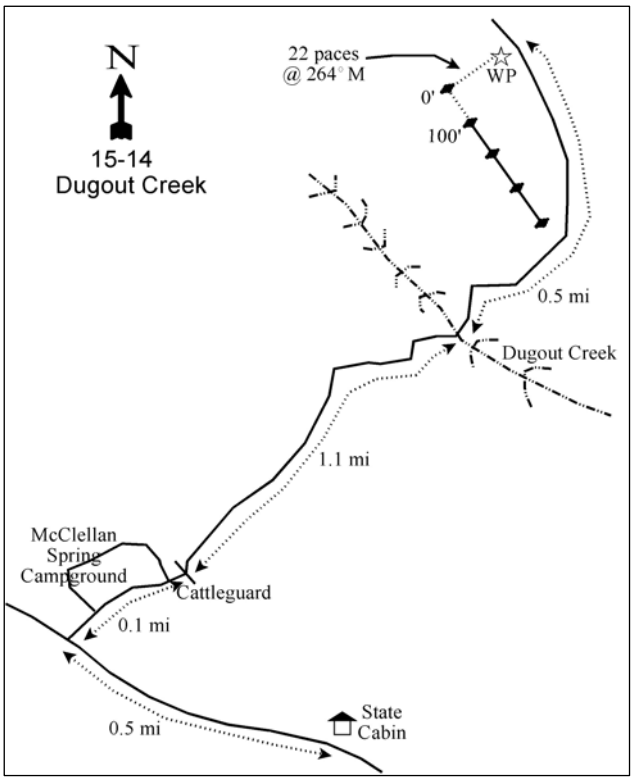
Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 8,300 ft (2,530 m)
Aspect: southeast
Slope: 10%-15%
Transect bearing: 140°M-lines 1-2; 145°M-line 3; 140°M-line 4
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:
From the DWR State Cabin travel north-west toward McClellan Spring for 0.5 miles. Turn right onto the road passing McClellan Spring Campground. Travel 0.1 miles to a cattleguard. Cross the cattleguard and continue 1.1 miles to Dugout Creek. Continue 0.5 miles past the creek to a witness post on the left hand side of the road. The beginning of the baseline is 22 paces from the witness post at 264°M. The 0-foot stake is marked with browse tag #153.

Map Name: Mount Ellen



Diagrammatic Sketch:



Township: 31S, Range: 10E, Section: 29

GPS: NAD 83, UTM 12S 514442 E 4215166 N

DUGOUT CREEK - TREND STUDY NO. 15-14

Site Information

Site Description: The study is located on a sagebrush flat that is surrounded by scattered pinyon pine (*Pinus edulis*), juniper (*Juniperus spp.*), and Gambel oak (*Quercus gambelii*). The northern end of the site is dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), but transitions to a black sagebrush (*A. nova*) community as you move south across the transect. The site lies within the Nasty Flat Cattle Allotment. Water is available for livestock and wildlife within one-quarter mile of the study site. Pellet group data for bison and cattle were combined due to difficulties in differentiating between these species. Pellet group data indicates light use by bison/cattle since 2004. Estimated deer use was moderately heavy in 2004 and very heavy in 2009 (Table - Pellet Group Data).

Browse: Mountain big sagebrush and black sagebrush are the key browse species in the area. These two species comprise the majority of the browse cover on the site (Table - Browse Trends). Both species populations are comprised of a good mixture of young and mature plants. Mountain big sagebrush density increased dramatically from 2004 to 2009, mostly due to a large increase of young plants. Decadence of black sagebrush is somewhat high, but improved from 2004 to 2009. Utilization of both mountain big and black sagebrush has been mostly light since 2004, with some moderate use of mountain big sagebrush in 2004 (Table - Browse Characteristics).

Other preferred browse species sampled were Utah serviceberry (*Amelanchier utahensis*) and Gambel oak Serviceberry is an important species, but is not very abundant and Gambel oak shows little to no use. Pinyon pine, Utah juniper (*Juniperus osteosperma*), Rocky Mountain juniper (*J. scopulorum*), and limber pine (*Pinus flexilis*) are present in low cover and abundance (Table - Browse Trends, Table - Browse Characteristics).

Herbaceous Understory: The grasses on the site fairly abundant, but not very diverse. Slender wheatgrass (*Agropyron trachycaulum*) is the dominant perennial grass on the site occurring in the greatest frequency and cover. However, cheatgrass (*Bromus tectorum*) is also present on the site, but has decreased significantly in nested frequency and decreased in cover since 2004. Other common perennial grasses include mutton bluegrass (*Poa fendleriana*) and bottlebrush squirreltail (*Sitanion hystrix*). Forbs are fairly diverse on the site, but not very abundant. The dominant forbs in cover and frequency on the site are dandelion (*Taraxacum officinale*), false dandelion (*Agoseris glauca*), and hoary aster (*Machaeranthera canescens*) (Table - Herbaceous Trends).

Soil: The soil is brown, clay loam with a neutral pH and a fairly deep effective rooting depth (Table - Soil Analysis Data). Protective cover is provided by good vegetation and litter cover which keeps bare ground cover low (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009. Some of the steeper slopes surrounding the site show more erosion.

Trend Assessments

Browse:

- **2004 to 2009 - up (+2):** There was a three-fold increase in the density of mountain big sagebrush, though most of this increase is due to a large increase in young plants. The density of mature mountain big sagebrush increased 55% from 2,300 mature plants/acre to 3,580 mature plants/acre. The density of black sagebrush increased 23%, also primarily due to a large increase in young plants. There was little change in the density of mature black sagebrush plants, though decadent plants decreased. Density of serviceberry also increased due to an increase in young plants.

Grass:

- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased by 15% and cover increased from 4% to 9%. There was a significant decrease in the nested frequency of cheatgrass and cover decreased from 10% to 1%. There was a significant increase in the nested frequency of slender wheatgrass.

Forb:

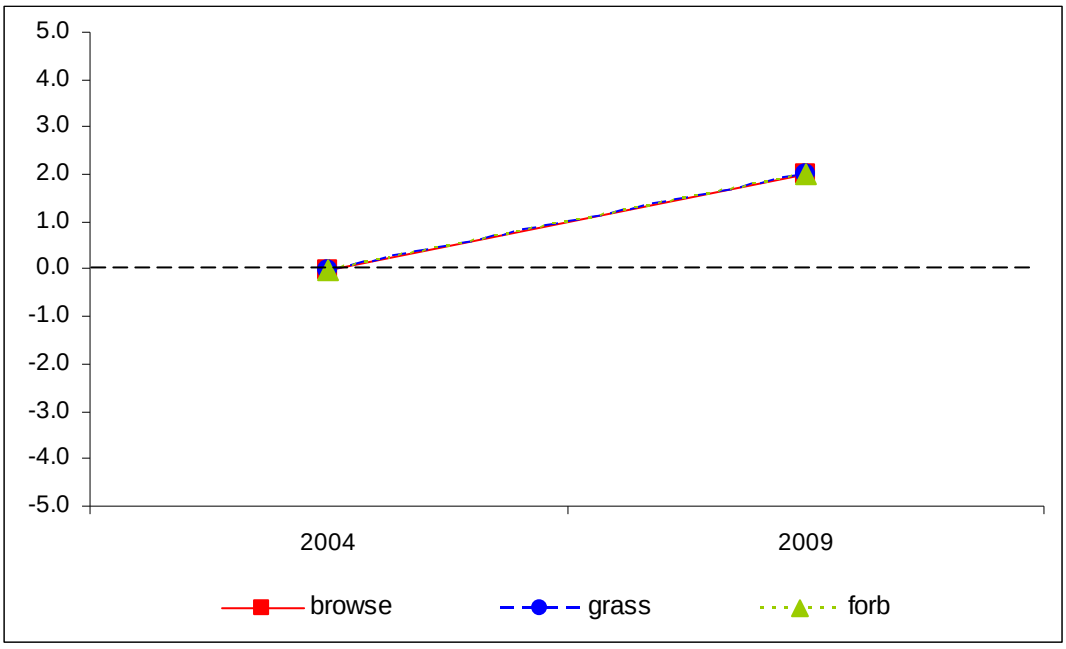
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased by 56% and cover increased from 2% to 5%. There was a significant increase in the nested frequency of many important perennial forb species.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 15, study no: 14

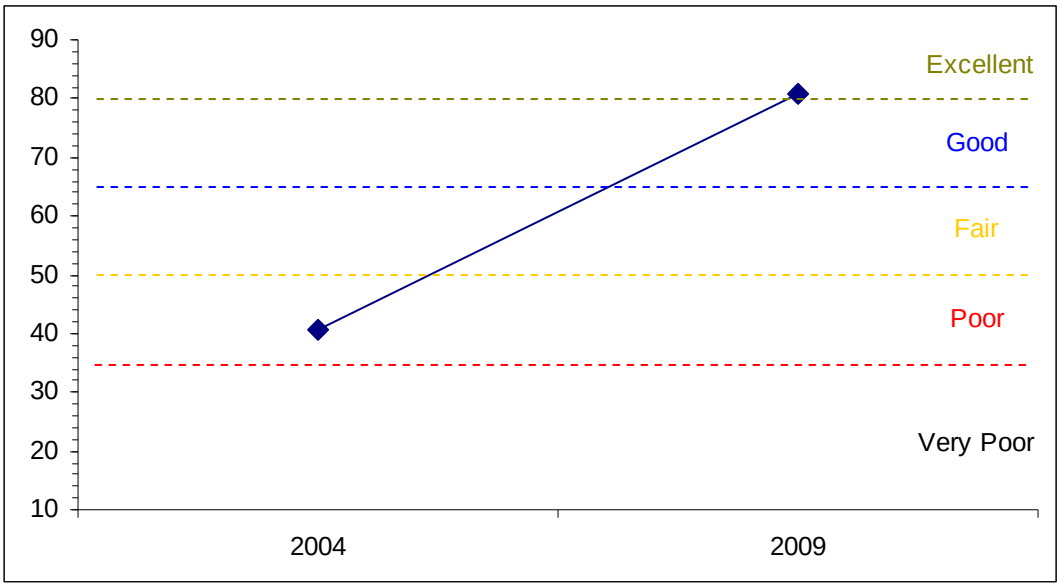
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
04	28.4	5.6	1.6	7.8	-7.4	4.6	0.0	**40.6**	Poor
09	27.7	11.1	15.0	18.4	-1.1	9.6	0.0	**80.8**	Good-Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 15, Study no: 14



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 15, Study no: 14



HERBACEOUS TRENDS--
Management unit 15, Study no: 14

Type	Species	Nested Frequency '04	Nested Frequency '09	Average Cover % '04	Average Cover % '09
G	Agropyron trachycaulum	$_{a}$48	$_{b}$95	1.36	6.28
G	Bouteloua gracilis	-	5	-	.15
G	Bromus tectorum (a)	$_{b}$271	$_{a}$108	9.84	1.40
G	Oryzopsis hymenoides	1	9	.00	.09
G	Poa fendleriana	45	41	1.32	1.02
G	Poa pratensis	2	-	.03	-
G	Poa secunda	$_{a}$3	$_{b}$8	.03	.18
G	Sitanion hystrix	$_{b}$53	$_{a}$29	.85	.54
G	Stipa lettermani	19	10	.30	.93
Total for Annual Grasses		271	108	9.84	1.40
Total for Perennial Grasses		171	197	3.90	9.22
Total for Grasses		442	305	13.75	10.63
F	Agoseris glauca	$_{a}$12	$_{b}$30	.04	.60
F	Antennaria rosea	$_{a}$4	$_{b}$12	.18	.33
F	Arabis sp.	1	2	.00	.00
F	Aster sp.	6	5	.03	.16
F	Calochortus nuttallii	$_{a}$10	$_{b}$41	.03	.14
F	Castilleja linariaefolia	7	13	.07	.13
F	Cirsium sp.	1	1	.03	.15
F	Crepis acuminata	$_{b}$48	$_{a}$21	.58	.32
F	Cymopterus sp.	12	11	.04	.20
F	Erigeron eatonii	38	50	.68	.98
F	Gayophytum ramosissimum(a)	8	-	.06	-
F	Ipomopsis aggregata	4	7	.04	.07

Type	Species	Nested Frequency '04	Nested Frequency '09	Average Cover % '04	Average Cover % '09
F	Lappula occidentalis (a)	$_{b}$39	$_{a}$3	.22	.00
F	Lomatium sp.	5	7	.03	.04
F	Machaeranthera canescens	$_{a}$4	$_{b}$21	.01	.11
F	Penstemon sp.	-	3	-	.01
F	Phlox longifolia	21	12	.13	.03
F	Polygonum douglasii (a)	$_{b}$66	$_{a}$30	.20	.05
F	Sanguisorba minor	-	1	-	.00
F	Senecio multilobatus	1	1	.00	.01
F	Taraxacum officinale	$_{a}$8	$_{b}$35	.31	1.19
F	Tragopogon dubius	$_{a}$5	$_{b}$18	.06	.30
Total for Annual Forbs		113	33	0.49	0.05
Total for Perennial Forbs		187	291	2.32	4.80
Total for Forbs		300	324	2.81	4.86

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

BROWSE TRENDS--
Management unit 15, Study no: 14

Type	Species	Strip Frequency '04	Strip Frequency '09	Average Cover % '04	Average Cover % '09
B	Amelanchier utahensis	3	4	.03	.03
B	Artemisia nova	37	40	7.15	6.00
B	Artemisia tridentata vaseyana	56	64	14.93	15.54
B	Cercocarpus montanus	0	0	-	-
B	Chrysothamnus depressus	1	1	-	-
B	Chrysothamnus nauseosus graveolens	8	8	1.01	1.91
B	Ephedra viridis	0	0	-	-
B	Gutierrezia sarothrae	25	30	1.14	.67
B	Juniperus osteosperma	1	1	.85	3.44
B	Juniperus scopulorum	0	1	3.77	1.82
B	Opuntia sp.	1	1	-	.03
B	Pinus edulis	1	1	1.00	.66
B	Pinus flexilis	1	1	.85	.85
B	Quercus gambelii	4	4	.76	.76
B	Ribes sp.	0	0	-	-
B	Symphoricarpos oreophilus	0	0	-	-
Total for Browse		138	156	31.52	31.76

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 14

Species	Percent Cover	
	'04	'09
Amelanchier utahensis	.36	.60
Artemisia nova	5.98	6.81
Artemisia tridentata vaseyana	15.30	14.94
Chrysothamnus nauseosus graveolens	1.11	1.31
Ephedra viridis	-	.06
Gutierrezia sarothrae	.51	.68
Juniperus osteosperma	1.08	4.40
Juniperus scopulorum	4.59	1.81
Pinus edulis	1.60	2.08
Pinus flexilis	1.26	1.50
Quercus gambelii	.90	.50

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 14

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	-	2.0
Artemisia tridentata vaseyana	1.4	2.0

BASIC COVER--
Management unit 15, Study no: 14

Cover Type	Average Cover %	
	'04	'09
Vegetation	48.49	46.56
Rock	11.46	13.25
Pavement	3.27	2.23
Litter	46.51	42.74
Cryptogams	.03	.55
Bare Ground	12.10	14.48

SOIL ANALYSIS DATA --
Management unit 15, Study no: 14, Study Name: Dugout Creek

Effective rooting depth (in)	pH	clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10.5	7.2	28.3	32.2	39.5	2.1	14	361.6	0.5

PELLET GROUP DATA--
Management unit 15, Study no: 14

Type	Quadrat Frequency '04	Quadrat Frequency '09	Days use per acre (ha) '04	Days use per acre (ha) '09
Rabbit	11	17	-	-
Deer	8	34	42 (103)	104 (258)
Bison/Cattle	7	2	12 (29)	2 (5)
Elk	-	-	-	1 (2)

BROWSE CHARACTERISTICS--
Management unit 15, 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									
04	**60**	0	100	-	-	67	0	0	29/35
09	**200**	60	40	-	40	20	0	0	41/42
Artemisia nova									
04	**2880**	8	56	36	460	8	0	9	12/24
09	**3540**	30	47	23	180	8	.56	6	10/23
Artemisia tridentata vaseyana									
04	**3340**	0	69	31	10080	44	0	13	26/35
09	**13260**	63	27	10	2620	3	0	7	18/27
Cercocarpus montanus									
04	**0**	0	0	-	-	0	0	0	36/45
09	**0**	0	0	-	-	0	0	0	58/53
Chrysothamnus depressus									
04	**20**	0	100	-	-	0	0	0	6/10
09	**20**	0	100	-	-	100	0	0	4/9
Chrysothamnus nauseosus graveolens									
04	**260**	0	54	46	20	0	0	15	34/39
09	**220**	0	73	27	20	9	0	27	27/33
Ephedra viridis									
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	17/12
Gutierrezia sarothrae									
04	**1180**	15	83	2	60	8	0	0	7/9
09	**2260**	25	73	2	80	0	0	2	5/8
Juniperus osteosperma									
04	**20**	0	100	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-
Juniperus scopulorum									
04	**0**	0	0	-	-	0	0	0	-/-
09	**20**	0	100	-	60	0	0	0	-/-

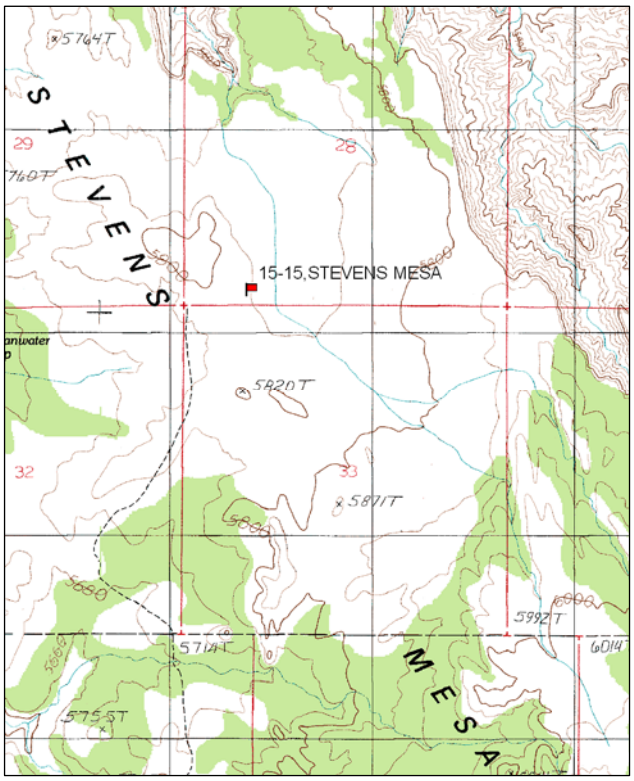
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
04	**20**	100	0	-	-	0	0	0	4/18
09	**40**	0	100	-	-	0	0	0	5/12
Pinus edulis									
04	**20**	100	0	-	60	0	0	0	-/-
09	**20**	0	100	-	40	0	0	0	-/-
Pinus flexilis									
04	**20**	0	100	-	-	0	0	0	-/-
09	**20**	0	100	-	-	0	0	0	-/-
Quercus gambelii									
04	**420**	19	81	-	-	0	0	0	45/22
09	**740**	19	81	-	-	59	30	0	50/29
Ribes sp.									
04	**0**	0	0	-	-	0	0	0	61/56
09	**0**	0	0	-	-	0	0	0	58/96
Symphoricarpos oreophilus									
04	**0**	0	0	-	-	0	0	0	20/44
09	**0**	0	0	-	-	0	0	0	19/40

STEVEN'S MESA - TREND STUDY NO. 15-15-09

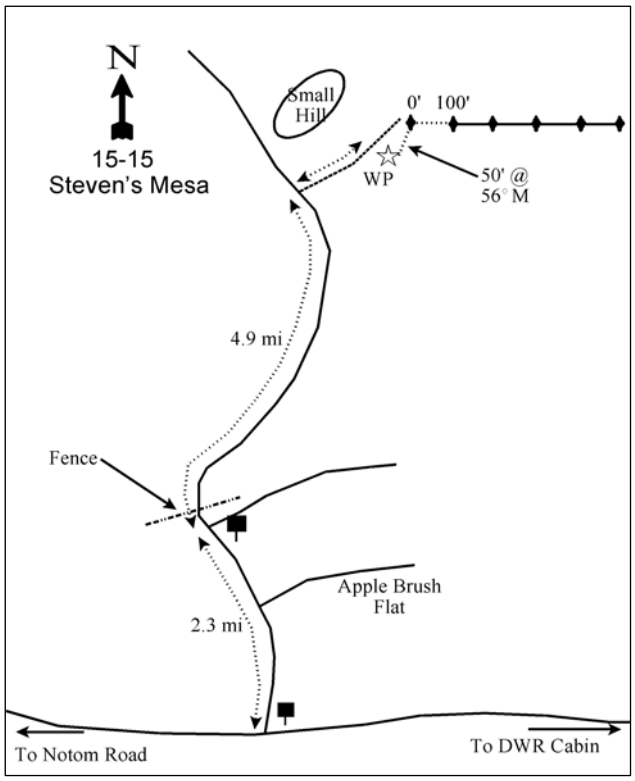
Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Crucial Bison Year-Long
NRCS Ecological Site Description: Semidesert Sandy Loam (Four-Wing Saltbush), R035XY215UT
Land Ownership: BLM
Elevation: 5,800 ft (1,768 m)
Aspect: east
Slope: 1%-2%
Transect bearing: 86 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:
On the road between Notom Road and the DWR State Cabin look for a sign for the turnoff to Stevens Mesa and Apple Brush Flat. Take this turnoff and travel north for 2.3 miles to a fork with a sign for Stevens Mesa and Cedar Creek Bench. Stay to the left passing through a fence and continue 4.9 miles to a very faint 2-track. Take a right onto the 2-track and travel 0.2 miles to a witness post on the right side of the road. The 0-foot stake is 50 feet from the witness post at 56°M and is marked with browse tag #139.

Map Name: Stevens Mesa



Diagrammatic Sketch:



Township: 30S, Range: 9E, Section: 28

GPS: NAD 83, UTM 12S 504317 E 4224385 N

STEVENS MESA - TREND STUDY NO. 15-15

Site Information

Site Description: The study was established in 2004 and is located on a lower elevation gently sloping mesa to the north and west of Mt. Ellen. The site was located on this mesa to monitor use by bison on this winter allotment. This is a very arid site with little available water nearby. Pellet group data for bison and cattle were combined due to the difficulty in differentiating between these species. Bison/cattle was estimated to be light in 2004, but increased to more moderate use in 2009. Deer use has been minimal on the site since 2004. The amount of rabbit droppings was very high on site with high quadrat frequency (Table - Pellet Group Data).

Browse: Four-wing saltbush (*Atriplex canescens*) is the primary preferred browse species on this site. Saltbush has decreased in cover and density and is fairly rare on the site. Use of saltbush has been mostly light, with some heavy use since 2004. The remainder of the browse cover is made up almost entirely of two less desirable species, narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) and broom snakeweed (*Gutierrezia sarothrae*). Both of these two species has shown an increase in density, but a decrease in cover since 2004 (Table - Browse Trends, Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is sparse. The grass component is comprised of three native species, galleta (*Hilaria jamesii*), Indian ricegrass (*Oryzopsis hymenoides*), and sand dropseed (*Sporobolus cryptandrus*). Galleta is the most abundant grass. The forb component on this site is provided almost entirely by annual species with little value.

Soil: The soil is a sandy loam with few rocks, is slightly alkaline pH (7.4), and has relatively low amounts of organic matter (Table - Soil Analysis Data). The soil is loose and easily transported by wind. There is a high amount of bare ground cover on the site (Table - Basic Cover), and there is a high amount of wind erosion on this site. The soil erosion condition classification was rated as stable in 2004 and 2009, with some surface litter movement noted in 2009.

Trend Assessments

Browse:

- **2004 to 2009 - down (-2):** Browse species are rare on this site and the preferred browse species, fourwing saltbush, decreased in density by 62% to 340 plants/acre. Cover of fourwing saltbush also decreased from 3% to less than 1%. Saltbush decadence and plants displaying poor vigor increased substantially. The other less desirable browse species, stickyleaf low rabbitbrush and broom snakeweed, both increased in density, but decreased in cover.

Grass:

- **2004 to 2009 - stable (0):** The sum of nested frequency for perennial grass species is similar to 2004 levels while cover has nearly doubled from 1% to 2%. There was a significant increase in nested frequency of galleta, and a significant decrease in nested frequency of Indian ricegrass and sand dropseed.

Forb:

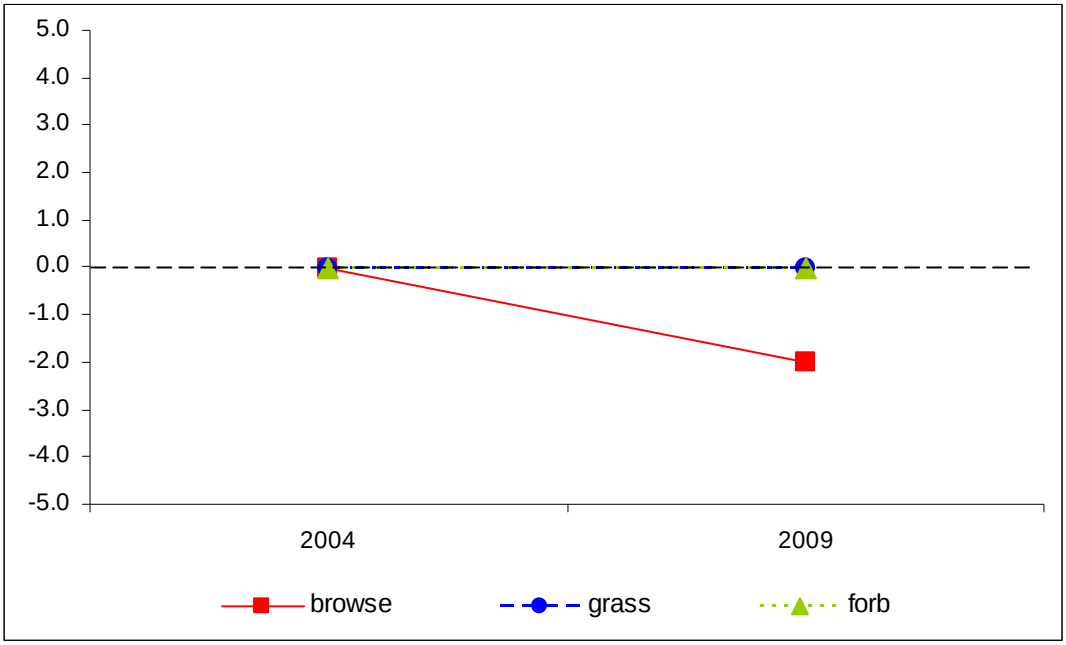
- **2004 to 2009 - stable (0):** The sum of nested frequency for perennial forbs has increased greatly, but perennial forbs are a minor component in the community. Weedy annual forbs have decreased from 8% to 1% cover and nested frequency of annual forbs has decreased 62%.

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

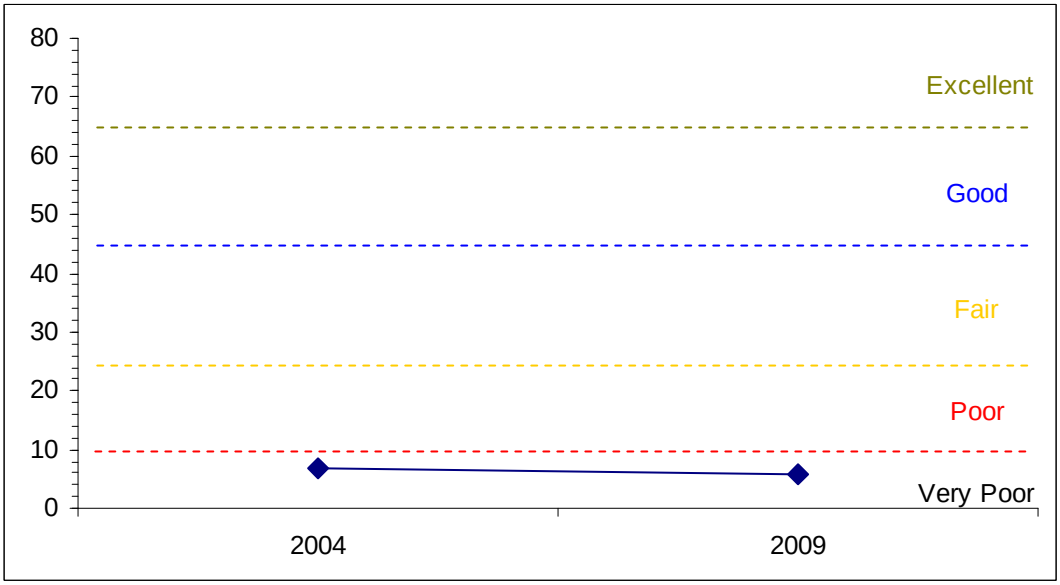
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
04	4	0	0	2.7	0	0.1	0	**6.8**	Very Poor
09	0.4	0	0	5.1	0	0.5	0	**6.0**	Very Poor

Trend Summary

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



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



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

Type	Species	Nested Frequency '04	Nested Frequency '09	Average Cover % '04	Average Cover % '09
G	Bouteloua gracilis	3	-	.15	-
G	Hilaria jamesii	$_{a}$52	$_{b}$95	.64	2.42
G	Oryzopsis hymenoides	$_{b}$24	$_{a}$14	.26	.08
G	Sporobolus cryptandrus	$_{b}$30	$_{a}$4	.28	.04
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		109	113	1.33	2.54
Total for Grasses		109	113	1.33	2.54
F	Astragalus sp.	-	2	-	.01
F	Gilia sp. (a)	$_{b}$39	$_{a}$4	.42	.12
F	Halogeton glomeratus (a)	-	1	-	.03
F	Helianthus annuus (a)	2	9	.18	.02
F	Lappula occidentalis (a)	$_{b}$12	$_{a}$1	.11	.00
F	Mentzelia albicaulis (a)	$_{b}$122	$_{a}$6	5.01	.13
F	Oenothera pallida	-	1	-	.03
F	Plantago patagonica (a)	4	3	.01	.00
F	Salsola iberica (a)	$_{a}$31	$_{b}$55	1.78	1.02
F	Sphaeralcea grossulariifolia	$_{a}$9	$_{b}$76	.07	.21
F	Townsendia sp.	2	-	.00	-
Total for Annual Forbs		210	79	7.53	1.33
Total for Perennial Forbs		11	79	0.07	0.25
Total for Forbs		221	158	7.61	1.59

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

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

Type	Species	Strip Frequency '04	Strip Frequency '09	Average Cover % '04	Average Cover % '09
B	Atriplex canescens	28	14	3.17	.15
B	Chrysothamnus viscidiflorus stenophyllus	62	60	9.12	4.01
B	Ephedra viridis	2	3	.00	.15
B	Gutierrezia sarothrae	71	80	4.70	1.64
B	Opuntia sp.	0	1	-	.00
Total for Browse		163	158	16.99	5.96

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

Species	Percent Cover '04	'09
Atriplex canescens	3.29	.10
Chrysothamnus viscidiflorus stenophyllus	8.28	2.36
Ephedra viridis	.33	-
Gutierrezia sarothrae	6.33	1.86

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

Species	Average leader growth (in) '04	'09
Atriplex canescens	8.2	2.3

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

Cover Type	Average Cover % '04	'09
Vegetation	25.42	9.63
Rock	.02	.05
Pavement	5.69	6.61
Litter	8.71	27.32
Bare Ground	72.12	59.29

SOIL ANALYSIS DATA --
Management unit 15, Study no: 15, Study Name: Steven's Mesa

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
9.3	7.4	63.6	13.8	22.6	0.7	10.9	185.6	0.5

PELLET GROUP DATA--
Management unit 15, Study no: 15

Type	Quadrat Frequency '04	'09	Days use per acre (ha) '04	'09
Rabbit	47	81	-	-
Deer	-	22	-	1 (3)
Bison/Cattle	6	3	2 (5)	17 (43)

BROWSE CHARACTERISTICS--
Management unit 15, Study no: 15

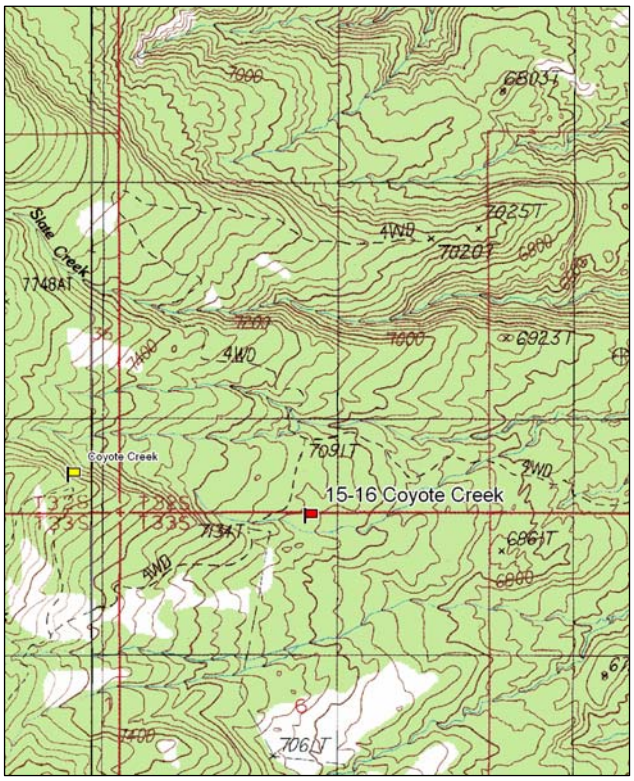
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Atriplex canescens									
04	**900**	11	71	18	-	13	7	16	25/29
09	**340**	12	6	82	-	6	12	65	27/25
Chrysothamnus viscidiflorus stenophyllus									
04	**4220**	0	96	4	-	0	0	.47	10/15
09	**6520**	13	79	8	120	0	0	6	7/12
Ephedra viridis									
04	**40**	0	100	0	-	0	0	0	8/9
09	**240**	50	42	8	-	0	0	0	7/10
Gutierrezia sarothrae									
04	**4720**	3	95	2	-	0	0	.84	7/9
09	**9560**	30	64	5	180	0	0	3	5/7
Opuntia sp.									
04	**0**	0	0	-	-	0	0	0	4/12
09	**20**	0	100	-	-	0	0	0	6/19

COYOTE SPRING - TREND STUDY NO. 15-16-09

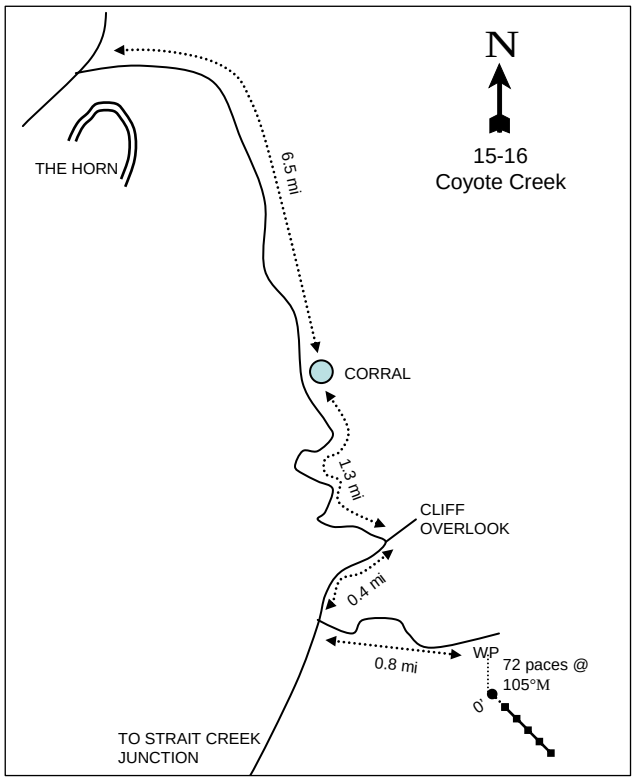
Vegetation Type: Burned P-J
Range Type: Crucial Deer Winter, Crucial Bison Year-Long
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 7,060 ft (2,152 m)
Aspect: east
Slope: 9%
Transect bearing: 55 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:
From Pennellen Pass, go east on the Coyote Spring road around The Horn towards Mud Spring and the Strait Creek Junction for 6.5 miles to a corral on the left (east) side of the road. Continue on the road for 1.3 miles to a fork with a faint road towards the cliff overlook. Stay right on the main road and proceed 0.4 miles to another fork with a faint road. Go left on this road for 0.8 miles to a witness post on the right (south) side of the road. The 0 foot stake is about 70 paces from the witness post at a bearing of 105°M.

Map Name: Cass Creek Peak



Diagrammatic Sketch:



Township: 33S, Range: 11E, Section: 6

GPS: NAD 83, UTM 12S 522802 E 4202759 N

COYOTE SPRING - TREND STUDY NO. 15-16

Site Information

Site Description: The study is located in the foothills on the east side of Mt. Pennell. The area was a pinyon/juniper/oak community, but burned in the Bulldog Fire in 2003 and was subsequently reseeded (Table - Seed Mix). The community is now dominated by seeded grass species. Pellet group data for bison and cattle were combined due to difficulties in distinguishing between these species. Bison/cattle use was estimated to be fairly heavy on the site. Deer and elk use was estimated to be light to minimal (Table - Pellet Group Data).

Browse: Browse species are not abundant on this site. The two preferred browse species Utah serviceberry (*Amelanchier utahensis*) and fourwing saltbush (*Atriplex canescens*) provide the majority of the browse cover on the site (Table - Browse Trends).

Herbaceous Understory: Grass cover on the site is provided almost entirely by seeded perennial species. Crested wheatgrass (*Agropyron cristatum*) is the dominant grass species. Bluebunch wheatgrass (*Agropyron spicatum*) is the dominant native species on the site. The forb component on the site is comprised almost entirely by the seeded species alfalfa (*Medicago sativa*) (Table - Herbaceous Trends).

Soil: The soil is a sandy clay loam with a neutral pH (6.84) (Table - Soil Analysis Data) and a very rocky profile. Bare ground cover is moderately low on the site with ample vegetation, litter, and rock cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2009.

SEED MIX -- BLM BULLDOG FIRE (NON-WSA)
Management unit 15, study no. 16

Seed Type
Crested Wheatgrass, Hycrest
Pubescent Wheatgrass, Luna
Russian Wild Rye, Bozoisky
Tall Wheatgrass, Alkar
Indian Ricegrass, Rimrock
Alfalfa, Ladak
Lewis Flax, Appar
Fourwing Saltbush

Trend Assessments

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 15, 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
09	0.5	0.0	0.0	30.0	0.0	2.8	0.0	**33.2**	Fair

Trend Summary

HERBACEOUS TRENDS--
Management unit 15, Study no: 16

Type	Species	Nested Frequency '09	Average Cover % '09
G	Agropyron cristatum	200	9.25
G	Agropyron intermedium	119	4.75
G	Agropyron spicatum	52	3.05
G	Agropyron trachycaulum	63	3.31
G	Bromus tectorum (a)	9	.02
G	Elymus junceus	96	3.94
G	Oryzopsis hymenoides	5	.39
Total for Annual Grasses		9	0.01
Total for Perennial Grasses		535	24.72
Total for Grasses		544	24.75
F	Achillea millefolium	-	.00
F	Astragalus sp.	5	.22
F	Chenopodium leptophyllum(a)	8	.02
F	Linum lewisii	1	.00
F	Medicago sativa	15	1.07
F	Phlox longifolia	2	.00
F	Sphaeralcea coccinea	8	.07
Total for Annual Forbs		8	0.01
Total for Perennial Forbs		31	1.38
Total for Forbs		39	1.40

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

BROWSE TRENDS--
Management unit 15, Study no: 16

Type	Species	Strip Frequency '09	Average Cover % '09
B	Amelanchier utahensis	1	.15
B	Atriplex canescens	7	.21
B	Cercocarpus montanus	1	.00
B	Chrysothamnus nauseosus	1	.03
Total for Browse		10	0.39

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 16

Species	Percent Cover '09
Atriplex canescens	.20
Chrysothamnus nauseosus	.31

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 15, Study no: 16

Species	Average leader growth (in) '09
Amelanchier utahensis	2.6
Atriplex canescens	2.9

BASIC COVER--
Management unit 15, Study no: 16

Cover Type	Average Cover % '09
Vegetation	29.91
Rock	21.67
Pavement	2.83
Litter	35.45
Bare Ground	22.32

SOIL ANALYSIS DATA --
Management unit 15, Study no: 16, Study Name: Coyote Spring

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
	6.8	47.44	26.72	25.8	2.65	22.17	172.8	0.88

PELLET GROUP DATA--
Management unit 15, Study no: 16

Type	Quadrat Frequency '09	Days use per acre (ha) '09
Rabbit	15	-
Elk	-	1 (3)
Deer	6	4 (10)
Bison/Cattle	13	46 (115)

BROWSE CHARACTERISTICS--
Management unit 15, Study no: 16

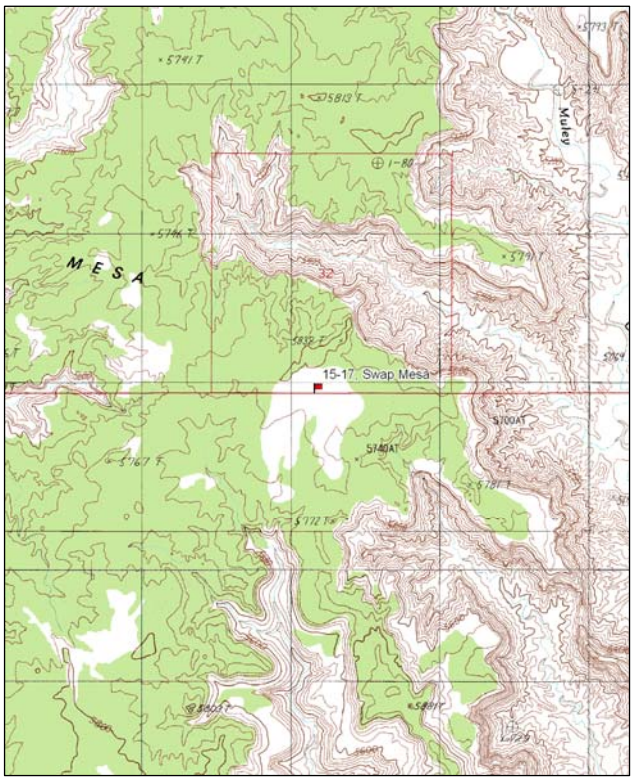
		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
09	**40**	0	100	-	-	0	100	0	29/40
Artemisia tridentata wyomingensis									
09	**0**	0	0	-	-	0	0	0	11/13
Atriplex canescens									
09	**260**	15	38	46	-	8	69	15	14/17
Cercocarpus montanus									
09	**20**	0	100	-	-	0	100	0	22/25
Chrysothamnus nauseosus									
09	**20**	0	100	-	-	0	0	0	23/27
Chrysothamnus viscidiflorus									
09	**0**	0	0	-	-	0	0	0	19/31
Gutierrezia sarothrae									
09	**0**	0	0	-	-	0	0	0	8/16

SWAP MESA - TREND STUDY NO. 15-17-09

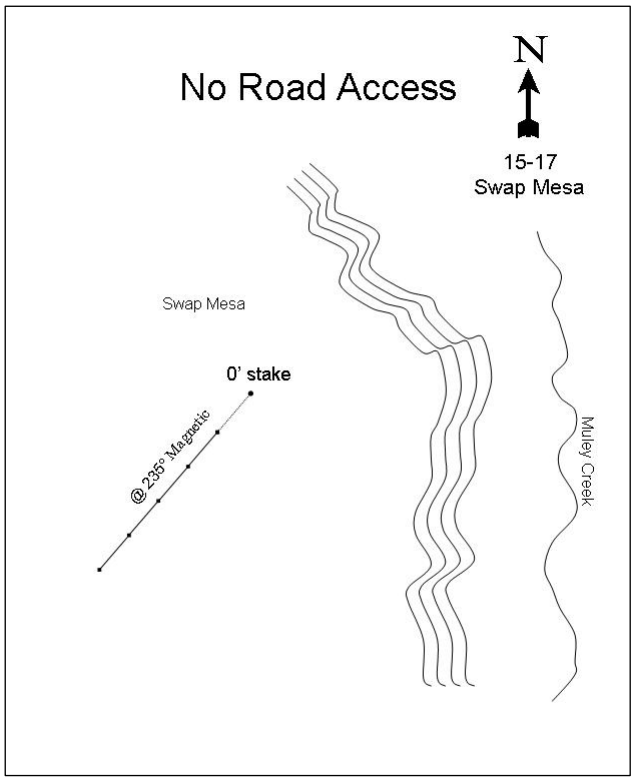
Vegetation Type: Desert Shrub
Range Type: Crucial Deer Winter, Crucial Bison Year-Long
NRCS Ecological Site Description: Semidesert Sandy Loam (Four-Wing Saltbush), R035XY215UT
Land Ownership: BLM
Elevation: 5,760 ft (1,756 m)
Aspect: south
Slope: 2%-5%
Transect bearing: 235 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:
No road access.

Map Name: Cave Flat



Diagrammatic Sketch:



Township: 33S, Range: 9E, Section: 32

GPS: NAD 83, 12S 505099 E 419136 N

SWAP MESA - TREND STUDY NO. 15-17

Site Information

Site Description: The study is located in a remote area to the west of Mt. Pennell on Swap Mesa. The transect samples an open meadow on Swap Mesa. It appears that the area had burned sometime in the distant past. The study was established to monitor bison use in this remote region. Pellet group data estimated bison use to be moderately heavy on the site (Table - Pellet Group Data).

Browse: Most of the browse cover is provided by the less desirable species broom snake weed (*Gutierrezia sarothrae*) (Table - Browse Trends). The preferred browse species fourwing saltbush (*Atriplex canescens*) is also found scattered over the site in low densities with only about 1% cover. Saltbush has mostly heavy to moderate use on the site (Table - Browse Characteristics).

Herbaceous Understory: The grasses on this site are quite diverse and mostly made up of warm season species. The dominant grass is the native species galleta (*Hilaria jamesii*). Forbs are not very diverse and provide little cover on the site. The dominant forb on the site is gooseberryleaf globemallow (*Sphaeralcea grossulariifolia*).

Soil: The soil is a sandy loam with a neutral pH (7.26) (Table - Soil Analysis Data). Bare ground cover is very high on the site with very little protective soil cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2009.

Trend Assessments

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 15, 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
09	1.2	0.0	0.0	21.5	-0.2	3.6	0.0	**26.1**	Poor-Fair

Trend Summary

HERBACEOUS TRENDS--
Management unit 15, Study no: 17

Type	Species	Nested Frequency '09	Average Cover % '09
G	Aristida purpurea	10	.07
G	Bouteloua gracilis	7	.16
G	Bromus tectorum (a)	76	.24
G	Hilaria jamesii	153	8.73
G	Oryzopsis hymenoides	27	.37
G	Sporobolus cryptandrus	69	1.38
G	Sporobolus giganteus	1	.00
G	Vulpia octoflora (a)	4	.01
Total for Annual Grasses		80	0.25
Total for Perennial Grasses		267	10.73
Total for Grasses		347	10.99
F	Astragalus sp.	4	.03

Type	Species	Nested Frequency '09	Average Cover % '09
F	Astragalus sp.	5	.01
F	Chenopodium fremontii (a)	30	.08
F	Eriogonum cernuum (a)	3	.00
F	Lepidium sp. (a)	2	.00
F	Navarretia intertexta (a)	68	.27
F	Salsola iberica (a)	89	.41
F	Sphaeralcea coccinea	1	.00
F	Sphaeralcea grossulariifolia	91	1.77
Total for Annual Forbs		192	0.77
Total for Perennial Forbs		101	1.81
Total for Forbs		293	2.59

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

BROWSE TRENDS--
Management unit 15, Study no: 17

Type	Species	Strip Frequency '09	Average Cover % '09
B	Atriplex canescens	7	.98
B	Ceratoides lanata	1	.00
B	Gutierrezia sarothrae	74	6.01
B	Opuntia sp.	7	.07
Total for Browse		89	7.07

CANOPY COVER, LINE INTERCEPT--
Management unit 15, Study no: 17

Species	Percent Cover '09
Atriplex canescens	1.31
Gutierrezia sarothrae	5.00
Opuntia sp.	.28

BASIC COVER--
Management unit 15, Study no: 17

Cover Type	Average Cover % '09
Vegetation	20.22
Rock	.02
Pavement	.21
Litter	15.19
Cryptogams	.12
Bare Ground	73.30

SOIL ANALYSIS DATA --

Management unit 15, Study no: 17, Study Name: Swap Mesa

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
	7.26	68.36	17.08	14.56	1.33	7.22	160	0.6

PELLET GROUP DATA--

Management unit 15, Study no: 17

Type	Quadrat Frequency '09	Days use per acre (ha) '09
Rabbit	64	-
Deer	1	-
Bison	14	34 (84)

BROWSE CHARACTERISTICS--

Management unit 15, 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)
Atriplex canescens									
09	**140**	14	86	-	-	43	57	0	40/59
Ceratoides lanata									
09	**20**	0	100	-	-	0	100	0	7/9
Ephedra viridis									
09	**0**	0	0	-	-	0	0	0	19/41
Gutierrezia sarothrae									
09	**4720**	3	91	7	-	0	0	4	9/11
Opuntia sp.									
09	**260**	15	85	-	-	0	0	0	5/14

SUMMARY
WILDLIFE MANAGEMENT UNIT 15 - HENRY MOUNTAINS

Community Types

There were thirteen Range Trend studies sampled in WMU 15 during the summer of 2009. Seven of the studies [Eagle Bench (15-1), South Creek Chaining (15-4), Bates Knob (15-5), Box Springs Chaining (15-6), Airplane Spring (15-7), Cave Flat Chaining (15-9) and Quaking Aspen Spring (15-12)] sampled areas that had been chained and seeded in the past to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). The Quaking Aspen Spring (15-12) study burned in the Bulldog wildfire in 2003 and was subsequently reseeded. One of the new studies established in 2009, Coyote Spring (15-16), samples a pinyon and juniper community that also burned in the Bulldog fire and was seeded in 2003. All eight of the studies that sample historic pinyon and juniper communities are considered to be crucial year round bison habitat. Six of the historic pinyon and juniper sites (15-1, 15-4, 15-5, 15-9, 15-12, and 15-16) are considered to be crucial deer winter habitat, one site (15-6) is considered crucial deer spring/fall/summer habitat, and one site (15-7) is considered crucial year round deer habitat.

Two study sites [Sidehill Spring (15-13) and Dugout Creek (15-14)] sample mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) communities. The Sidehill Spring (15-13) study is considered to be crucial year round habitat for both bison and deer, while the Dugout Creek (15-14) study is considered crucial deer winter habitat. The Sidehill Spring study site burned in the 2003 Bulldog wildfire and was reseeded. Two study sites [Steven's Mesa (15-15) and Swap Mesa (15-17)] sample two desert shrub communities that are considered to be crucial year long habitat for bison and crucial winter habitat for deer. The remaining study [Nasty Flat (15-2)] samples an aspen (*Populus tremuloides*) community that is considered to be crucial year long bison habitat and crucial deer summer habitat.

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation data from this herd unit were compiled from the Hanksville and Capital Reef National Park weather stations (Figures 1 and 2). The units 27 year annual mean was 6.53 inches, the 28 year spring (March to May) mean was 1.51 inches, and the 27 year fall (Sept. to Nov.) mean was 1.98 inches. The unit annual precipitation was below 75% of the normal annual mean (drought conditions) in 1989, 1996, 2002, 2007, and 2008 (Figure 1). Spring precipitation was below 75% of normal in 1982, 1989, 1994, 1996, 1998, 2000, 2002, 2003, and 2008 (Figure 2). Fall precipitation was below 75% of normal in 1983, 1984, 1988, 1989, 1992, 1993, 1995, 1999, 2001, 2007, and 2008 (Figure 2) (Utah Climate Summary 2009).

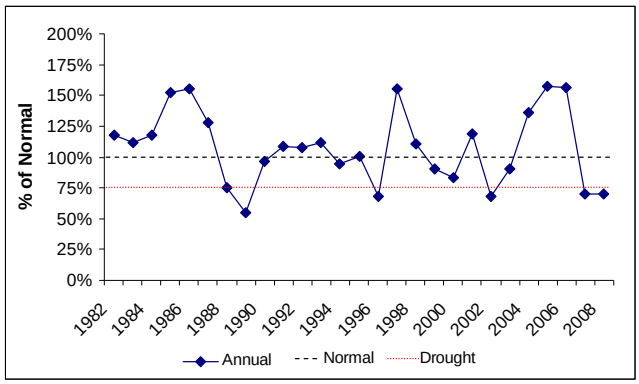


Figure 1. Percent annual precipitation based on the 27 year mean precipitation for WMU 15, Henry Mountains. Precipitation data were collected at the Hanksville and Capital Reef National Park weather stations (Utah Climate Summary 2009).

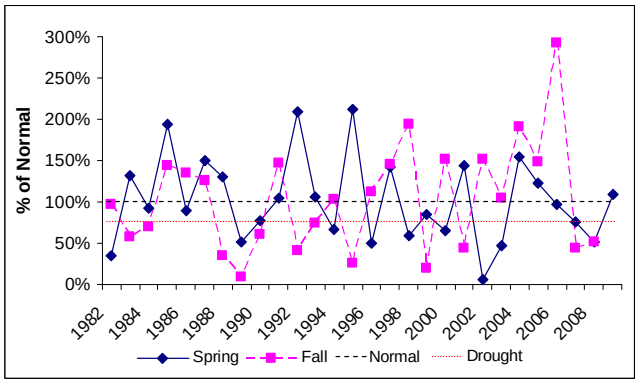


Figure 2. Percent annual precipitation based on the 27 year mean for spring (March-May) and fall (Sept.-Nov.) precipitation for WMU 15, Henry Mountains. Precipitation data were collected at the Hanksville and Capital Reef National Park weather stations (Utah Climate Summary 2009).

Browse

The median browse trend has remained relatively steady since 1987 with a slight increase between 2004 and 2009 (Figure 5). Three sagebrush species were sampled in the unit; Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*), and black sagebrush (*A. nova*). Mountain big sagebrush was sampled at six study sites on the unit: 15-2, 15-4, 15-5, 15-6, 15-13 and 15-14. The mean density and cover of mountain big sagebrush was similar from 1994 to 2009, but increased significantly from 2004 to 2009 (Figure 3a and 3b). Much of the increase in density is due to a large recruitment of young plants in two studies, South Creek Chaining (15-4) and Dugout Creek (15-14). Mean mountain big sagebrush population decadence has remained low at below 10% since 1994. Decadence of mountain big sagebrush was significantly lower in 1999 compared to the other sample years (Figure 3c). Wyoming big sagebrush was sampled on two sites in the unit: 15-1 and 15-12. The mean density of Wyoming big sagebrush has remained similar since 1994 with a slight decrease in 2004 (Figure 3a). The mean Wyoming big sagebrush cover increased significantly from 1994 to 1999, but then remained similar through 2009 (Figure 3b). The mean population decadence of Wyoming big sagebrush was low at below 14% since 1994. Decadence of Wyoming big sagebrush increased significantly from 1999 to 2004, but decreased significantly again in 2009 (Figure 3c). Black sagebrush was sampled in four studies in the unit: 15-4, 15-12, 15-13 and 15-14. The mean density and cover of black sagebrush decreased significantly from 1999 to 2004 (Figure 3a and 3b). The large decline in black sagebrush was due to the Bulldog fire which burned the Quaking Aspen Spring and Sidehill Spring study sites in 2003. The mean population decadence of black sagebrush was slightly higher in 2004, but was low (less than 10%) in all sample years (Figure 3c).

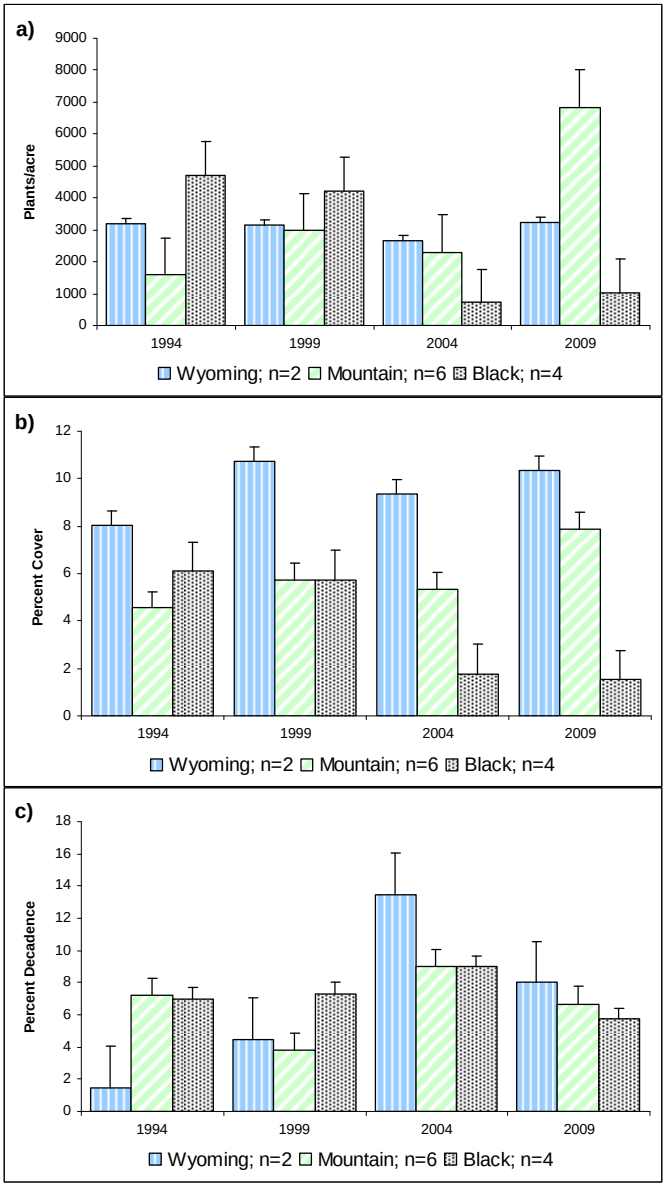


Figure 3. a) Mean density of sagebrush (*Artemisia spp.*) by year for WMU 15, Henry Mountains. **b)** Mean cover of sagebrush by year for WMU 15. **c)** Mean population decadence of sagebrush by year for WMU 15.

Herbaceous Understory

The median grass trend decreased from 1987 to 1994 and again from 1999 to 2004, but increased again 2009 (Figure 5). The mean perennial grass sum of nested frequency was similar in 1994, 1999 and 2009, but was significantly lower in 2004 than all other sample years (Figure 4a). This same trend is reflected in the mean cover of perennial grass on the unit (Figure 4b). Cheatgrass (*Bromus tectorum*) has had a relatively low presence on the unit, but was significantly higher in nested frequency and cover in 1999 (Figure 4a and 4b).

The median forb trend decreased slightly from 1987 to 1994, then decreased more from 1999 to 2004 (Figure 5). The mean perennial forb sum of nested frequency has decreased slightly, but steadily since 1994. The sum of nested frequency of perennial forbs was significantly lower in 2004 and 2009 than in 1994 (Figure 4a). The

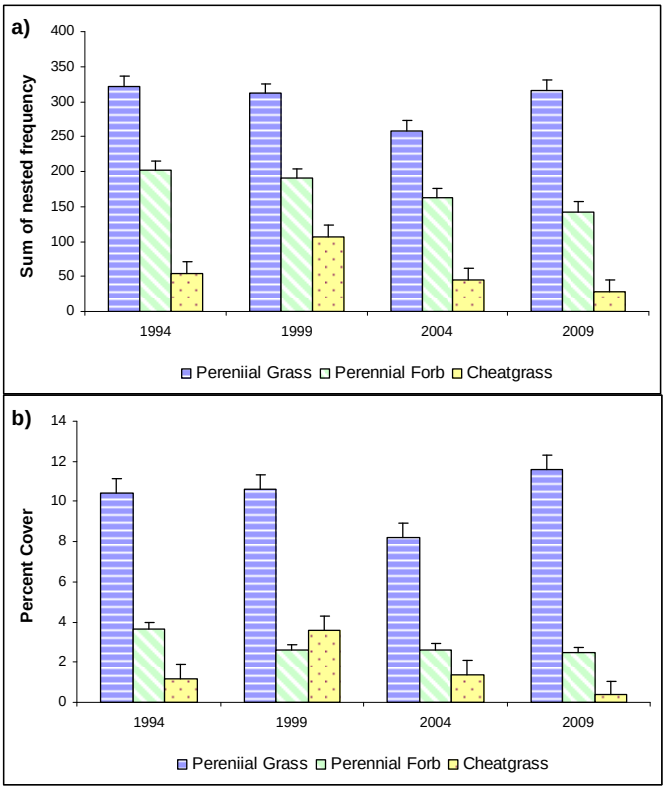


Figure 4. a) Mean perennial grass, perennial forb and cheatgrass sum of nested frequency by year for WMU 15, Henry Mountains. **b)** Mean perennial grass, perennial forb and cheatgrass cover by year for WMU 15.

increase in the perennial grass cover score (Table 2).

mean cover of perennial forbs decreased significantly from 1994 and 1999, but remained similar from 1999 to 2009 (Figure 4b). No noxious weeds were sampled on the studies in this herd unit.

Desirable Components Index

Five studies in this herd unit are considered within the low potential scale for the deer Desirable Components Index (DCI): 15-1, 15-9, 15-15, 15-16 and 15-17. The mean DCI ranking for these studies decreased from fair in 1994 and 1999 to poor and poor-fair in 2004 and 2009, respectively (Figure 6 and Table 1). The decrease in DCI scores is primarily due to a decrease in browse scores (Table 1). This is an artifact of the addition of three new trend sites, Steven's Mesa in 2004, and Coyote Creek and Swap Mesa in 2009, all of which had much lower browse scores than the Eagle Bench study. The seven remaining winter range studies, 15-4, 15-5, 15-6, 15-7, 15-12, 15-13 and 15-14, are within the mid-level potential scale. The mean DCI ranking for these studies remained steady at poor from 1994 to 2004, then increased to fair in 2009 (Figure 6 and Table 2). Much of the increase in the average DCI score was due to an

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	14.7	6.3	3.5	13.9	-2.7	1.7	0.0	**37.4**	Fair
99	16.2	7.7	4.1	9.9	-3.8	1.3	0.0	**35.6**	Fair
04	13.6	3.5	0.0	5.2	0.0	0.5	0.0	**22.7**	Poor
09	5.4	2.0	0.1	15.0	-0.1	2.1	0.0	**24.5**	Poor-Fair

Table 1. Low potential scale mean deer DCI scores (n=5) for WMU 15, Henry Moutains. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

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	3.8	16.7	-0.2	4.7	0.0	**39.0**	Poor
99	11.1	4.8	3.7	17.8	-2.5	4.6	0.0	**39.5**	Poor
04	8.9	6.8	3.0	18.2	-1.5	5.1	0.0	**40.5**	Poor
09	11.6	9.8	7.0	24.7	-0.4	5.6	0.0	**58.2**	Fair

Table 2. Mid-level potential scale mean deer DCI scores (n=7) by year for WMU 15, Henry Moutnains. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

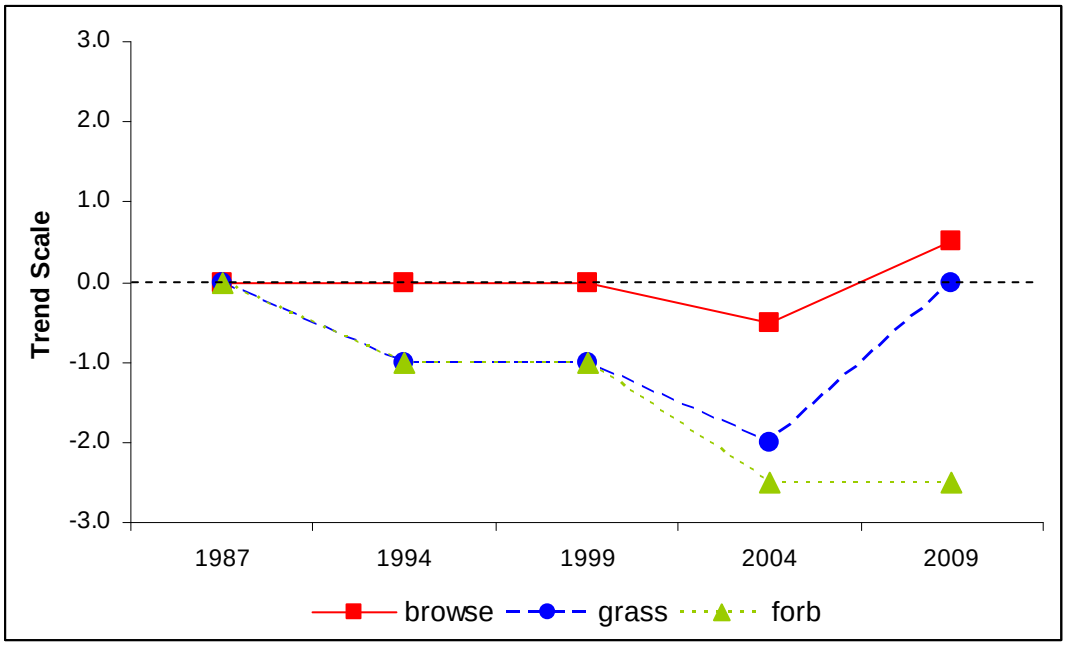


Figure 5. Cumulative median browse, grass and forb trends by year for WMU 15, Henry Mountains.

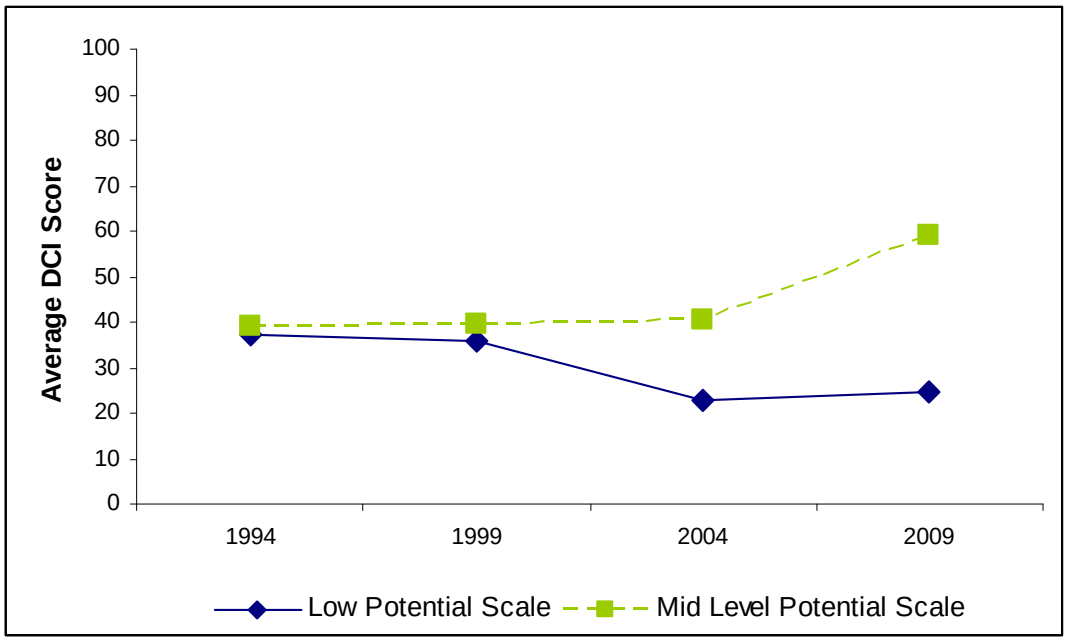


Figure 6. Mean low (n=5) and mid-level (n=7) potential scale DCI scores by year for WMU 15, Henry Mountains. The deer DCI scores are divided into three categories based on ecological potentials which inlude low, mid-level and high.

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