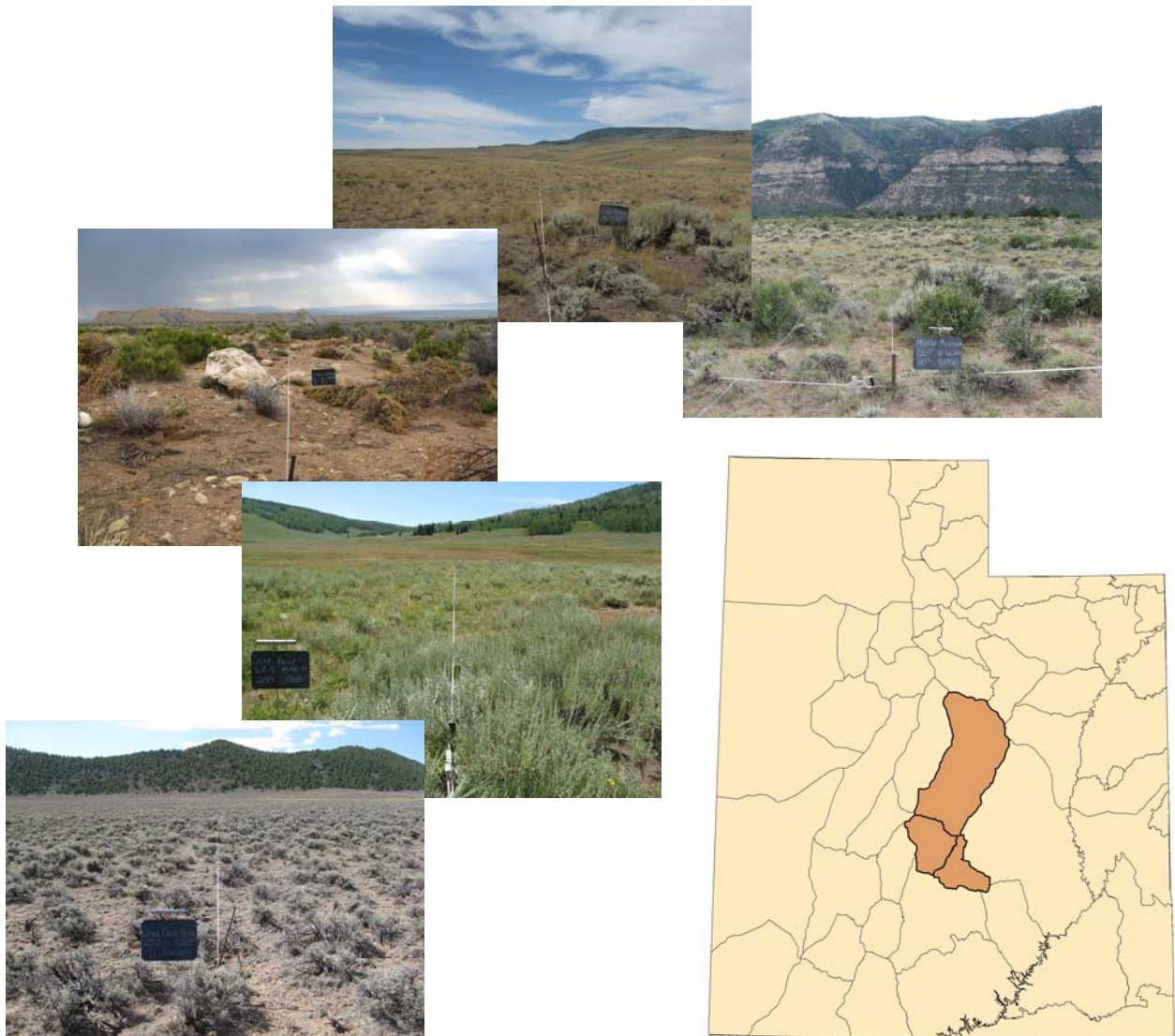


UTAH BIG GAME RANGE TREND STUDIES 2009 Volume II Southeastern Region



**PUBLICATION NUMBER 10-38
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 II**

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

Publication No. 10-38

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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:

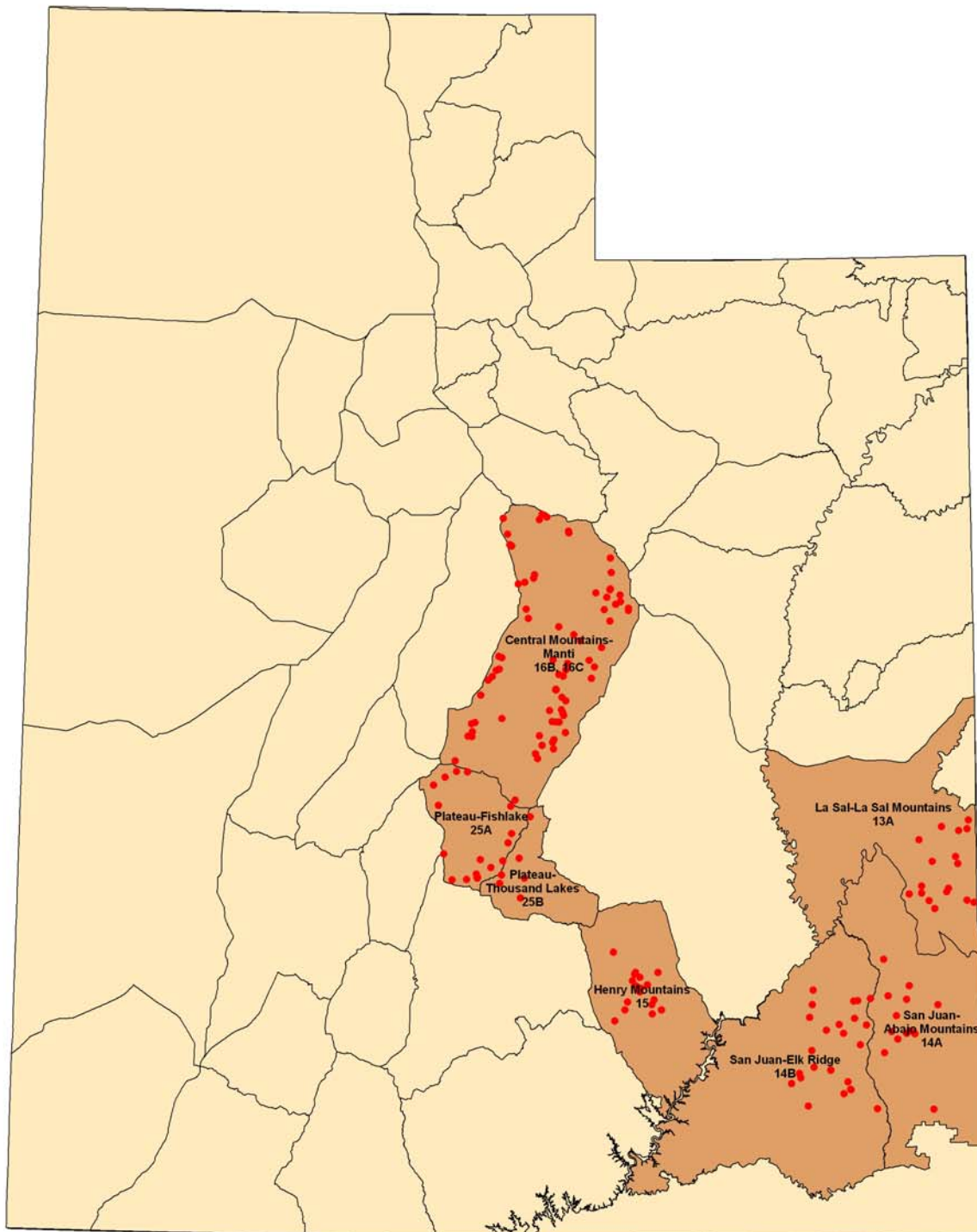
Bureau of Land Management
Monticello Resource Area
Moab resource Area

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 m² 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.

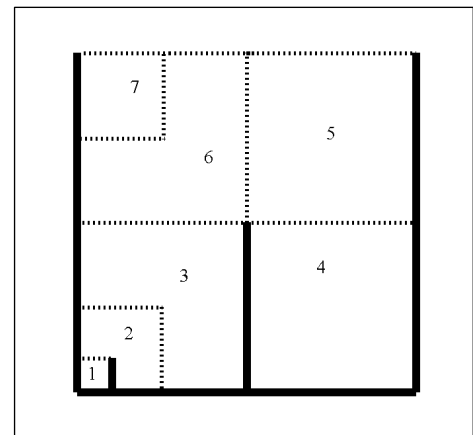


Figure 1. Cover classes of the 1/4 m² sampling quadrat.

Total canopy cover of shrubs or trees is estimated using the line-intercept method (¹U.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.

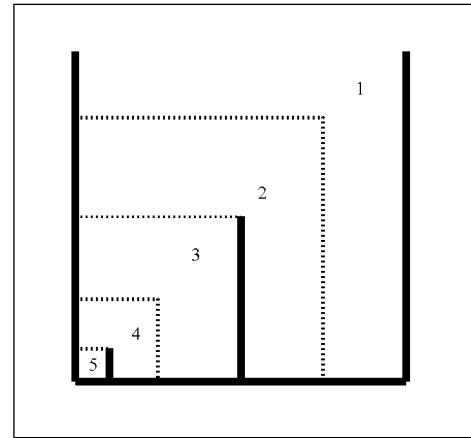


Figure 2. Nested frequency sub-quadrats of the 1/4 m² sampling quadrat.

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 (²U.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

T y p e	Species	Nested Frequency					Average Cover %			
		'87	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	b135	ab106	ab100	ab112	a81	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	b61	a3	a19	a3	a-	.03	.18	.01	-
G	Oryzopsis hymenoides	-	3	3	3	8	.00	.00	.03	.07
G	Poa bulbosa	b220	b256	b250	a129	a136	7.14	8.01	2.43	2.86
G	Poa fendleriana	a-	b16	d53	cd55	bc24	.06	.38	1.24	.33
G	Sitanion hystrix	6	1	-	-	-	.00	-	-	-
G	Stipa comata	b48	a14	bc24	bc30	a21	.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	b40	bc17	ab25	b37	a9	.10	.42	.99	.10
F	Calochortus nuttallii	8	-	-	1	-	-	-	.00	-
F	Castilleja chromosa	b38	a4	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	b14	a6	a-	a-	a-	.03	-	-	-
F	Erigeron flagellaris	-	-	3	-	1	-	.15	-	.00
F	Erigeron pumilus	b111	a21	a43	a20	a12	.07	.51	.53	.08
F	Eriogonum racemosum	b63	a30	a34	a25	a28	.14	.30	.35	.21
F	Hymenoxys acaulis	3	-	3	1	-	-	.00	.03	-
F	Lomatium triternatum	b31	a-	a-	a-	a-	-	-	-	-
F	Lupinus argenteus	d162	c57	b20	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	c67	bc53	ab31	a7	a17	.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 1/4m² 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	<i>Amelanchier utahensis</i>	18	18	16	20	2.25	3.74	6.50	5.30
B	<i>Artemisia tridentata vaseyana</i>	86	82	85	85	16.28	9.40	10.65	9.94
B	<i>Chrysothamnus depressus</i>	12	26	23	23	.66	.72	1.46	.87
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	86	81	72	72	3.62	4.96	5.00	6.14
B	<i>Coryphantha vivipara arizonica</i>	0	2	5	5	-	.00	.00	.00
B	<i>Eriogonum microthecum</i>	10	16	10	9	.01	.53	.12	.12
B	<i>Gutierrezia sarothrae</i>	0	4	8	4	.01	.04	.15	.03
B	<i>Juniperus osteosperma</i>	0	0	0	0	-	-	-	.15
B	<i>Opuntia</i> sp.	36	35	41	45	.32	.56	1.12	1.33
B	<i>Pinus edulis</i>	0	16	14	10	2.92	3.53	7.21	8.53
B	<i>Purshia tridentata</i>	0	1	1	1	-	.00	.00	.00
B	<i>Quercus gambelii</i>	0	3	3	2	.76	.63	1.48	.76
B	<i>Symphoricarpos oreophilus</i>	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 1/4m² 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
<i>Amelanchier utahensis</i>	.80	7.25	9.48
<i>Artemisia tridentata vaseyana</i>	-	13.21	13.93
<i>Chrysothamnus depressus</i>	-	1.04	.58
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	-	4.73	7.25
<i>Eriogonum microthecum</i>	-	.11	.06
<i>Opuntia</i> sp.	-	.65	.71
<i>Pinus edulis</i>	3.59	11.86	13.43
<i>Quercus gambelii</i>	-	1.23	1.43
<i>Symphoricarpos oreophilus</i>	-	-	.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
<i>Amelanchier utahensis</i>	1.8	1.7
<i>Artemisia tridentata vaseyana</i>	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			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
<i>Pinus edulis</i>	201	175	213	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)
<i>Artemisia tridentata vaseyana</i>									
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			%OM	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, 100ft² 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			
	'94	'99	'04	'09
Rabbit	44	6	6	34
Elk	28	26	11	3
Deer	14	28	15	9
Cattle	-	2	-	1

Days use per acre (ha)		
'99	'04	'09
-	-	-
70 (173)	27 (68)	4 (10)
32 (79)	16 (40)	25 (63)
6 (14)	4 (11)	4 (9)

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

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

Preferred Browse (60 points)

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

Preferred Browse Cover (30 pts. possible)

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

Percent Decadence (15 points possible)

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

Percent Young (15 points possible)

- 0.5 points for each 1% of young

Herbaceous Understory (40 points)

Perennial Grass Cover (30 points possible)

- 2 points for each 1% cover

Perennial Forb Cover (10 points possible)

- 2 points for each 1% cover

Annual Grass Cover (-20 points possible)

- -0.75 points for each 1% cover

Noxious Weeds (State List)

- -2 points for each species present

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

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

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

Mid-level potential scale (Mountain Big Sagebrush)

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

High potential scale (Mountain Brush)

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

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

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

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REPORT FORMAT

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

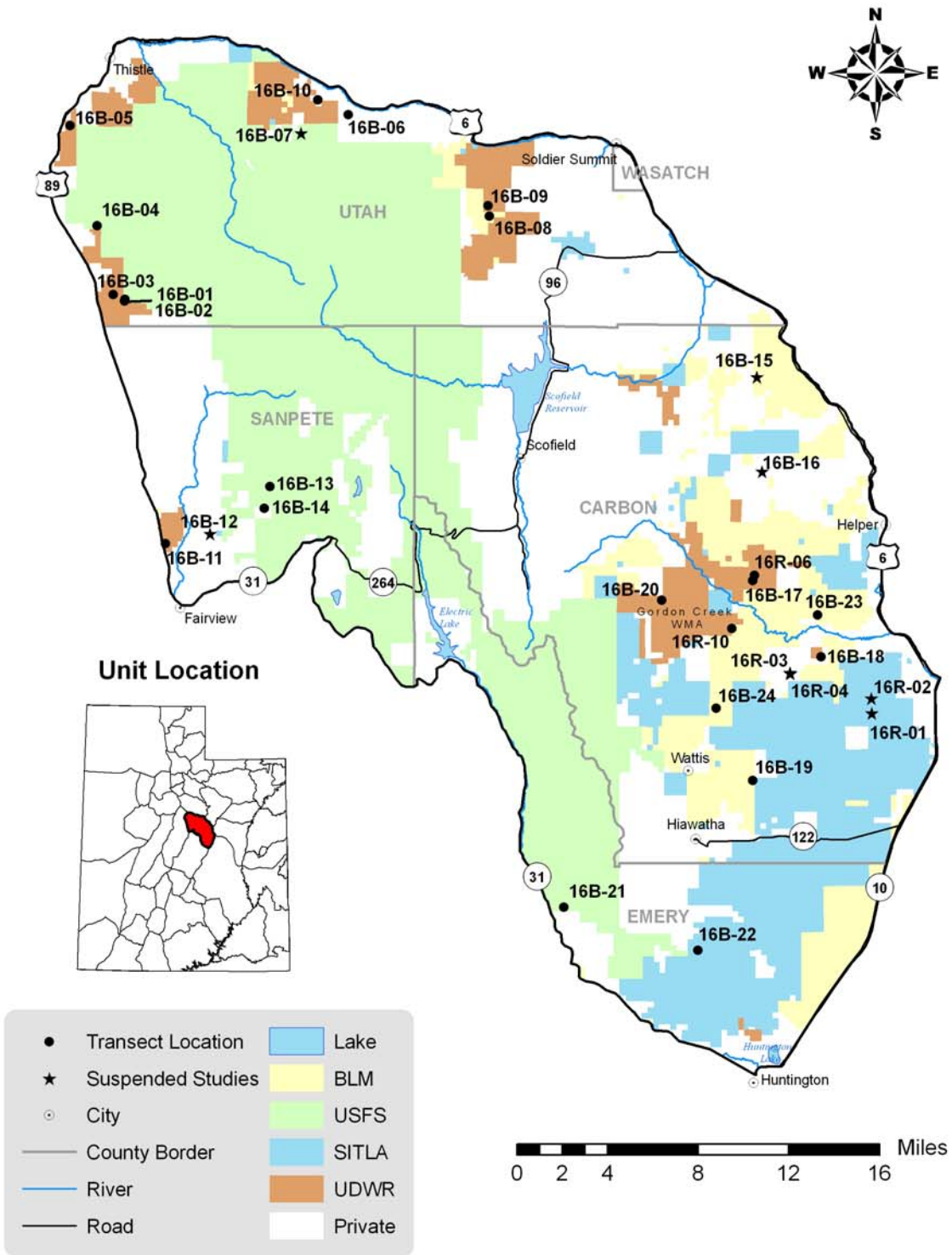
The name and directions for locating the site are given on the location page. Also included on this page are the vegetation type, range type, NRCS ecological site description, land ownership, elevation, aspect, slope, arrangement and diagrammatic sketch of the baseline, and the location on a topographical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

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

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

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

Management Unit 16B



WILDLIFE MANAGEMENT UNIT 16B - CENTRAL MOUNTAINS, MANTI NORTH

Boundary Description

Utah, Sanpete, Emery, and Carbon counties - Boundary begins at Highway SR-10 and Highway SR-31 in Huntington; then north on SR-10 to Highway US-6; northwest on US-6 to Highway US-89; south on US-89 to SR-31; southeast on SR-31 to Huntington.

Management Unit Description

Management unit 16B covers the east and west sides of the Wasatch Plateau. The eastern and western halves are roughly divided by the Skyline Drive to Soldiers Summit. The eastern half was monitored in 2009 and will next be monitored in 2014. The western half was monitored in 2007 with the Central Region and will be monitored again in 2012.

This unit was previously called the Northeast Manti Deer Herd Unit 30. In the spring of 1998, this unit was incorporated into the much larger Wildlife Management Unit 16. Most of the winter range in subunit 16B lies on the east side of the Wasatch Plateau, which rises straight up from the valley floor to ridges with heights over 9,500 feet. The winter range is a narrow strip of land along the base of the plateau below the 8,000 foot contour. It runs from Price Canyon south to Huntington Canyon. Other important winter ranges include a large section of land along the Price River in the Colton area, below Scofield Reservoir and in the mouths of several side canyons in Huntington Canyon. Elk winter ranges are found on south-facing grassy points at high elevations on the Wasatch Plateau.

Currently, 54% of the winter range in Wildlife Management Unit 16 is managed by the BLM and U.S. Forest Service. The remaining portion is primarily owned by private entities, with a small amount of acreage being owned by the DWR. Summer range is 72% Forest Service lands, 22% privately owned, with the remainder made up of state owned lands.

The Manti-North area has historically supported a variety of wildlife and outdoor recreation, livestock grazing, ranches and farms, energy developments, and some forest industry. Industrial activities on the deer herd unit are associated primarily with coal production, electrical power generation, and oil and gas development. Exploration and development activities for oil and gas have the potential for future increases. Add to this a growing demand for low-sulfur Wasatch coal, and the demands placed upon winter ranges in this area will likely increase.

Power plants, pipe lines, slack piles, coal load-out facilities, ghost towns, railroads, and agriculture compete for valuable winter range property. The Huntington Canyon Power Plant alone has removed over 400 acres of crucial winter range. An extensive road system provides year-round access to large portions of the winter range. Heavily used access roads to coal mines dissect important winter ranges all along the east side of the Wasatch Plateau and are accountable for a large number of the highway deer mortality.

Key wintering areas for deer include Wildcat Canyon and the Gordon Creek basin, Consumers Bench, Porphyry Bench, North Spring, several areas in Huntington Canyon, Gentry Mountain, and Spring Canyon drainages. Preferred elk wintering areas include Miles Point, Reynolds Point on Trail Mountain, Telephone Bench, and Diamanti Bench. The winter range is made up of several habitat types which include pinyon-juniper, sagebrush/grass, mountain brush, grassland, seedings, and other miscellaneous vegetation types. Pinyon-juniper woodland is the most widespread type, accounting for 40 percent of the total winter range. Unfortunately, it is also among the least productive according to the 1980 range inventory. Sagebrush grass communities make up approximately 24 percent of the winter range and probably receive the heaviest use due to the availability of preferred forage.

Range Trend Studies

Six interagency range trend studies were established in June and July of 1988 and have continued to be monitored through 2009. Four of these sites [Slackpile (16B-17), Porphyry Bench (16B-18), North Spring Bench (16B-19) and Telephone Bench (16B-20)] sample the big sagebrush-grass range type. One study [Huntington Canyon (16B-21)] is on a higher elevation, steep slope, dominated by perennial grass, and one study [Poison Spring Bench (16B-22)] is in a pinyon-juniper chaining. Two additional studies [Consumer Bench (16B-23) and Wire Grass Bench (16B-24)] were added in 1994 and sample big sagebrush-grass communities. Two special studies, North Slackpile (16R-6) and Gordon Creek Burn (16R-10) were established in 1998 and 1999, respectively. These two studies were reread in 2009 as regular range trend studies. Two regular range trend studies [Ford Ridge (16B-15) and Hardscrabble (16B-16)] and four special studies [Price Pipeline South (16R-1), Price Pipeline Native South (16R-2), Price Pipeline Native North (16R-3) and Price Pipeline North (16R-4)] were suspended for various reasons and were not monitored in 2009.

SLACKPILE - TREND STUDY NO. 16B-17-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: [Upland Loam \(Basin Big Sagebrush\), R047XA308UT](#)

Land Ownership: DWR

Elevation: 6,600 ft (2,012 m)

Aspect: North

Slope: 5%-8%

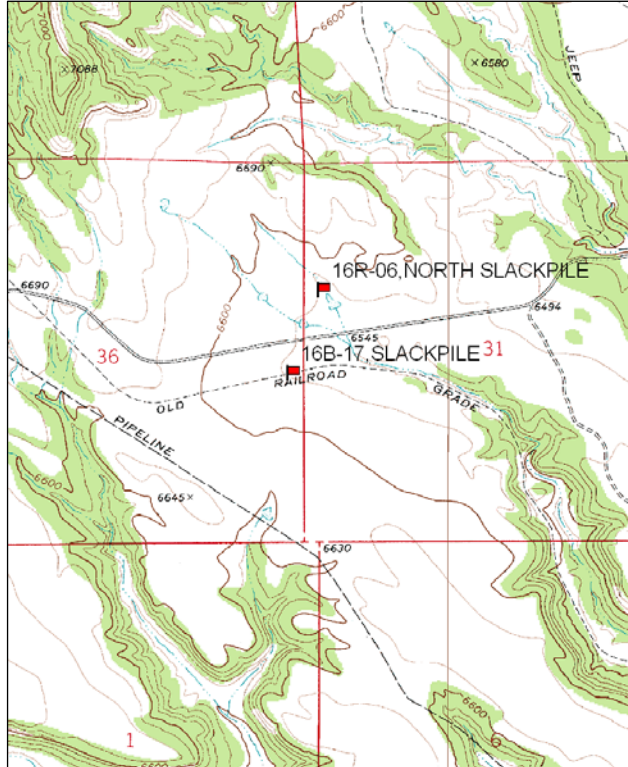
Transect bearing: Line 1 & 2 - 165°M, Line 3 & 4 - 163°M

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

Directions:

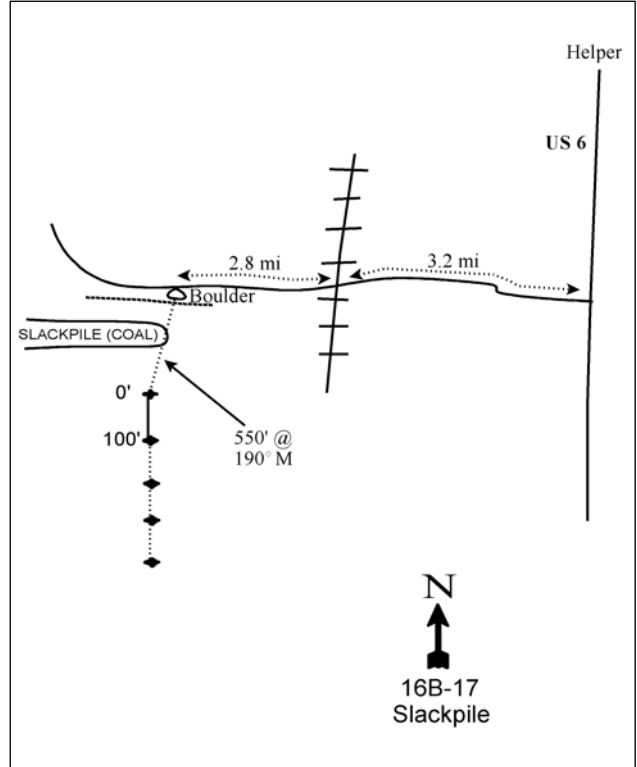
On US 6 south of Helper, turn west onto Consumers Road. Proceed west 3.2 miles to the railroad tracks. Cross the tracks and continue 2.8 miles to a large boulder on the left. The study is located in the sagebrush south of the fence. Walk 550 feet at 190°M from the boulder to the start of the frequency baseline. The first stake is marked with a red browse tag, #9022.

Map Name: Standardville



Township: 13S , Range: 8E, Section: 36

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 502829 E 4388997 N

SLACKPILE - TREND STUDY NO. 16B-17

Site Information

Site Description: The study samples a sagebrush/grass site owned by the Utah Division of Wildlife Resources. Similar sagebrush-grass communities cover an extensive part of the Gordon Creek range, an important wintering area for large numbers of deer. The Division allows spring cattle grazing on two pastures, one south of Consumers road and another north of the road. Each pasture is grazed every other year. North Slackpile (16R-6) was established to monitor the north pasture, while this site monitors the south pasture. Pellet group data has indicated that deer use has been consistently heavy on the site. Estimated cattle use was moderate in 1999, but light since 2004 (Table - Pellet Group Data).

Browse: The key browse species is Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). There was a large die-off of sagebrush in 2004, likely related to drought conditions in prior years, but good seedling production and recruitment of young sagebrush plants helped to reestablish the population by 2009. The sagebrush population is still maturing since the die-off, and is comprised primarily of young sagebrush plants. The average height/crown of mature sagebrush plants also decreased in 2009, indicating a younger population. Prior to the die-off, decadence of Wyoming big sagebrush was high, but decreased substantially in 2009. Utilization of Wyoming big sagebrush was mostly moderate to heavy from 1987 to 2004, with lighter use in 2009 (Table - Browse Characteristics).

Stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) is the most abundant shrub in both cover and density on the site. Density and cover of rabbitbrush also decreased markedly in 2004, but had recovered in 2009. Most of the rabbitbrush is small (Table - Browse Trends, Table - Browse Characteristics). Other browse sampled on the site were black sagebrush (*Artemisia nova*) and broom snakeweed (*Gutierrezia sarothrae*).

Herbaceous Understory: Species diversity and abundance of grasses is normal for a site like this. The native perennial grasses, bluebunch wheatgrass (*Agropyron spicatum*), blue grama (*Bouteloua gracilis*), and Indian ricegrass (*Oryzopsis hymenoides*), are the dominant grasses in cover and frequency on the site. Other important grasses include salina wildrye (*Elymus salina*) and needle-and-thread (*Stipa comata*). Forbs are diverse, but not very abundant on the site. Scarlet globemallow (*Sphaeralcea coccinea*) is the dominant forb on the site, with longleaf phlox (*Phlox longifolia*) and hollyleaf clover (*Trifolium gymnocarpon*) also being common (Table - Herbaceous Trends).

Soil: Soil texture is a loam with a slightly alkaline pH and a moderately deep effective rooting depth. Phosphorus (5.1 ppm) and potassium (44.8 ppm) (Table - Soil Analysis Data) have a low availability for plant development and growth (Tiedemann and Lopez 2004). There is a considerable amount of bare ground on the site ranging from 40%-62% since 1988. Cryptogam cover has fluctuated over the sample years (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 and 2009, primarily due to the pedestaling of plants.

Trend Assessments

Browse:

- **1988 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 and poor vigor of Wyoming big sagebrush increased to 57% and 13%, respectively. Recruitment of young sagebrush plants decreased to only 2% of the population.
- **1994 to 1999 - stable (0):** There was little change in the density of Wyoming big sagebrush, but cover increased from 5% to 8%. Decadence of Wyoming big sagebrush decreased to 36% and recruitment of young sagebrush plants improved slightly, but is still low.

- **1999 to 2004 - down (-2):** There was a large die-off of Wyoming big sagebrush as the density decreased from 2,800 plants/acre to just 600 plants/acre. Decadence of Wyoming big sagebrush increased to 88% and poor vigor increased to 67%. This large decrease in density is attributed to drought conditions in the few years prior to the 2004 sampling.
- **2004 to 2009 - up (+2):** The Wyoming big sagebrush population has rebounded to a density of 8,880 plants/acre. Most of the population is comprised of young plants and the average height/crown of mature Wyoming big sagebrush plants has decreased from previous sample years. Decadence and poor vigor of Wyoming big sagebrush decreased substantially.

Grass:

- **1988 to 1994 - stable (0):** There was a slight decrease of 7% in the sum of nested frequency of perennial grasses. There was a significant increase in the nested frequency of bluebunch wheatgrass.
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial grasses continued to decline, this time by 8%. Cover of perennial grasses decreased from 15% to 12%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 35% and cover decreased to 4%. There was a significant decrease in the nested frequency of bluebunch wheatgrass.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased to 1994 levels and cover increased to 9%. There was a significant increase in nested frequency of salina wildrye and needle-and-thread.

Forb:

- **1988 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased by 50%. There was a significant decrease in the nested frequency of several important perennial forbs.
- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial forbs increased markedly, but did not reach 1988 levels. Cover of perennial forbs increased from 1% to 2%.
- **1999 to 2004 - up (+2):** The sum of nested frequency of perennial forbs increased by 23% to 1988 levels. Cover of perennial forbs increased to 5%.
- **2004 to 2009 - down (-2):** The sum of nested frequency decreased by 26%, returning to 1999 levels. Cover of perennial forbs decreased to 3%. There was a significant increase in the nested frequency of scarlet globemallow.

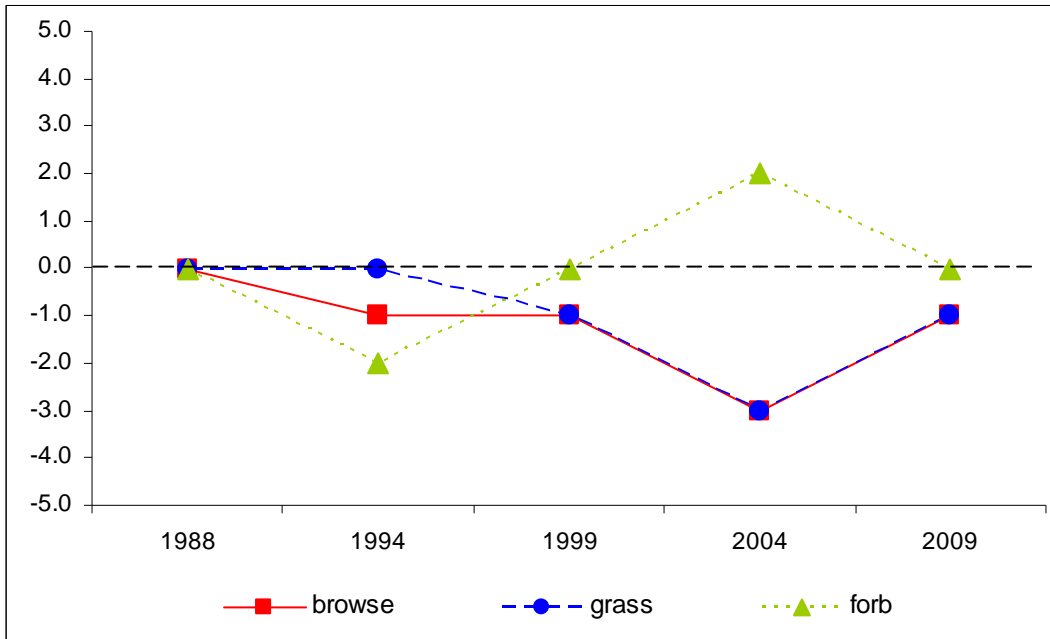
DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 16B, study no: 17

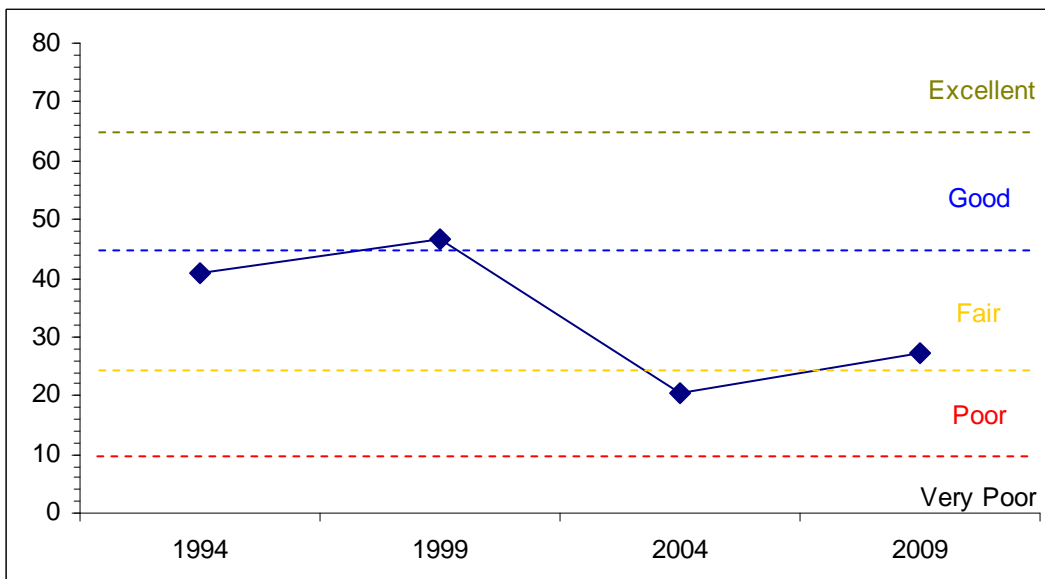
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	7.2	-0.8	2.5	29.4	0.0	2.6	0.0	40.9	Fair
99	9.9	4.7	4.3	23.2	0.0	4.4	0.0	46.5	Fair-Good
04	1.8	0.0	0.0	8.5	0.0	10.0	0.0	20.3	Poor
09	4.2	0.0	0.0	17.9	0.0	5.1	0.0	27.1	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16B, Study no: 17



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 16B, Study no: 17



HERBACEOUS TRENDS--

Management unit 16B, Study no: 17

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	a-	a-	a-	a-	b14	-	-	-	.27
G	Agropyron spicatum	a127	b211	b235	a97	a134	10.30	8.85	1.50	2.72
G	Bouteloua gracilis	a-	b37	b30	b30	b34	1.72	1.22	2.04	2.76
G	Bromus tectorum (a)	-	-	-	-	3	-	-	-	.01
G	Elymus salina	a-	ab17	ab20	a3	b27	.51	.87	.00	.73
G	Oryzopsis hymenoides	ab95	ab81	a53	ab81	b107	1.77	.57	.27	1.75
G	Poa fendleriana	-	3	3	3	5	.01	.03	.00	.03
G	Sitanion hystrix	b172	ab26	a7	a-	ab9	.29	.04	-	.06
G	Stipa comata	a15	a6	a3	a14	b61	.06	.03	.40	.59
Total for Annual Grasses		0	0	0	0	3	0	0	0	0.00
Total for Perennial Grasses		409	381	351	228	391	14.68	11.61	4.23	8.96
Total for Grasses		409	381	351	228	394	14.68	11.61	4.23	8.97
F	Alyssum alyssoides (a)	-	-	-	-	3	-	-	-	.00
F	Arabis sp.	6	-	5	-	-	-	.01	-	.00
F	Astragalus convallarius	b44	a5	b35	b48	a5	.01	.08	.65	.04
F	Calochortus nuttallii	a1	a-	ab19	b82	a-	-	.05	.30	-
F	Castilleja linariaefolia	a1	a-	b13	b8	ab8	-	.20	.02	.10
F	Chenopodium leptophyllum(a)	-	a-	a-	b51	a2	-	-	.28	.00
F	Collinsia parviflora (a)	-	-	5	-	-	-	.01	-	-
F	Comandra pallida	-	-	-	-	1	-	-	-	.00
F	Convolvulus arvensis	-	-	-	3	-	-	-	.00	-
F	Delphinium nuttallianum	-	-	-	-	-	-	-	-	.00
F	Descurainia pinnata (a)	-	a-	a-	b13	a-	-	-	.07	-
F	Eriogonum cernuum (a)	-	-	-	3	-	-	-	.01	-
F	Eriogonum umbellatum	a-	a3	b10	a3	a3	.15	.16	.15	.15
F	Gayophytum ramosissimum(a)	-	a-	a-	b46	a7	-	-	.60	.02
F	Helianthella uniflora	-	-	-	-	1	-	-	-	.00
F	Lappula occidentalis (a)	-	-	-	5	2	-	-	.15	.01
F	Machaeranthera grindelioides	ab9	ab10	b19	a2	a1	.07	.07	.18	.03
F	Orthocarpus sp. (a)	b46	a-	a-	a3	a-	-	-	.01	-
F	Penstemon caespitosus	c43	b23	a-	a-	a-	.11	-	-	-
F	Penstemon carnosus	a-	a-	c31	b17	b18	-	.13	.12	.10
F	Phlox austromontana	a3	b29	b32	a2	a2	.36	.70	.00	.00
F	Phlox longifolia	c235	ab106	a88	b131	ab131	.25	.25	.72	.40
F	Physaria sp.	-	-	1	-	-	-	.00	-	-
F	Polygonum douglasii (a)	-	a-	a-	b80	a3	-	-	.43	.01
F	Potentilla sp.	-	-	2	-	-	-	.03	-	-
F	Ranunculus testiculatus (a)	-	a-	a-	a5	b116	-	-	.01	.44
F	Schoenocrambe linifolia	a-	a-	a9	ab9	b19	-	.03	.05	.05
F	Sphaeralcea coccinea	a44	a45	a49	a68	b105	.35	.20	1.94	1.48
F	Thlaspi montanum	-	-	2	-	-	-	.00	-	-
F	Tragopogon dubius	-	-	-	-	1	-	-	-	.00
F	Trifolium gymnocarpon	c59	a-	bc47	c64	b32	-	.24	.86	.14

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
F	Zigadenus paniculatus	-	-	-	7	3	-	-	.02	.00
Total for Annual Forbs		46	0	5	206	133	0	0.01	1.57	0.49
Total for Perennial Forbs		445	221	362	444	330	1.31	2.19	5.04	2.53
Total for Forbs		491	221	367	650	463	1.31	2.21	6.62	3.03

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

BROWSE TRENDS--

Management unit 16B, Study no: 17

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia nova	4	3	2	5	.76	.38	.00	.56
B	Artemisia tridentata wyomingensis	74	73	25	75	5.03	7.57	1.45	2.76
B	Ceratoides lanata	0	0	0	1	-	-	-	.00
B	Chrysothamnus nauseosus	0	0	0	1	-	-	-	.00
B	Chrysothamnus viscidiflorus viscidiflorus	90	95	76	100	6.42	8.37	3.90	12.40
B	Echinocereus sp.	0	3	0	0	-	.00	-	-
B	Gutierrezia sarothrae	42	27	7	51	.17	.30	.03	1.04
B	Opuntia sp.	17	19	15	16	.22	.37	.39	.38
B	Pediocactus simpsonii	0	0	1	0	-	-	.00	-
B	Sclerocactus sp.	0	1	0	0	-	.00	-	-
Total for Browse		227	221	126	249	12.63	17.00	5.79	17.15

CANOPY COVER, LINE INTERCEPT--

Management unit 16B, Study no: 17

Species	Percent Cover	
	'04	'09
Artemisia nova	-	.05
Artemisia tridentata wyomingensis	.76	1.76
Chrysothamnus viscidiflorus viscidiflorus	3.01	17.53
Gutierrezia sarothrae	-	.83
Opuntia sp.	-	.16

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16B, Study no: 17

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.9	1.7

BASIC COVER--

Management unit 16B, Study no: 17

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	4.50	28.70	30.32	17.02	26.75
Rock	0	.06	.00	.04	0
Pavement	.50	.09	.01	.19	.00
Litter	29.25	25.67	21.25	29.62	26.46
Cryptogams	10.00	2.78	9.93	1.43	.85
Bare Ground	55.75	40.50	42.94	62.46	57.06

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 17, Study Name: Slackpile

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18	7.5	39.3	34.2	26.6	1.5	5.1	44.8	0.6

PELLET GROUP DATA--

Management unit 16B, Study no: 17

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	8	54	25	51
Elk	4	2	-	5
Deer	48	59	61	55
Cattle	1	6	2	1

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	-	-
65 (160)	52 (139)	49 (121)
23 (57)	7 (18)	9 (23)

BROWSE CHARACTERISTICS--
Management unit 16B, Study no: 17

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
88	0	0	0	0	-	0	0	0	-/-
94	160	25	50	25	-	50	0	13	16/34
99	220	0	82	18	-	27	64	0	7/14
04	80	0	0	100	-	0	0	25	9/15
09	100	40	40	20	-	60	0	20	9/15
<i>Artemisia tridentata wyomingensis</i>									
88	2998	27	31	42	199	40	44	4	13/18
94	2800	2	41	57	-	52	7	13	16/23
99	2800	9	55	36	-	31	42	10	18/27
04	660	3	9	88	6440	39	45	67	18/21
09	8880	71	23	6	3840	22	20	4	13/15
<i>Atriplex canescens</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	14/47
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	37/24
09	0	0	0	-	-	0	0	0	26/31
<i>Ceratoides lanata</i>									
88	66	100	0	-	66	100	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	100	0	8/6
<i>Chrysothamnus nauseosus</i>									
88	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	100	0	7/5
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
88	53798	82	17	0	1999	3	.12	0	6/9
94	12620	3	97	0	-	0	0	.15	5/12
99	19040	18	81	0	560	23	6	.31	4/9
04	4820	13	87	0	133300	2	.82	.41	7/9
09	48040	20	80	1	400	5	5	.16	5/9

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Echinocereus</i> sp.									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	60	0	100	-	-	0	0	0	2/4
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
88	13398	18	78	3	133	0	0	.99	7/7
94	1400	0	100	0	-	0	0	0	8/5
99	2000	1	99	0	-	0	0	0	4/3
04	280	0	100	0	-	0	0	0	6/6
09	3520	12	83	5	-	0	0	2	5/7
<i>Opuntia</i> sp.									
88	399	67	33	0	66	0	0	33	3/7
94	440	0	100	0	-	0	0	0	4/13
99	540	19	59	22	20	0	4	19	3/13
04	520	12	85	4	40	0	0	4	4/9
09	620	10	87	3	100	0	0	0	3/11
<i>Pediocactus simpsonii</i>									
88	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	2/2
09	0	0	0	-	-	0	0	0	-/-
<i>Pinus edulis</i>									
88	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	-/-
<i>Sclerocactus</i> sp.									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	20	0	100	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-

PORPHYRY BENCH - TREND STUDY NO. 16B-18-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter

NRCS Ecological Site Description: [Upland Loam \(Basin Big Sagebrush\), R047XA308UT](#)

Land Ownership: DWR

Elevation: 6,300 ft (1,920 m)

Aspect: West

Slope: 1%-2%

Transect bearing: 270 degrees magnetic

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

Directions:

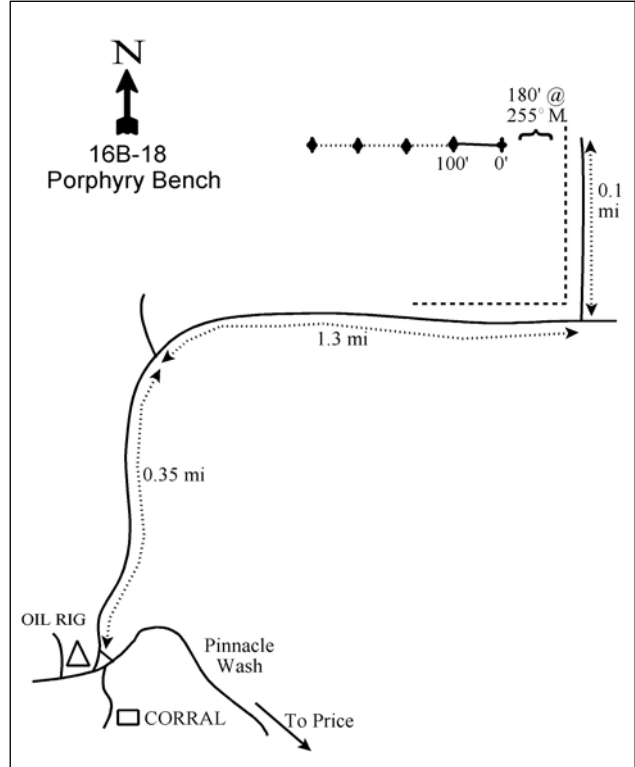
Take Westwood Blvd (1550 W) northwest out of Price 2.35 miles to a major intersection. Turn left onto Gordon Creek Road and travel 0.45 miles to a fork. Bear left away from Gordon Creek, going 0.1 miles to a gravel pit. Continue 5.2 miles on the Pinnacle Peak Road to a 3-way fork at the top of the bench. Go right 0.35 miles to a fork. Bear right and continue 1.3 miles, going alongside a fence to the SE corner. Turn left and go along the fence 0.1 mile to the fifth wood post from the corner. Walk west into the sagebrush 180 feet to the 0-foot baseline stake. It is a 1 1/2 foot tall fencepost marked by browse tag #9021.

Map Name: Pinnacle Peak



Township: 14S, Range: 9E, Section: 16

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 507669 E 4383587 N

PORPHYRY BENCH - TREND STUDY NO. 16B-18

Site Information

Site Description: The study is located on DWR land that is largely a sagebrush/grass community, with juniper covered side hills and draws. The area was part of the Price West Benches, Porphyry Bench Watershed Restoration Initiative project ([project# 229](#)) that was implemented in 2005. The area was treated by an aerator and reseeded (Table - Seed Mix) to address the long-term decline of sagebrush winter range for greater sage grouse and mule deer. The treatment was done in 100 foot strips, by repeatedly alternating treated and untreated strips. Two sample belts sampled treated strips and three sample belts sampled untreated strips. A nearby pellet group transect had an average of 45 deer days use/acre between 1988 and 1994. Pellet group transect data has indicated extremely heavy deer use since 1999. Estimated elk use was light in 1999, but increased to moderate use since 2004. Cattle use has been minimal on the site since 1999 (Table - Pellet Group Data).

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the key species for this site, but has decreased in cover (Table - Browse Trends) and density since 1999. There was a large die-off of sagebrush between 1999 and 2004 attributed to a severe drought in the years prior to the 2004 sampling. The sagebrush population is mostly decadent with a high proportion of plants displaying poor vigor since 2004. Recruitment of young sagebrush plants has fluctuated over the sample years, but was good in 2009. The average height crown of mature sagebrush plants has decreased steadily since 1999. Utilization of sagebrush has been mostly heavy in most sample years (Table - Browse Characteristics).

Brittle pricklypear cactus (*Opuntia fragilis*) has been the dominant browse on the site since 2004. Density of cactus has steadily decreased since 1999 as well, but this population appears to have endured the drought better than sagebrush. The seeded species prostrate kochia (*Kochia prostrata*) was sampled on the site in low density and cover for the first time in 2009, after the treatment and seeding. Winterfat (*Ceratoides lanata*) was also sampled, but is relatively uncommon (Table - Browse Trends, Table - Browse Characteristics).

Herbaceous Understory: The dominant species on the site is the native perennial grass needle-and-thread (*Stipa comata*). Native perennial grasses were abundant at the outset of the study in 1988, but had decreased substantially by 2004. In 2009, after the treatment, perennial grasses were again abundant with two additional introduced species, crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*A. intermedium*) also being present. Other common grasses include Indian ricegrass (*Oryzopsis hymenoides*) and western wheatgrass (*Agropyron smithii*). Perennial forbs are somewhat rare on the site except for scarlet globemallow (*Sphaeralcea coccinea*), which has steadily increased in cover and frequency since 1999 (Table - Herbaceous Trends).

Soil: The soil is a loam with a moderately alkaline pH and moderately deep effective rooting depth. Potassium has a low availability for plant growth and development at 25.6 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is quite high, but the level topography of the site limits erosion. Litter cover also provides fairly good protection from erosion (Table - Basic Cover). The soil erosion condition was classified as stable in 2009.

SEED MIX

Management unit 16B, study no. 18

Project name: Price West Benches, Porphyry Bench

WRI Database #: 229 Size (acre): 1000

Seed type	lbs in mix	lbs/acre
Crested Wheatgrass 'Hycrest'	410	0.4
Thickspike Wheatgrass 'Critana'	85	0.1
Siberian Wheatgrass 'Vavilov'	410	0.4
Great Basin Wildrye 'Trailhead'	85	0.1
Russian Wildrye 'Bozoisky'	820	0.8
Sheep Fescue	85	0.1
Indian Ricegrass 'Rimrock'	85	0.1
Yellow Sweetclover	205	0.2
Small Burnet 'Delar'	205	0.2
Winterfat--Duchesne/Uintah UT	116	0.1
Whitstem Rubber Rabbitbrush	43	0.0
Forage Kochia	580	0.6
Fourwing Saltbush	870	0.9
Wyoming big sagebrush	145	0.1
Blue Flax	9	0.0
Rocky Mt. Beeplant	17	0.0
TOTAL:	4170	4.17

Trend Assessments

Browse:

- **1988 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. Decadence and poor vigor of sagebrush both decreased slightly. Recruitment of young sagebrush plants also decreased to just 4% of the population.
- **1994 to 1999 - slightly up (+1):** The density of sagebrush increased 22% to 7,540 plants/acre, and cover increased from 11% to 12%. Recruitment of young sagebrush plants increased to 10% of the population.
- **1999 to 2004 - down (-2):** There was a large sagebrush die-off that is attributed to a drought in the years prior to the 2004 sample. Density of sagebrush decreased 84% to 1,200 plants/acre, and cover decreased to only 1%. Decadence of sagebrush increased to 95% and plants displaying poor vigor increased to 87% of the population. Recruitment of young sagebrush plants decreased to only 3% of the population.
- **2004 to 2009 - stable (0):** Density of sagebrush remained similar, but cover decreased to less than 1%. Decadence and poor vigor of sagebrush both decreased, but are still quite high. Recruitment of young sagebrush plants increased to 19% of the population. Prostrate kochia was sampled for the first time at low density and cover.

Grass:

- **1988 to 1994 - up (+2):** The sum of nested frequency of perennial grasses increased by 23%. There was a significant increase in the nested frequency of western wheatgrass and sand dropseed (*Sporobolus cryptandrus*).
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased 10%, though cover increased from 12% to 14%. There was a significant decrease in the nested frequency of sand dropseed and bottlebrush squirreltail (*Sitanion hystrix*).

- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased 56% and cover decreased to only 1%. There was a significant decrease in nested frequency of the dominant grass, needle-and-thread, and bottlebrush squirreltail.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased to 1999 levels and cover increased to a recorded high of 24%. Two seeded species, crested wheatgrass and intermediate wheatgrass, were sampled for the first time. There was a significant increase in nested frequency of Indian ricegrass, bottlebrush squirreltail, and needle-and-thread.

Forb:

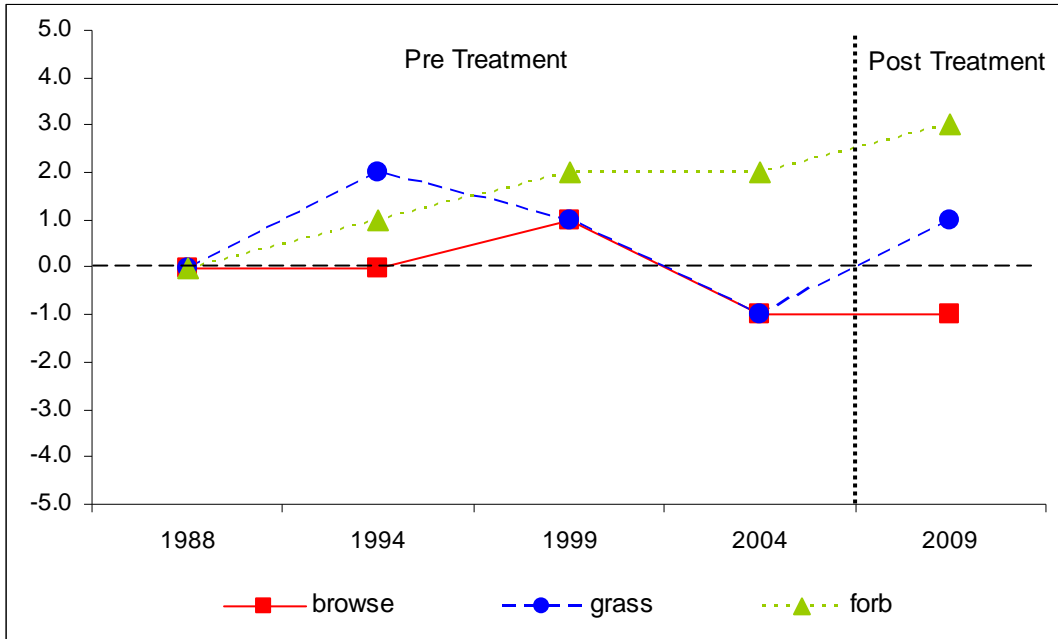
- **1988 to 1994 - slightly up (+1):** There was an 18% increase in the sum of nested frequency of perennial forbs.
- **1994 to 1999 - slightly up (+1):** There was a 48% increase in the sum of nested frequency of perennial forbs and cover increased from 1% to 2%. The increase in nested frequency was primarily due to a significant increase in longleaf phlox (*Phlox longifolia*). Forbs are not abundant on this site.
- **1999 to 2004 - stable (0):** The sum of nested frequency of perennial forbs decreased to 1994 levels, but cover increased to 9%. The increase in cover was due to the substantial increase in cover of scarlet globemallow.
- **2004 to 2009 - slightly up (+1):** There was a 51% increase in the sum of nested frequency of perennial forbs, but cover decreased slightly. There was a significant increase in the nested frequency of scarlet globemallow.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 16B, study no: 18

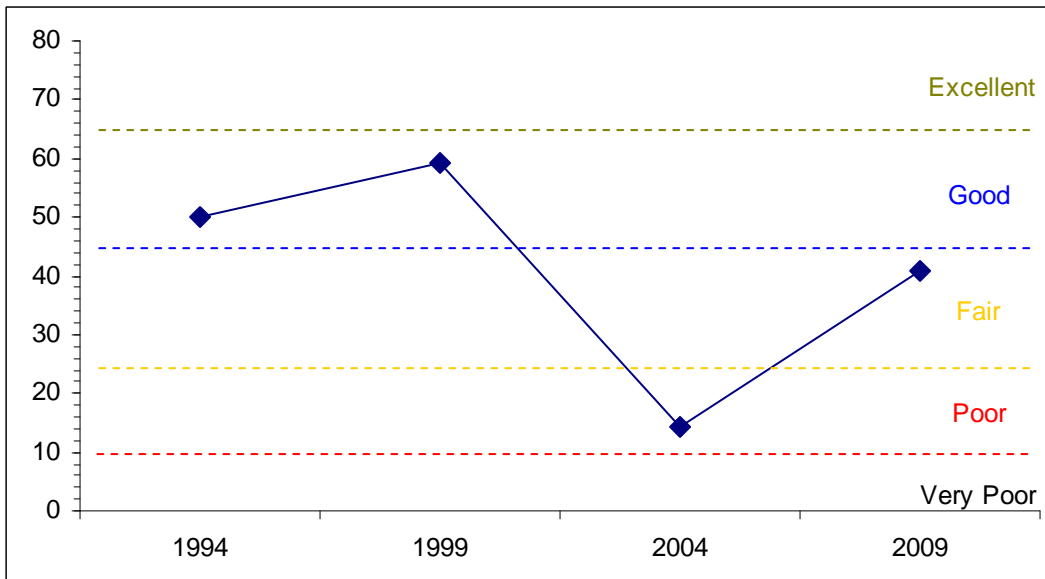
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	13.5	7.5	2.0	24.5	0.0	2.4	0.0	49.9	Good
99	14.9	6.6	5.0	28.6	0.0	4.0	0.0	59.1	Good
04	1.7	0.0	0.0	2.7	0.0	10.0	0.0	14.4	Poor
09	0.8	0.0	0.0	30.0	0.0	10.0	0.0	40.8	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16B Study no: 18



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 16B, Study no: 18



HERBACEOUS TRENDS--
Management unit 16B, Study no: 18

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	a-	a-	a-	a-	b91	-	-	-	5.22
G	Agropyron intermedium	a-	a-	a-	a-	b25	-	-	-	.95
G	Agropyron smithii	a21	c86	bc84	b52	a7	.67	1.79	.26	.04
G	Bouteloua gracilis	a1	ab8	b11	ab2	a-	.06	.22	.01	-
G	Bromus tectorum (a)	-	3	-	-	9	.00	-	-	.02
G	Oryzopsis hymenoides	a59	a40	ab67	a59	b97	1.26	2.12	.20	4.74
G	Sitanion hystrix	c43	c77	b13	a-	b14	1.15	.28	-	.52
G	Sporobolus cryptandrus	a3	b13	a-	a3	a-	.39	-	.00	-
G	Stipa comata	c262	c250	c256	a74	b191	8.67	9.88	.88	12.21
Total for Annual Grasses		0	3	0	0	9	0.00	0	0	0.01
Total for Perennial Grasses		389	474	431	190	427	12.24	14.31	1.36	23.70
Total for Grasses		389	477	431	190	436	12.24	14.31	1.36	23.72
F	Alyssum alyssoides (a)	-	-	-	-	5	-	-	-	.01
F	Astragalus convallarius	10	-	4	4	2	-	.00	.07	.00
F	Calochortus nuttallii	-	-	5	2	6	-	.03	.00	.01
F	Castilleja sp.	-	-	2	-	2	-	.00	-	.00
F	Chenopodium fremontii (a)	-	-	-	8	-	-	-	.07	-
F	Chenopodium leptophyllum(a)	-	b19	a-	c279	b15	.03	-	7.03	.04
F	Cruciferae	6	-	-	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	a-	a-	b37	a-	-	-	.16	-
F	Eriogonum alatum	-	-	2	-	-	-	.00	-	-
F	Eriogonum cernuum (a)	-	8	-	3	6	.01	-	.03	.01
F	Gayophytum ramosissimum(a)	-	a-	a-	b95	a3	-	-	1.77	.01
F	Lappula occidentalis (a)	-	b16	a-	c38	a-	.05	-	.23	-
F	Lesquerella sp.	5	7	-	-	-	.01	-	-	-
F	Lomatium sp.	-	-	4	4	-	-	.01	.01	-
F	Machaeranthera canescens	2	-	-	-	-	-	-	-	-
F	Mentzelia albicaulis (a)	-	-	-	-	8	-	-	-	.06
F	Orobancha sp.	1	-	-	-	-	-	-	-	-
F	Penstemon caespitosus	1	-	-	-	-	-	.00	-	-
F	Penstemon carnosus	-	-	-	-	-	-	-	.00	-
F	Phlox longifolia	a-	a4	b68	ab13	ab14	.04	.32	.08	.10
F	Plantago patagonica (a)	-	bc37	a9	c53	ab26	.08	.01	.38	.07
F	Salsola iberica (a)	-	-	-	16	15	-	-	.37	.06
F	Schoenocrambe linifolia	a-	a-	a3	ab2	b11	-	.00	.03	.05
F	Sedum lanceolatum	-	-	-	-	3	-	-	-	.00
F	Senecio multilobatus	6	5	6	1	-	.01	.04	.00	-
F	Sisymbrium altissimum (a)	-	-	-	2	-	-	-	.03	-
F	Sphaeralcea coccinea	a94	ab125	ab126	b141	c214	1.13	1.59	9.13	6.66
F	Taraxacum officinale	-	10	-	-	-	.01	-	-	-
F	Tragopogon dubius	3	-	-	-	-	-	-	-	-
F	Zigadenus paniculatus	-	-	3	2	3	-	.00	.00	.00
Total for Annual Forbs		0	80	9	531	78	0.18	0.01	10.10	0.27

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
	Total for Perennial Forbs	128	151	223	169	255	1.22	2.02	9.35	6.85
	Total for Forbs	128	231	232	700	333	1.40	2.04	19.46	7.12

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

BROWSE TRENDS--

Management unit 16B, Study no: 18

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	<i>Artemisia tridentata wyomingensis</i>	85	95	42	42	10.81	11.91	1.36	.52
B	<i>Ceratoides lanata</i>	0	0	0	3	-	-	-	.03
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	0	4	1	5	-	.03	.00	.09
B	<i>Gutierrezia sarothrae</i>	3	11	0	0	.03	.10	-	-
B	<i>Kochia prostrata</i>	0	0	0	8	-	-	-	.06
B	<i>Opuntia fragilis</i>	93	93	80	68	2.96	3.74	2.83	2.81
	Total for Browse	181	203	123	126	13.81	15.78	4.19	3.52

CANOPY COVER, LINE INTERCEPT--

Management unit 16B, Study no: 18

Species	Percent Cover	
	'04	'09
<i>Artemisia tridentata wyomingensis</i>	1.36	.46
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	-	.25
<i>Opuntia fragilis</i>	2.78	1.36

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16B, Study no: 18

Species	Average leader growth (in)	
	'04	'09
<i>Artemisia tridentata wyomingensis</i>	3.2	1.8

BASIC COVER--

Management unit 16B, Study no: 18

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	5.50	27.77	31.73	26.38	32.28
Rock	0	.00	0	0	0
Pavement	0	.05	.00	.05	.00
Litter	49.50	35.52	29.25	42.54	39.57
Cryptogams	2.25	.90	7.30	.72	.27
Bare Ground	42.75	35.40	26.54	44.39	41.62

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 18, Study Name: Porphyry Bench

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.1	8.1	47.3	30.2	22.6	1.1	12.3	25.6	0.6

PELLET GROUP DATA--

Management unit 16B, Study no: 18

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	21	32	19	42	-	-	-
Elk	11	2	4	5	1 (3)	31 (76)	40 (98)
Deer	52	79	67	63	149 (369)	317 (784)	217 (536)
Cattle	-	1	-	-	4 (9)	-	-
Antelope	-	-	-	1	-	-	-

BROWSE CHARACTERISTICS--

Management unit 16B, Study no: 18

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata wyomingensis</i>									
88	6931	19	35	46	66	35	48	13	17/21
94	6200	4	71	25	-	2	0	6	17/24
99	7540	10	62	28	60	31	56	7	16/24
04	1200	3	2	95	40	10	88	87	13/18
09	1180	19	17	64	-	7	64	29	9/12
<i>Atriplex canescens</i>									
88	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	12/11
<i>Ceratoides lanata</i>									
88	199	33	67	-	-	33	33	0	15/8
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	12/11
09	60	0	100	-	-	0	0	0	12/10
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	100	0	100	-	-	0	0	0	4/10
04	40	0	100	-	-	0	0	0	8/8
09	440	50	50	-	-	0	5	0	5/9

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Gutierrezia sarothrae</i>										
88	1065	25	75	-	-	0	0	0	8/4	
94	80	0	100	-	-	0	0	0	6/7	
99	1040	54	46	-	-	0	0	0	3/5	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	7/10	
<i>Kochia prostrata</i>										
88	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	220	0	100	-	-	64	27	0	6/8	
<i>Opuntia fragilis</i>										
88	8131	43	52	5	266	0	0	4	3/9	
94	6960	1	98	1	-	0	0	0	3/12	
99	7360	4	86	10	20	0	0	15	3/12	
04	5080	2	85	13	-	0	0	6	4/13	
09	4040	1	87	12	20	0	0	6	3/12	

NORTH SPRING BENCH - TREND STUDY NO. 16B-19-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: Upland Stony Loam (Pinyon-Utah Juniper), R034XY330UT

Land Ownership: BLM

Elevation: 6,600 ft (2,012 m)

Aspect: East

Slope: 2%-4%

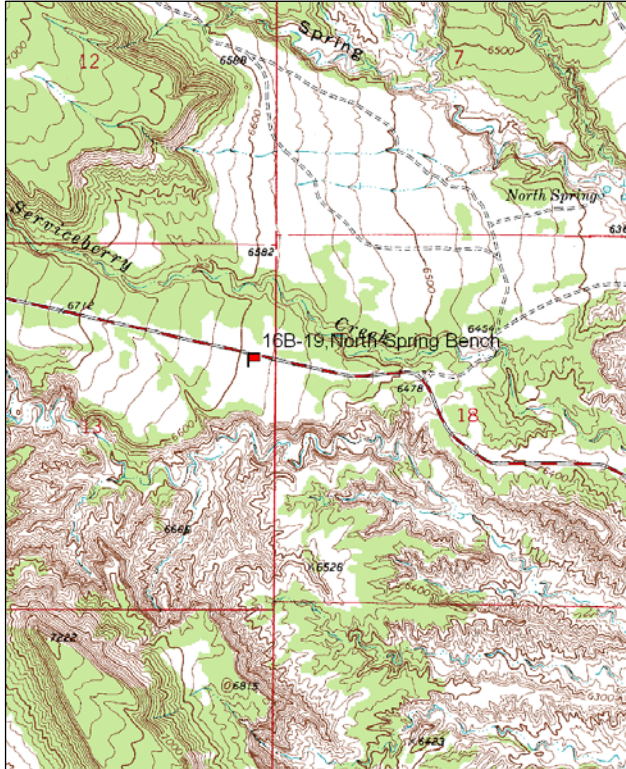
Transect bearing: 165 degrees magnetic

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

Directions:

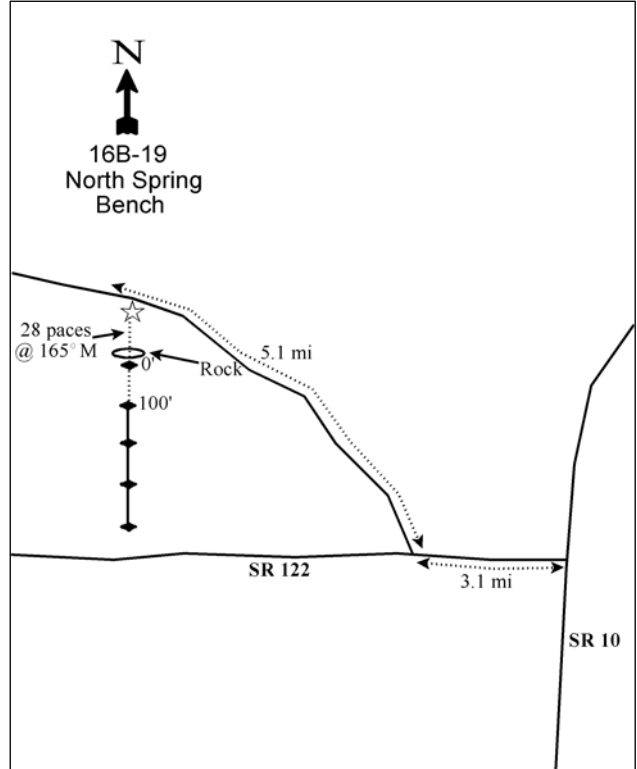
From the junction of state highways 10 and 122 south of Price, go west on SR 122. Go 3.1 miles to a major fork. Go right towards Wattis for 5.1 miles. Look for a witness post 10 feet off the south side of the road in a sagebrush flat. The first baseline stake is 28 paces south of the witness post at 165° M, and located behind a large rock. It is marked with a red browse tag (#9013). The other study posts, all 18" fenceposts, are south at 100 foot intervals.

Map Name: Pinnacle Peak



Township: 15S, Range: 9E, Section: 18

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 502836 E 4374797 N

NORTH SPRING BENCH - TREND STUDY NO. 16B-19

Site Information

Site Description: The study is located on a sagebrush flat surrounded by mature pinyon-juniper below Watis in the Spring Creek area. The area is managed by the BLM as part of the North Springs allotment and is used by sheep from May 1 to June 30. Deer often occupy the area until the first of May. This southern end of the Gordon Creek sagebrush range receives heavy use by deer. Pellet group data indicate deer use has been extremely heavy since 1999. Estimated elk use has steadily increased from no use in 1999, light use in 2004, to lightly moderate use in 2009. Estimated sheep use was moderate in 2009 (Table - Pellet Group Data).

Browse: The key browse species in the area is Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). There was a large die-off of sagebrush between the 1999 and 2004 sample years that is attributed to a drought period in the years prior to 2004. Cover of sagebrush decreased from 14% to 4% over those years (Table - Browse Trends). The average height/crown of sagebrush also decreased substantially over the same period. In 2004, 97% of the sagebrush plants were classified as decadent with 91% of the population displaying poor vigor. Recruitment of young plants comprised the other 3% of the sagebrush population. Decadence and poor vigor in the sagebrush population decreased in 2009, but were still high. Recruitment of young sagebrush plants has fluctuated over the sample years, but was good in 2009. Utilization of sagebrush has been mostly heavy since 1999 (Table - Browse Characteristics).

Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees surround the site and are encroaching into the sagebrush flat. Pinyon pine is the dominant species in cover on the site. The pinyon population on the site appears to be maturing and infilling as point quarter density estimates have not increased markedly, but cover and average basal diameter of pinyon trees has steadily increased (Table - Point Quarter Tree Data, Table - Browse Trends). The trees also appear to be getting taller as 53% were classified as 1-4 feet tall in 2004, and 45% were classified as 4-8 feet tall in 2009.

Herbaceous Understory: The grasses also decreased substantially in cover and frequency in 2004, similar to sagebrush. Blue grama (*Bouteloua gracilis*) has been the dominant grass species on this site historically, but needle-and-thread (*Stipa comata*) currently dominates the grasses in cover and frequency. Cheatgrass (*Bromus tectorum*) has increased significantly on the site since 1999. Cheatgrass cover and nested frequency appears to be dependant on the precipitation pattern over the sample years (Table - Herbaceous Trends). Other prevalent native perennial grasses on the site include bottlebrush squirreltail (*Sitanion hystrix*), Indian ricegrass (*Oryzopsis hymenoides*), and western wheatgrass (*Agropyron smithii*). Perennial forbs are not abundant on the site. Almost all of the perennial forb cover is provided by one species, scarlet globemallow (*Sphaeralcea coccinea*). The cover of scarlet globemallow increased substantially in 2004 and there was a significant increase in nested frequency in 2009.

Soil: The soil is a sandy clay loam with a neutral pH and a moderately deep effective rooting depth (Table - Soil Analysis Data). A calcium carbonate hardpan is present about 12 inches below the surface which may be restrictive to plants roots. There are no major gullies, but nearby washes show continued down cutting and active erosion. Bare ground cover is moderately high with litter providing the majority of the protective ground cover. Cryptogam cover has decreased since 1999 (Table - Basic Cover), with most cryptogam cover occurring under or near protective shrub cover. The soil erosion condition was classified as stable in 2004 and slight in 2009 due primarily to flow patterns and pedestaling of plants.

Trend Assessments

Browse:

- **1988 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. Decadence of sagebrush increased

slightly, but was already high. Sagebrush plants displaying poor vigor also increased slightly and recruitment of young sagebrush plants decreased slightly.

- **1994 to 1999 - up (+2):** The density of sagebrush increased by 38% to 6,320 plants/acre and cover increased slightly from 13% to 14%. Decadence and poor vigor of sagebrush both decreased, and recruitment of young sagebrush plants increased to 23% of the population.
- **1999 to 2004 - down (-2):** There was a substantial die-off of sagebrush with a 67% decrease in density to 2,060 plants/acre. Cover of sagebrush decreased to just 4%. Almost the entire sagebrush population was decadent with 97% of the population classified as decadent. Young sagebrush plants made up the other 3% of the population. Plants displaying poor vigor comprised 91% of the population.
- **2004 to 2009 - slightly up (+1):** There was a 9% increase in the density of sagebrush to 2,240 plants/acre, though cover decreased slightly. Decadence and poor vigor both decreased, but remained high in the population. Recruitment of young sagebrush plants increased to 13% of the population.

Grass:

- **1988 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 23%. There was a significant decrease in the nested frequency of blue grama and bottlebrush squirreltail.
- **1994 to 1999 - slightly up (+1):** There was a 9% increase in the sum of nested frequency and cover of perennial grasses, but there was a significant increase in the nested frequency of cheatgrass. There was also a significant increase in the nested frequency of western wheatgrass and Indian ricegrass, with 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 24% and cover decreased from 12% to 6%. There was a significant decrease in the nested frequency of western wheatgrass, blue grama, and Indian ricegrass. There was a significant increase in the nested frequency of needle-and-thread.
- **2004 to 2009 - up (+2):** There was a 51% increase in the sum of nested frequency of perennial grasses and cover increased to 13%. There was a significant increase in the nested frequency of needle-and-thread grass as well as cheatgrass. Needle-and-thread became the dominant grass in cover and frequency.

Forb:

- **1988 to 1994 - stable (0):** There was a decrease in the sum of nested frequency of perennial forbs, but forbs are rare on this site.
- **1994 to 1999 - up (+2):** There was a substantial increase in the sum of nested frequency of perennial forbs, but cover is still less than 1%.
- **1999 to 2004 - up (+2):** The sum of nested frequency of perennial forbs increased by 21% and cover increased to 3%. The increase is due to a substantial increase in the cover of scarlet globemallow.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs.

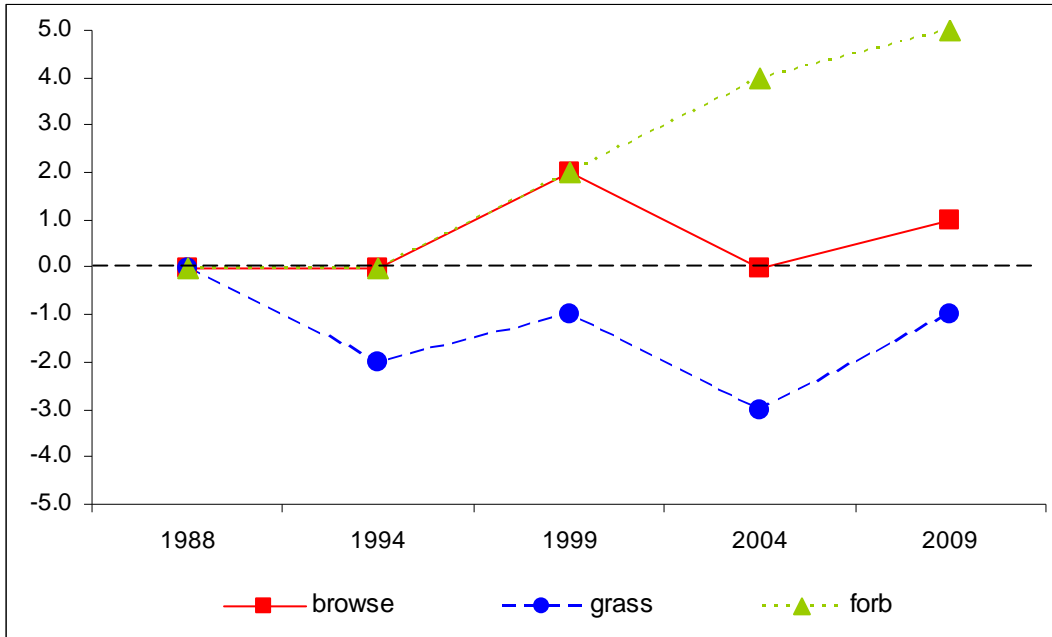
DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 16B, study no: 19

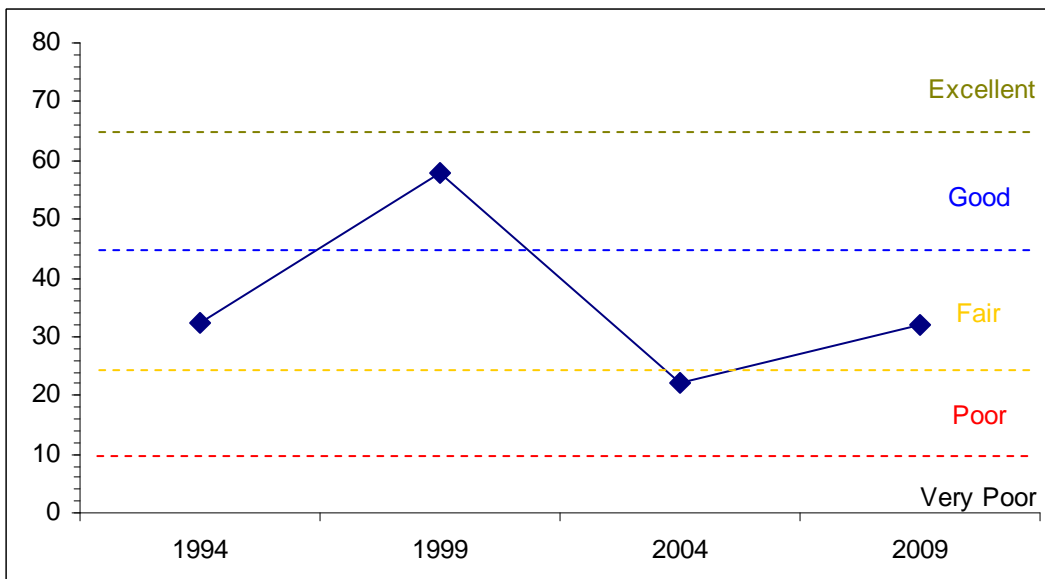
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	15.9	-3.6	1.5	18.5	0.0	0.1	0.0	32.5	Fair
99	17.1	5.7	11.5	23.3	-0.7	0.9	0.0	57.8	Good
04	4.6	0.0	0.0	12.2	-0.1	5.3	0.0	22.0	Poor
09	3.5	0.0	0.0	26.0	-0.9	3.5	0.0	32.2	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16B, Study no: 19



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 16B, Study no: 19



HERBACEOUS TRENDS--

Management unit 16B, Study no: 19

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	b99	b125	c171	a18	a53	.85	2.81	.18	.39
G	Agropyron spicatum	-	-	-	6	11	-	-	.01	.05
G	Bouteloua gracilis	c213	b147	b136	a96	ab118	6.20	5.74	2.65	3.27
G	Bromus tectorum (a)	-	a7	b96	ab15	c149	.01	.88	.08	1.19
G	Oryzopsis hymenoides	abc37	a23	c64	ab30	bc56	.22	1.22	.13	.68
G	Sitanion hystrix	c153	a76	ab80	ab75	bc103	1.57	1.72	1.00	1.87
G	Sporobolus cryptandrus	-	9	-	-	-	.04	-	-	-
G	Stipa comata	b35	b35	a1	c120	d181	.36	.15	2.13	6.74
G	Vulpia octoflora (a)	-	-	-	-	4	-	-	-	.01
Total for Annual Grasses		0	7	96	15	153	0.01	0.87	0.08	1.20
Total for Perennial Grasses		537	415	452	345	522	9.26	11.65	6.12	13.01
Total for Grasses		537	422	548	360	675	9.27	12.53	6.21	14.22
F	Arabis sp.	-	-	-	-	2	-	-	-	.03
F	Astragalus convallarius	-	-	3	4	1	-	.00	.03	.00
F	Calochortus nuttallii	-	-	-	1	-	-	-	.01	-
F	Castilleja linariaefolia	-	-	2	-	-	-	.06	-	-
F	Caulanthus crassicaulis	2	-	-	-	-	-	-	-	-
F	Chaenactis douglasii	-	-	1	-	4	-	.00	-	.01
F	Chenopodium fremontii (a)	-	a-	a-	b31	a-	-	-	.18	-
F	Chenopodium leptophyllum(a)	-	a-	a-	b154	a-	-	-	1.35	-
F	Cryptantha sp.	a-	a-	a-	b35	a4	-	-	.78	.00
F	Cymopterus sp.	-	-	1	5	-	-	.00	.01	-
F	Descurainia pinnata (a)	-	b19	ab5	b10	a-	.03	.01	.04	-
F	Epilobium brachycarpum (a)	-	-	-	-	2	-	-	-	.00
F	Erigeron sp.	3	-	-	-	-	-	-	-	-
F	Eriogonum cernuum (a)	-	ab5	a-	b15	a4	.03	-	.08	.03
F	Gayophytum ramosissimum(a)	-	a-	a-	b110	a-	-	-	.97	-
F	Gilia sp. (a)	-	a-	a-	b117	a-	-	-	1.12	-
F	Helianthella uniflora	-	-	-	-	3	-	-	-	.00
F	Lappula occidentalis (a)	-	a-	ab15	b122	a1	-	.06	1.34	.00
F	Leucelene ericoides	-	-	-	-	4	-	-	.00	.01
F	Oenothera sp.	-	-	-	1	-	-	-	.00	-
F	Phlox longifolia	a11	a1	b47	b41	a11	.00	.15	.16	.04
F	Plantago patagonica (a)	-	a10	b50	c129	a17	.02	.15	1.88	.05
F	Ranunculus testiculatus (a)	-	-	-	-	3	-	-	-	.00
F	Salsola iberica (a)	-	a-	a-	b23	a-	-	-	.21	-
F	Schoenrambe linifolia	a-	a-	b22	b16	b26	-	.04	.14	.21
F	Sphaeralcea coccinea	a23	a23	a48	a50	b96	.05	.17	1.47	1.43
F	Thermopsis montana	-	-	1	-	-	-	.00	-	-
F	Townsendia sp.	-	-	2	1	1	-	.00	.00	.00
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	34	70	711	27	0.09	0.22	7.20	0.09
Total for Perennial Forbs		40	24	127	154	152	0.05	0.46	2.64	1.76

Type	Species	Nestled Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
	Total for Forbs	40	58	197	865	179	0.15	0.68	9.84	1.86

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

BROWSE TRENDS--

Management unit 16B, Study no: 19

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	86	95	62	62	12.75	13.66	3.66	2.82
B	Atriplex canescens	0	1	0	0	-	.00	-	-
B	Ephedra viridis	0	0	1	0	-	-	.00	-
B	Gutierrezia sarothrae	28	88	30	70	.08	3.01	.32	1.24
B	Juniperus osteosperma	0	0	1	2	1.25	-	.15	.38
B	Opuntia fragilis	75	76	51	47	1.29	2.41	1.03	.53
B	Pinus edulis	0	3	3	3	3.08	4.51	2.00	11.48
B	Symphoricarpos oreophilus	0	0	0	1	-	-	-	.00
	Total for Browse	189	263	148	185	18.48	23.60	7.18	16.46

CANOPY COVER, LINE INTERCEPT--

Management unit 16B, Study no: 19

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata wyomingensis	-	1.79	1.86
Gutierrezia sarothrae	-	.21	1.41
Opuntia fragilis	-	.20	.20
Pinus edulis	10.19	12.06	12.25

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16B, Study no: 19

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.1	1.7

POINT-QUARTER TREE DATA--

Management unit 16B, Study no: 19

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	17	-	27	2.7	-	3.1
Pinus edulis	100	146	133	2.1	2.6	2.9

BASIC COVER--

Management unit 16B, Study no: 19

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	12.25	26.72	36.40	22.96	33.59
Rock	1.25	1.11	.79	.83	.43
Pavement	.25	.20	.27	.54	.06
Litter	27.25	34.23	32.38	37.97	47.29
Cryptogams	6.50	2.03	8.32	2.43	1.81
Bare Ground	52.50	46.56	36.29	45.27	39.84

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 19, Study Name: North Spring Bench

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16	7.2	57.3	20.2	22.6	1.2	10.9	51.2	0.6

PELLET GROUP DATA--

Management unit 16B, Study no: 19

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Sheep	-	-	-	1	-	-	18 (45)
Rabbit	45	54	44	62	-	-	-
Elk	4	-	12	11	-	10 (25)	26 (65)
Deer	76	82	68	79	159 (392)	263 (650)	142 (350)

BROWSE CHARACTERISTICS--

Management unit 16B, Study no: 19

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Artemisia tridentata wyomingensis</i>									
88	6065	4	44	52	-	53	32	10	14/18
94	4580	3	36	62	1180	49	8	27	37/35
99	6320	23	46	31	760	15	48	14	17/26
04	2060	3	0	97	20	3	88	91	12/18
09	2240	13	19	68	20	8	72	56	14/13
<i>Atriplex canescens</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	60	100	0	-	-	100	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	28/19

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
88	199	33	67	-	-	67	0	33	6/5
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	10/9
09	0	0	0	-	-	0	0	0	-/-
<i>Ephedra viridis</i>									
88	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	13/18
09	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
88	17265	27	69	3	1199	4	.77	.38	7/5
94	860	23	74	2	-	0	0	0	6/6
99	16500	24	76	0	1020	9	.36	.60	4/6
04	1340	7	93	0	160	6	0	0	5/6
09	5480	13	86	1	20	0	.72	1	6/6
<i>Juniperus osteosperma</i>									
88	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	40	100	0	-	-	0	0	0	-/-
<i>Opuntia fragilis</i>									
88	7199	32	52	16	-	0	0	22	2/4
94	4800	3	97	0	-	0	0	0	2/8
99	4900	15	78	7	-	0	0	19	2/6
04	1920	14	81	5	-	0	0	3	3/7
09	1880	5	83	12	-	0	0	13	2/7
<i>Pinus edulis</i>									
88	265	75	25	-	-	75	0	0	109/118
94	0	0	0	-	-	0	0	0	-/-
99	60	67	33	-	-	0	0	0	-/-
04	60	0	100	-	-	0	0	0	-/-
09	60	67	33	-	-	0	0	0	-/-
<i>Symphoricarpos oreophilus</i>									
88	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	40	0	100	-	-	0	0	0	-/-

TELEPHONE BENCH - TREND NO. 16B-20-09

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: [Mountain Shallow Loam \(Mountain Big Sagebrush\), R047XA446UT](#)

Land Ownership: DWR

Elevation: 7,500 ft (2,286 m)

Aspect: Northeast

Slope: 3%-5%

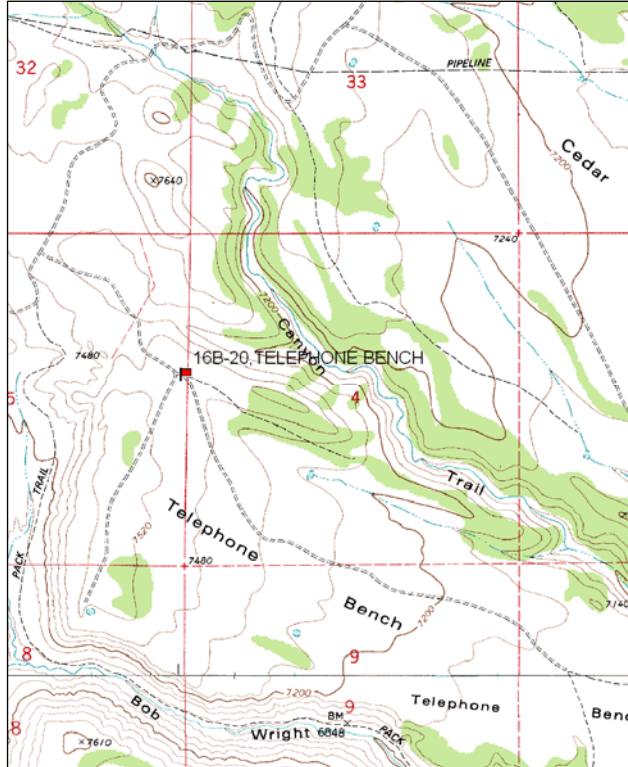
Transect bearing: 165 degrees magnetic

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

Directions:

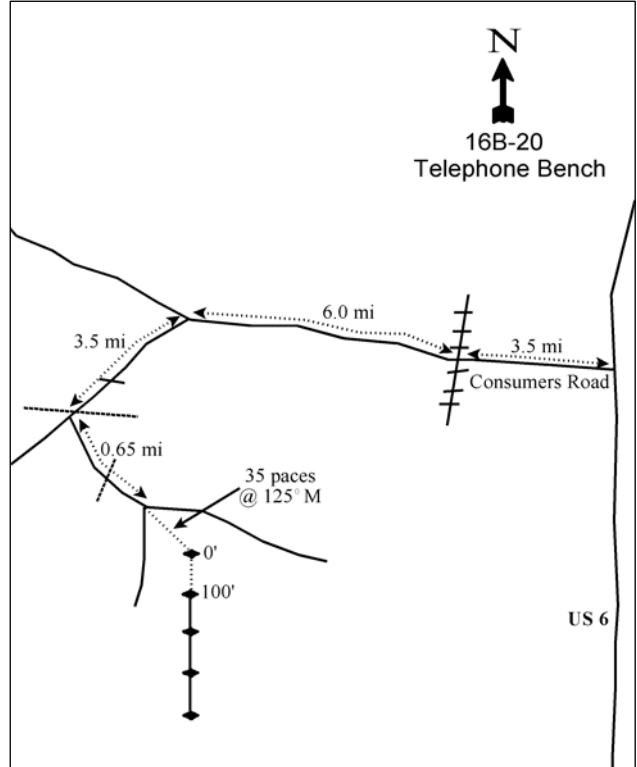
From the intersection of US 6 and the Consumers Road south of Helper, go 3.5 miles to a railroad crossing. Continue up the oiled road 6.0 miles. Turn left onto a dirt road, cross Gordon Creek and proceed approximately 2.3 miles to a cattleguard. Go 1.2 miles to a wire fence. Just beyond the fence, turn left at the fork and go 0.45 miles to another fence. Continue on 0.2 miles to a fork at the top of the hill. The study site is between the forks. The 0-foot baseline stake is 35 paces southeast of fork. The study is marked by cut green fenceposts about 18" tall.

Map Name: Jump Creek



Township: 14S, Range: 8E, Section: 5

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 496377 E 4387484 N

TELEPHONE BENCH - TREND STUDY NO. 16B-20

Site Information

Site Description: The Telephone Bench area is owned by the Utah Division of Wildlife Resources and is located west of Price. This study samples a big sagebrush/grass community on the northern end of Telephone Bench. This site is the highest of the winter range study sites in the area. Pellet group data indicated light deer use in 1999, increasing to moderate use since 2004. Estimated elk use has been high since 1999. Cattle use has been minimal since 1999 (Table - Pellet Group Data).

Browse: The dominant browse species on the site is black sagebrush (*Artemisia nova*). There was a die-off of sagebrush on this site between 1999 and 2004, but the decrease was not as large as other sites in the unit. The sagebrush die-off is attributed to a severe drought prior to the 2004 sample year. Decadence of black sagebrush was high at the outset of the study, but improved markedly between 1994 and 1999. Vigor of black sagebrush has been mostly good over the sample years. Recruitment of young black sagebrush plants was mostly good from 1988 to 2004, and increased substantially in 2009 comprising 77% of the population that year. Utilization of black sagebrush has been mostly light to moderate since the outset of the study in 1988 (Table - Browse Characteristics).

Other preferred browse species sampled on the site were Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and dwarf rabbitbrush (*Chrysothamnus depressus*). None of these species provides substantial cover (Table - Browse Trends). There is also a population of broom snakeweed (*Gutierrezia sarothrae*) on the site that has had a fluctuating density over the sample years (Table - Browse Characteristics).

Herbaceous Understory: Native perennial grasses dominate the site and are fairly diverse. The composition of grasses has fluctuated over the sample years. Several species, western and bluebunch wheatgrass (*Agropyron smithii* and *A. spicatum*), and mutton and Sandberg bluegrass (*Poa fendleriana* and *P. secunda*), were respectively identified as individual species in early sample years. Salina wildrye (*Elymus salina*) is currently the dominant grass species on the site with other important species being bluebunch wheatgrass and Sandberg bluegrass. Perennial forbs on the site are diverse, but not particularly abundant. There has been an average of 20 perennial forb species sampled each year since 1988 (Table - Herbaceous Trends).

Soil: The soil is a dense clay loam with a slightly alkaline pH and a somewhat shallow effective rooting depth. Phosphorus is limiting to plant growth and development at 5.7 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). There is a moderate amount of bare ground cover on the site, but litter and vegetation cover from herbaceous species provides protective ground cover. Cryptogam cover has decreased steadily since 1999 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004, but increased to slight in 2009 due primarily to pedestaling of plants and flow patterns.

Trend Assessments

Browse:

- **1988 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, black sagebrush, has remained high and plants displaying poor vigor increased. Recruitment of young black sagebrush plants decreased, but remained good. Decadence and poor vigor of mountain big sagebrush also increased slightly.
- **1994 to 1999 - slightly up (+1):** There was little change in the density of black sagebrush, but decadence decreased from 55% to 15% and poor vigor decreased from 34% to 3%. There was also a slight improvement in the recruitment of young sagebrush plants.

- **1999 to 2004 - down (-2):** Density of black sagebrush decreased by 35% from 6,840 plants/acre to 4,480 plants/acre, and cover decreased from 8% to 4%. Decadence of black sagebrush increased to 25% and poor vigor increased to 13%. Recruitment of young black sagebrush plants decreased to 9% of the population.
- **2004 to 2009 - up (+2):** Density of black sagebrush increased to over 33,000 plants/acre due to a substantial increase in young plants, which comprised 77% of the population. Many of the young plants will likely die before maturity. Density of mature black sagebrush plants increased from 2,980 plants/acre to 7,000 plants/acre. Cover of black sagebrush increased to 8%.

Grass:

- **1988 to 1994 - up (+2):** The sum of nested frequency of perennial grasses increased 51% with a significant increase in the nested frequency of *Poa spp.*, and Salina wildrye was sampled for the first time. There was a significant decrease in the nested frequency of *Agropyron spp.*
- **1994 to 1999 - stable (0):** There was a slight increase in the sum of nested frequency of perennial grasses and cover increased from 16% to 21%.
- **1999 to 2004 - slightly down (-1):** There was a 20% decrease in nested frequency and cover decreased to 17%. There was a significant decrease in the nested frequency of bluebunch wheatgrass, western wheatgrass, mutton bluegrass, and bottlebrush squirreltail (*Sitanion hystrix*). There was a significant increase in the nested frequency of Sandberg bluegrass.
- **2004 to 2009 - stable (0):** There was a slight increase in the sum of nested frequency of perennial grasses and cover increased to 21%. There was a significant increase in the nested frequency of Salina wildrye and a significant decrease in the nested frequency of Sandberg bluegrass.

Forb:

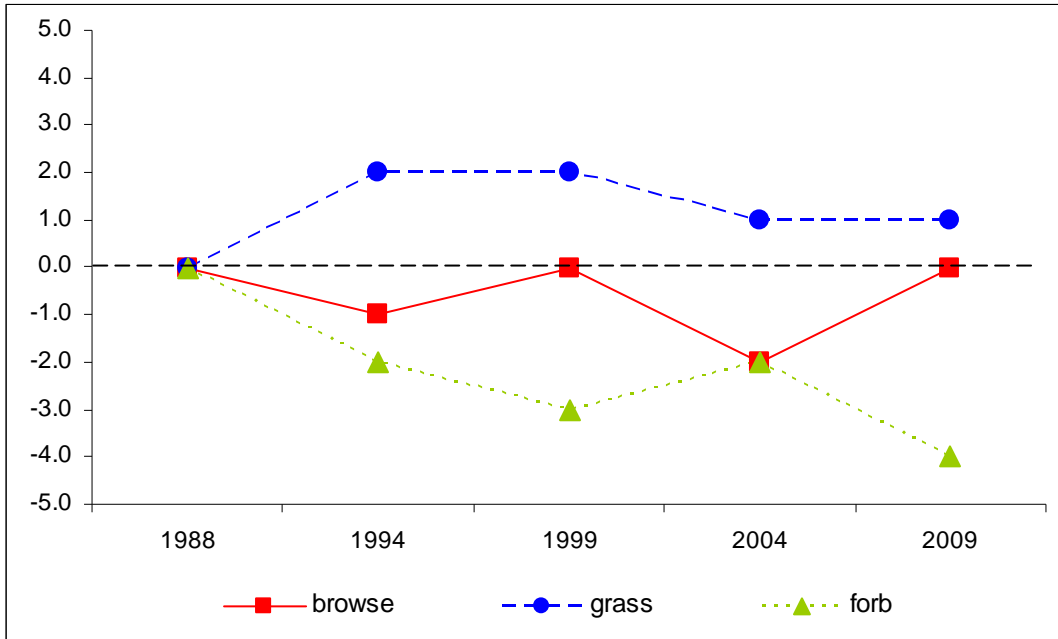
- **1988 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased by 37% with a significant decrease in nested frequency of many perennial forbs.
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 26%, but cover increased from 3% to over 4%.
- **1999 to 2004 - slightly up (+1):** There was an 11% increase in the sum of nested frequency and cover increased to 6%. Most of the change is due to a significant increase in the nested frequency of bladderpod (*Lesquerella sp.*).
- **2004 to 2009 - down (-2):** The sum of nested frequency of perennial forbs decreased by 33% and cover decreased to 3%. There was a significant decrease in the nested frequency of bladderpod.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 16B, study no: 20

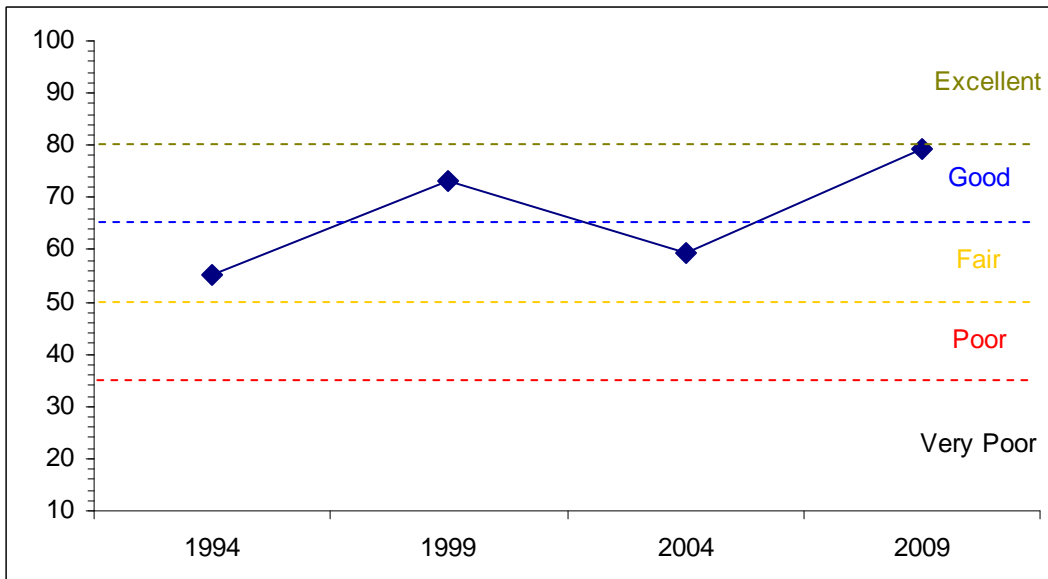
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	11.5	4.5	3.9	30.0	0.0	5.4	0.0	55.3	Fair
99	15.7	12.1	6.3	30.0	0.0	9.0	0.0	73.1	Good
04	7.7	8.4	3.4	30.0	0.0	10.0	0.0	59.5	Fair
09	14.1	14.3	15.0	30.0	0.0	5.7	0.0	79.1	Good-Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16B, Study no: 20



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 16B, Study no:20



HERBACEOUS TRENDS--
Management unit 16B, Study no: 20

T y p e	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	_d 265	_c 238	_b 72	_a 11	_a 4	8.94	.72	.59	.03
G	Agropyron spicatum	_a -	_a -	_c 239	_b 131	_b 160	-	12.92	3.01	6.44
G	Bouteloua gracilis	15	13	22	15	18	.48	.46	.86	1.44
G	Bromus tectorum (a)	-	-	-	4	-	-	-	.01	-
G	Elymus salina	_a -	_b 65	_b 78	_b 60	_c 114	2.37	4.17	3.00	8.89
G	Koeleria cristata	-	3	3	-	-	.01	.03	-	-
G	Oryzopsis hymenoides	-	3	3	10	6	.00	.00	.31	.01
G	Poa fendleriana	_c 95	_d 250	_b 36	_a 1	_{ab} 20	4.42	.41	.00	.45
G	Poa secunda	_a -	_a -	_b 156	_d 274	_c 213	-	2.30	8.67	3.77
G	Sitanion hystrix	_{abc} 16	_c 26	_{bc} 22	_a 4	_{ab} 8	.13	.44	.03	.21
G	Stipa comata	4	-	-	-	-	-	-	-	-
Total for Annual Grasses		0	0	0	4	0	0	0	0.00	0
Total for Perennial Grasses		395	598	631	506	543	16.36	21.48	16.50	21.28
Total for Grasses		395	598	631	510	543	16.36	21.48	16.51	21.28
F	Agoseris glauca	-	-	5	-	1	-	.04	.00	.03
F	Antennaria rosea	_b 59	_b 46	_{ab} 15	_a 2	_a -	.90	.26	.00	-
F	Arabis sp.	8	2	4	1	5	.00	.01	.00	.01
F	Astragalus convallarius	_c 91	_b 40	_b 52	_b 60	_a 8	.14	.77	.50	.05
F	Astragalus tenellus	10	1	9	-	2	.00	.64	-	.00
F	Balsamorhiza hookeri	_b 22	_a -	_a -	_a -	_a -	-	-	-	-
F	Calochortus nuttallii	_a -	_a 4	_a 3	_b 27	_a 7	.01	.00	.07	.01
F	Castilleja linariaefolia	_b 137	_a 21	_a 29	_a 12	_a 34	.06	.19	.14	.45
F	Chenopodium album (a)	-	-	-	-	2	-	-	-	.00
F	Collinsia parviflora (a)	-	_a 3	_a -	_b 67	_c 163	.00	-	.25	1.12
F	Comandra pallida	_{ab} 20	_b 24	_b 31	_{ab} 15	_a 3	.15	.37	.09	.00
F	Crepis acuminata	_a 2	_b 36	_a 1	_a -	_{ab} 7	.26	.03	.00	.07
F	Cymopterus sp.	-	-	-	-	1	-	-	-	.03
F	Delphinium nuttallianum	-	-	-	3	1	-	-	.00	.00
F	Descurainia pinnata (a)	-	_a 3	_a 1	_b 18	_a -	.00	.03	.03	-
F	Erigeron eatonii	_c 64	_b 37	_{ab} 15	_a -	_a 1	.19	.04	-	.03
F	Eriogonum jamesii	11	12	10	12	19	.34	.24	.48	.64
F	Gilia sp. (a)	-	4	-	-	-	.01	-	-	-
F	Hymenoxys acaulis	10	-	4	3	5	-	.06	.03	.04
F	Lappula occidentalis (a)	-	_a 3	_a -	_c 124	_b 30	.00	-	2.05	.08
F	Lesquerella sp.	_a 20	_{ab} 47	_b 63	_c 151	_a 17	.10	.48	3.35	.04
F	Lomatium sp.	-	6	1	-	-	.01	.03	-	-
F	Machaeranthera grindelioides	_b 26	_{ab} 11	_{ab} 15	_a 5	_a 6	.03	.39	.06	.07
F	Paronychia sessiliflora	10	-	-	-	-	-	-	-	-
F	Pedicularis centranthera	_a -	_a -	_a -	_b 11	_b 12	-	-	.39	.39
F	Penstemon carnosus	_a -	_a -	_a -	_b 13	_b 13	-	-	.06	.06
F	Penstemon watsonii	_b 45	_b 38	_b 50	_a 2	_a 2	.10	.79	.03	.03
F	Phlox longifolia	_c 175	_b 119	_a 8	_a 5	_a 35	.27	.01	.04	.17
F	Polygonum douglasii (a)	-	2	-	4	-	.00	-	.01	-

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
F	Ranunculus testiculatus (a)	-	-	-	-	2	-	-	-	.01
F	Schoenocrambe linifolia	-	-	-	2	12	-	-	.03	.05
F	Senecio multilobatus	2	-	5	12	-	-	.01	.25	-
F	Sphaeralcea coccinea	a1	ab5	bc20	bc19	c25	.06	.09	.44	.45
F	Trifolium gymnocarpon	c30	ab16	a3	bc22	abc19	.04	.00	.16	.15
F	Zigadenus paniculatus	a-	a-	a-	a5	b22	-	-	.01	.05
Total for Annual Forbs		0	15	1	213	197	0.02	0.03	2.35	1.21
Total for Perennial Forbs		743	465	343	382	257	2.71	4.48	6.20	2.87
Total for Forbs		743	480	344	595	454	2.74	4.51	8.56	4.09

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

BROWSE TRENDS--

Management unit 16B, Study no: 20

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	9	10	11	11	.56	.38	.56	.78
B	Artemisia nova	94	96	84	98	5.24	7.77	4.29	8.16
B	Artemisia tridentata vaseyana	8	12	5	6	.83	.03	.00	.16
B	Chrysothamnus depressus	84	80	56	61	2.48	4.32	1.16	2.00
B	Chrysothamnus viscidiflorus viscidiflorus	48	38	10	16	.90	.66	.00	.10
B	Eriogonum corymbosum	3	5	0	1	.03	.09	-	.00
B	Gutierrezia sarothrae	54	68	82	40	1.54	1.50	3.17	.13
B	Opuntia sp.	2	0	0	2	.00	-	-	.03
B	Pediocactus simpsonii	1	1	1	3	.01	.00	.00	.00
B	Tetradymia canescens	2	5	5	4	.00	.00	.00	.00
Total for Browse		305	315	254	242	11.61	14.75	9.20	11.38

CANOPY COVER, LINE INTERCEPT--

Management unit 16B, Study no: 20

Species	Percent Cover	
	'04	'09
Amelanchier utahensis	.08	-
Artemisia nova	5.30	8.41
Artemisia tridentata vaseyana	.25	.01
Chrysothamnus depressus	1.06	1.91
Chrysothamnus viscidiflorus viscidiflorus	.15	.03
Gutierrezia sarothrae	2.23	.35

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16B, Study no: 20

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	1.6	1.9
Artemisia tridentata vaseyana	3.2	1.6

BASIC COVER--

Management unit 16B, Study no: 20

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	14.00	32.61	37.92	32.43	41.22
Rock	4.25	2.26	1.97	2.67	2.17
Pavement	1.00	.54	.61	.52	.40
Litter	42.00	42.15	24.82	28.38	35.36
Cryptogams	3.75	4.62	6.30	2.60	.61
Bare Ground	35.00	34.70	31.67	45.57	36.15

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 20, Study Name: Telephone Bench

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.2	7.4	38.4	29.8	31.8	1.7	5.7	83.2	0.5

PELLET GROUP DATA--

Management unit 16B, Study no: 20

Type	Quadrat Frequency			
	'94	'99	'04	'09
Sheep	-	1	-	-
Rabbit	20	6	4	9
Elk	51	37	61	34
Deer	18	16	7	24
Cattle	-	-	-	-

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	-	-
72 (179)	94 (233)	65 (160)
19 (48)	32 (79)	34 (83)
1 (2)	1 (2)	2 (3)

BROWSE CHARACTERISTICS--
Management unit 16B, Study no: 20

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
88	466	100	0	-	66	29	57	0	-/-
94	180	0	100	-	-	44	22	0	63/88
99	200	30	70	-	20	30	70	0	24/28
04	220	0	100	-	-	0	100	0	21/26
09	220	9	91	-	120	0	82	18	25/32
<i>Artemisia nova</i>									
88	6932	27	28	45	2399	11	0	10	10/12
94	6680	13	31	55	120	35	1	34	9/14
99	6840	16	70	15	1460	40	15	3	8/16
04	4480	9	67	25	8160	19	.44	12	9/17
09	33860	77	21	2	4780	33	4	1	8/18
<i>Artemisia tridentata vaseyana</i>									
88	465	43	29	29	66	14	57	0	11/12
94	180	0	67	33	-	78	0	11	18/21
99	360	11	72	17	120	50	28	11	14/19
04	100	0	40	60	-	20	60	20	16/26
09	140	29	43	29	-	29	29	0	15/27
<i>Chrysothamnus depressus</i>									
88	5131	43	55	3	199	1	1	4	5/7
94	6140	1	98	1	-	0	0	.32	4/8
99	6260	5	94	1	680	19	0	0	4/10
04	2240	2	78	21	20	21	9	15	5/8
09	3660	22	76	2	40	30	16	1	4/10
<i>Chrysothamnus nauseosus</i>									
88	66	0	0	100	-	0	100	0	-/-
94	0	0	0	0	-	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	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
88	5599	35	63	2	133	2	0	0	4/6
94	2520	3	96	1	-	0	0	0	4/10
99	1600	1	99	0	-	1	0	0	5/10
04	380	0	100	0	-	5	0	0	5/11
09	560	4	96	0	-	0	0	0	4/9

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Eriogonum corymbosum</i>									
88	0	0	0	-	-	0	0	0	-/-
94	60	0	100	-	-	33	0	0	13/27
99	180	0	100	-	-	11	0	0	10/18
04	0	0	0	-	-	0	0	0	15/23
09	20	0	100	-	-	0	0	0	14/23
<i>Gutierrezia sarothrae</i>									
88	798	50	50	0	-	0	0	0	5/4
94	2320	22	74	4	20	0	0	.86	5/6
99	5940	7	93	0	100	0	0	0	6/7
04	14220	12	88	0	340	0	0	.14	4/7
09	1600	18	68	15	80	0	0	8	4/7
<i>Opuntia sp.</i>									
88	0	0	0	-	-	0	0	0	-/-
94	40	50	50	-	-	0	0	0	2/7
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	40	0	100	-	-	0	0	0	-/-
<i>Pediocactus simpsonii</i>									
88	0	0	0	-	-	0	0	0	-/-
94	20	0	100	-	-	0	0	0	-/-
99	20	0	100	-	-	0	100	0	6/3
04	20	0	100	-	-	0	0	0	1/2
09	80	0	100	-	-	0	0	0	1/3
<i>Sambucus cerulea</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	2/11
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Tetradymia canescens</i>									
88	66	0	100	0	-	100	0	0	12/16
94	40	0	100	0	20	0	0	0	11/14
99	100	20	80	0	-	20	0	0	8/16
04	100	0	80	20	-	0	0	0	10/17
09	80	25	75	0	-	50	0	0	10/21

HUNTINGTON CANYON - TREND STUDY NO. 16B-21-09

Vegetation Type: Perennial Grass

Range Type: Crucial Deer Spring/Fall, Crucial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: DWR

Elevation: 8,880 ft (2,707 m)

Aspect: Southwest

Slope: 35% -> 50%

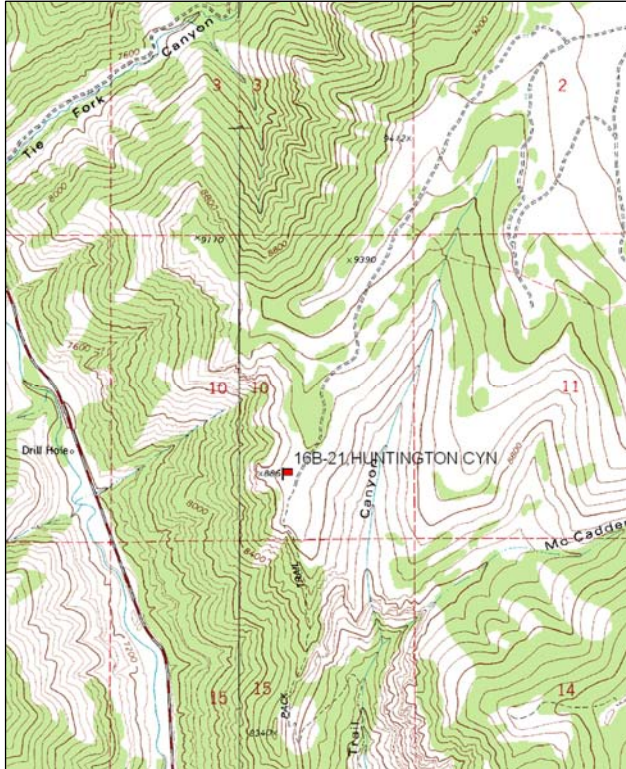
Transect bearing: Line 1 235°M, Lines 2-4 248°M

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

Directions:

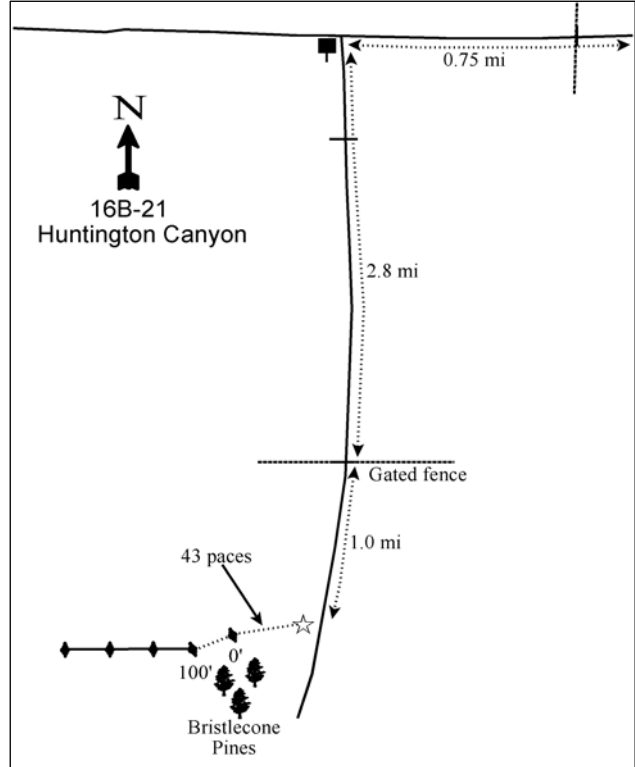
From the ghost town of Mohrland, proceed past the coal loadout and up Cedar Creek. Go 4.5 miles to the top of Gentry Mountain and a three-way junction. Take the middle road (#252) and go 0.1 mile to a fence and cattleguard at the Forest Boundary. Continue 0.65 miles to a fork with a sign, and turn right toward McCadden Hollow. Go 0.7 miles to a cattleguard. Continue 2.1 miles on the main road, passing a few minor forks, to a gated fence. Continue down the road for one mile. There is a witness post on the right. Walk west from the road 43 paces to the edge by a patch of bristlecone pine. The 0' stake is just north of these trees.

Map Name: Hiawatha



Township: 16S, Range: 7E, Section: 10

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 489415 E 4365800 N

HUNTINGTON CANYON - TREND STUDY NO. 16B-21

Site Information

Site Description: The study samples a very steep slope on the east side of Huntington Canyon dominated by Salina wildrye (*Elymus salina*). The windswept ridge tops and steep side hills are important winter range for the elk on Gentry Mountain. Adjacent stands of curlleaf mountain mahogany (*Cercocarpus ledifolius*) have shown signs of heavy elk use in the past. Although mahogany provides good thermal cover, much of the forage is unavailable because the mature trees are highlined. Pellet group transect indicated heavy elk use in 1999 and 2004, but use decreased slightly to moderate use in 2009. Estimated cattle use has been light since 2004 and deer use has been minimal since 1999, with no deer sign sampled in 2009 (Table - Pellet Group Data).

Browse: There is little browse directly on the study transect. There is a patch of curlleaf mahogany next to the study that has shown evidence of heavy browsing in the past. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is also found on the site in low cover (Table - Browse Trends) and density. The mountain big sagebrush population is mostly mature with a high amount of decadence and poor vigor. Utilization of mountain big sagebrush has been mostly light with some years of moderate use. The most numerous shrubs on the site are broom snakeweed (*Gutierrezia sarothrae*) and fringed sagebrush (*Artemisia frigida*) (Table - Browse Characteristics).

Herbaceous Understory: Salina wildrye dominates the community with an average cover of nearly 13% since 1994. Wildrye is also the only grass species of note on the site. Perennial forbs are somewhat diverse, but are not abundant. The perennial forb cover has increased and decreased markedly since 1994, and provided less than 2% cover in 2009 (Table - Herbaceous Trends).

Soil: The soil is very rocky on the surface with rock and pavement fragments loose and easily dislodged downslope. Soil texture is a clay loam with a slightly alkaline pH and has a moderately deep effective rooting depth. Both potassium and phosphorus are limiting to plant growth and development (Table - Soil Analysis Data). Bare ground cover has been low to moderate with high amounts of rock and pavement cover over the sample years (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 and 2009 due to soil and surface litter movement, and flow patterns.

Trend Assessments

Browse:

- **1988 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 no change in decadence or vigor of mountain big sagebrush. Recruitment of young mountain big sagebrush plants decreased with no young plants sampled.
- **1994 to 1999 - slightly up (+1):** Density of the key browse species, mountain big sagebrush, increased slightly from 560 plants/acre to 820 plants/acre, and cover increased from just over 2% to 5%. Decadence of mountain big sagebrush increased from 7% to 20% and recruitment of young plants remained low. Fringed sagebrush also increased in density and cover.
- **1999 to 2004 - slightly down (-1):** The density of mountain big sagebrush decreased 17% to 620 plants/acre. Decadence of mountain big sagebrush increased to 44% and plants displaying poor vigor increased from 2% to 32%. There was a large increase in the density of fringed sagebrush, but a decrease in cover.
- **2004 to 2009 - stable (0):** There was little to no change in the mountain big sagebrush population. Fringed sagebrush density and cover decreased slightly.

Grass:

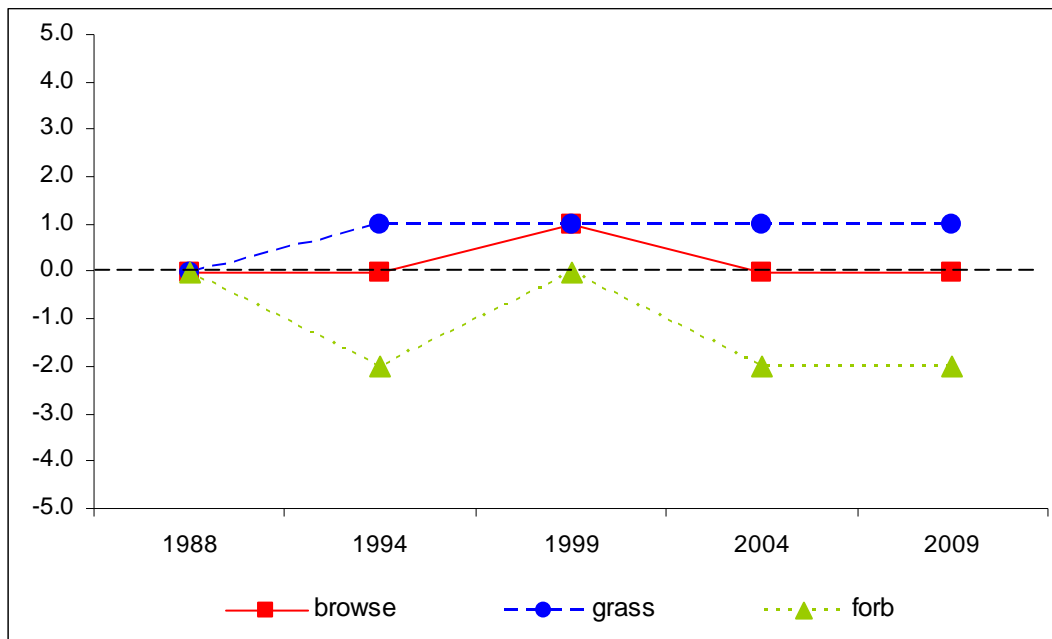
- **1988 to 1994 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 17%.
- **1994 to 1999 - stable (0):** There was little change in cover or the sum of nested frequency of perennial grasses.
- **1999 to 2004 - stable (0):** There was little change in cover or the sum of nested frequency of perennial grasses.
- **2004 to 2009 - stable (0):** There was little change in cover or the sum of nested frequency of perennial grasses.

Forb:

- **1988 to 1994 - down (-2):** There was a 33% decrease in the sum of nested frequency of perennial forbs.
- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial forbs increased to 1988 levels and cover increased from 3% to 9%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 45% and cover decreased to less than 2%.
- **2004 to 2009 - stable (0):** There was little change in cover of the sum of nested frequency of perennial forbs.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16B, Study no: 21



HERBACEOUS TRENDS--

Management unit 16B, Study no: 21

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron intermedium	-	3	-	-	-	.00	-	-	-
G	Agropyron spicatum	-	-	-	3	-	-	-	.00	-
G	Elymus salina	222	252	237	236	254	12.20	12.80	12.23	12.78
G	Poa fendleriana	a-	ab12	b17	a2	ab7	.24	.11	.00	.04
G	Poa secunda	-	1	3	1	3	.00	.03	.00	.03
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		222	268	257	242	264	12.45	12.93	12.25	12.86
Total for Grasses		222	268	257	242	264	12.45	12.93	12.25	12.86
F	Agoseris sp.	7	-	-	-	-	-	-	-	-
F	Antennaria microphylla	4	-	-	-	-	-	-	-	-
F	Arenaria fendleri	8	6	-	-	-	.01	-	-	-
F	Astragalus coltoni	b82	a-	a-	a-	a-	-	-	-	-
F	Astragalus convallarius	a-	b9	c97	b19	b24	.12	4.75	.23	.21
F	Astragalus tenellus	ab12	b27	ab9	a2	a3	1.16	.69	.03	.01
F	Chaenactis douglasii	11	2	12	-	-	.00	.06	-	-
F	Cryptantha sp.	-	-	-	2	-	-	-	.00	-
F	Holosteum umbellatum (a)	-	-	-	3	-	-	-	.00	-
F	Hymenopappus filifolius	a-	a-	a-	b15	ab9	-	-	.14	.04
F	Hymenoxys acaulis	c65	ab19	ab17	b28	a5	.05	.16	.14	.01
F	Hymenoxys richardsonii	bc63	d97	cd91	a34	ab48	1.93	1.85	.21	.45
F	Lesquerella sp.	-	-	1	-	-	-	.00	-	-
F	Lupinus sp.	-	-	-	-	3	.00	.06	-	.03
F	Machaeranthera canescens	-	-	-	2	-	-	-	.00	.03
F	Machaeranthera grindelioides	14	19	30	22	29	.17	.98	.34	.42
F	Penstemon sp.	-	1	1	-	2	.01	.00	-	.03
F	Phlox austromontana	a-	a-	ab4	b17	b15	-	.15	.35	.52
F	Phlox longifolia	-	-	-	-	9	-	-	-	.05
F	Streptanthus cordatus	-	-	-	4	-	-	-	.01	-
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	0	3	0	0	0	0.00	0
Total for Perennial Forbs		267	180	262	145	147	3.48	8.75	1.47	1.82
Total for Forbs		267	180	262	148	147	3.48	8.75	1.47	1.82

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

BROWSE TRENDS--

Management unit 16B, Study no: 21

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	<i>Artemisia frigida</i>	41	44	53	52	.56	.94	.63	.37
B	<i>Artemisia tridentata vaseyana</i>	17	23	23	23	2.44	5.01	3.20	3.47
B	<i>Cercocarpus ledifolius</i>	6	2	4	7	.01	.15	.00	.03
B	<i>Chrysothamnus nauseosus glabratus</i>	34	20	23	32	.76	.77	1.21	.82
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	0	4	7	1	-	.15	.24	.00
B	<i>Eriogonum corymbosum</i>	1	1	1	2	.00	.00	.00	.03
B	<i>Gutierrezia sarothrae</i>	57	38	53	43	1.14	.42	1.04	.78
B	<i>Juniperus osteosperma</i>	0	0	0	0	.15	-	-	-
B	<i>Juniperus scopulorum</i>	0	0	1	2	-	.85	.85	.38
B	<i>Pinus edulis</i>	0	1	0	0	-	.00	-	-
B	<i>Pinus flexilis</i>	0	0	0	0	.53	1.38	2.07	2.74
B	<i>Pseudotsuga menziesii</i>	0	0	0	0	.15	-	.38	-
B	<i>Symphoricarpos oreophilus</i>	3	2	3	3	.15	.45	.45	.66
Total for Browse		159	135	168	165	5.91	10.15	10.10	9.29

CANOPY COVER, LINE INTERCEPT--

Management unit 16B, Study no: 21

Species	Percent Cover		
	'99	'04	'09
<i>Artemisia frigida</i>	-	.88	.35
<i>Artemisia tridentata vaseyana</i>	-	3.93	4.83
<i>Cercocarpus ledifolius</i>	5.19	1.89	3.00
<i>Chrysothamnus nauseosus glabratus</i>	-	1.13	2.08
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	-	-	.08
<i>Eriogonum corymbosum</i>	-	-	.05
<i>Gutierrezia sarothrae</i>	-	1.56	.45
<i>Juniperus scopulorum</i>	-	1.00	1.18
<i>Pinus flexilis</i>	2.20	5.06	4.48
<i>Pseudotsuga menziesii</i>	.60	1.00	-
<i>Symphoricarpos oreophilus</i>	-	1.10	1.13

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16B, Study no: 21

Species	Average leader growth (in)	
	'04	'09
<i>Artemisia tridentata vaseyana</i>	2.2	1.3
<i>Cercocarpus ledifolius</i>	4.3	1.9

BASIC COVER--

Management unit 16B, Study no: 21

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	13.25	20.46	34.86	24.12	24.79
Rock	21.75	30.95	18.72	21.60	17.51
Pavement	16.50	6.52	14.21	14.98	8.47
Litter	23.50	22.46	20.60	19.57	27.02
Cryptogams	0	.08	.04	.33	.08
Bare Ground	25.00	33.02	17.42	30.67	29.37

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 21, Study Name: Huntington Canyon

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16	7.5	36	25.4	38.6	1.6	2.8	64	0.6

PELLET GROUP DATA--

Management unit 16B, Study no: 21

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	7	7	5	5	-	-	-
Elk	29	24	43	36	53 (131)	55 (136)	34 (84)
Deer	4	3	2	4	3 (7)	1 (2)	-
Cattle	-	-	-	2	-	9 (23)	12 (29)

BROWSE CHARACTERISTICS--

Management unit 16B, Study no: 21

		Age class distribution					Utilization		
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia frigida									
88	1165	57	43	0	166	6	0	0	4/6
94	1720	1	98	1	-	13	0	14	6/7
99	2300	24	76	0	420	20	0	0	8/7
04	4200	4	92	4	-	25	10	1	4/5
09	2660	17	74	8	-	12	14	11	5/5
Artemisia tridentata vaseyana									
88	465	36	57	7	66	0	0	0	19/28
94	560	0	93	7	-	0	0	0	10/22
99	820	5	76	20	-	41	5	2	18/28
04	680	0	56	44	-	65	6	32	14/30
09	700	9	49	43	-	20	11	31	17/36

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Cercocarpus ledifolius</i>										
88	433	100	0	-	66	31	62	0	-/-	
94	160	50	50	-	-	0	0	0	33/24	
99	80	75	25	-	20	0	75	0	149/121	
04	120	83	17	-	20	0	83	0	90/93	
09	140	57	43	-	-	14	14	0	24/22	
<i>Chrysothamnus nauseosus glabratus</i>										
88	1164	9	74	17	-	17	0	0	11/13	
94	1180	0	100	0	-	0	0	0	41/34	
99	580	7	86	7	-	0	0	0	17/20	
04	580	3	72	24	20	14	10	14	15/20	
09	780	3	51	46	-	3	0	23	15/20	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	0	0	0	0	-	0	0	0	6/16	
99	160	25	75	0	-	25	0	0	14/18	
04	240	0	75	25	-	8	25	8	9/11	
09	60	0	0	100	-	0	100	100	7/15	
<i>Eriogonum corymbosum</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	20	0	100	-	-	100	0	0	3/14	
99	40	50	50	-	-	0	0	0	6/15	
04	20	0	100	-	-	0	100	0	6/14	
09	40	0	100	-	40	0	0	0	9/19	
<i>Gutierrezia sarothrae</i>										
88	3865	60	36	3	699	4	.86	.86	8/7	
94	3140	10	83	7	-	0	0	4	6/7	
99	1960	8	88	4	100	7	0	1	8/8	
04	3860	1	98	2	-	2	0	2	6/7	
09	1940	1	86	13	-	0	0	5	6/7	
<i>Juniperus osteosperma</i>										
88	33	100	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	-/-	
<i>Juniperus scopulorum</i>										
88	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	40	50	50	-	-	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										
88	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	-/-	
Pinus longaeva										
88	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	-/-	
Symphoricarpos oreophilus										
88	0	0	0	0	-	0	0	0	-/-	
94	80	25	75	0	-	0	0	0	16/48	
99	40	0	100	0	40	50	0	0	19/54	
04	80	0	100	0	-	0	25	0	15/41	
09	180	0	11	89	-	0	100	0	13/43	

POISON SPRING BENCH - TREND STUDY NO. 16B-22-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: Upland Stony Loam (Pinyon-Utah Juniper), R034XY330UT

Land Ownership: SITLA

Elevation: 7,000 ft (2,134 m)

Aspect: East

Slope: 3%-5%

Transect bearing: 165 degrees magnetic

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

Directions:

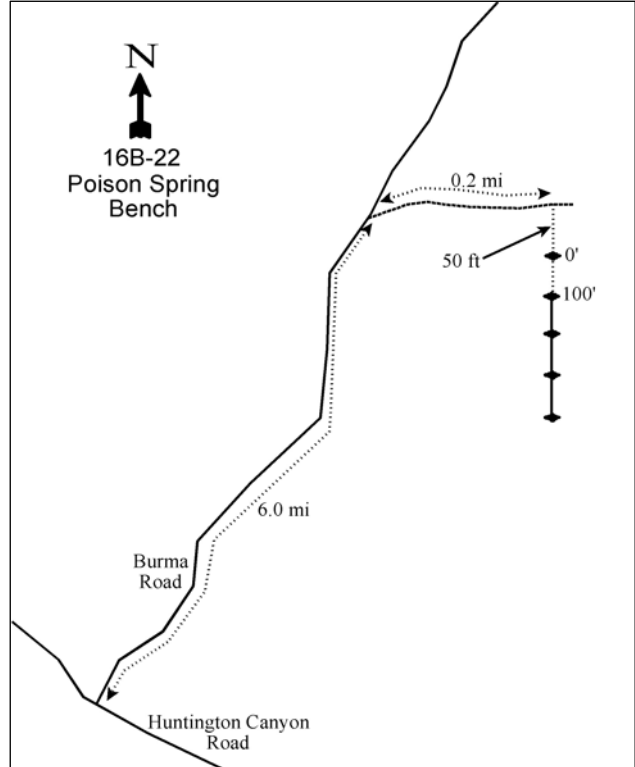
To reach Poison Spring Bench, go up the Huntington Canyon Road to the Huntington research farm below the power plant. Across from the farm gate, turn right onto the Burma Road. Follow the Burma Road for 6 miles. Turn right onto a faint road that goes into the chaining below the road. Go down along the edge of the chaining for 0.2 miles to the study site. The zero-foot witness post is about 50 feet off the road, and the transect runs south.

Map Name: Hiawatha



Township: 16S, Range: 8E, Section: 22

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 498919 E 4362735 N

POISON SPRING BENCH - TREND STUDY NO. 16B-22

Site Information

Site Description: The study is located south of Cedar Creek and southwest of Poison Spring Bench. This area is managed by the BLM and is part of the North Huntington cattle allotment which is grazed in the spring and fall. The site was chained and seeded in the late 1960's. The area is now dominated by black sagebrush (*Artemisia nova*) with several released pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees. Pellet group data indicated light deer use in 1999 and 2004, but more moderate use by deer in 2009. Estimated elk use has been light to lightly moderate since 1999. Estimated cattle use has been light since 1999 (Table - Pellet Group Data).

Browse: Browse species dominate this site providing the majority of the vegetation cover. The dominant species on the site is black sagebrush which has provided an average cover of 21% since 1994 (Table - Browse Trends). The black sagebrush population is mostly mature with low decadence and good vigor. Recruitment of young black sagebrush plants has steadily decreased since 1994 with no young plants being sampled in 2009. Utilization of black sagebrush has been mostly light with some moderate use (Table - Browse Characteristics).

Other desirable browse species occur on the site in low densities. These include Utah serviceberry (*Amelanchier utahensis*), true mountain mahogany (*Cercocarpus monatanus*), green ephedra (*Ephedra veridis*), and four-wing saltbush (*Atriplex canescens*). True mountain mahogany, four-wing saltbush, and serviceberry have all been heavily browsed. Some of the pinyon and juniper trees that survived the chaining have matured and increased in size since the chaining. Point-quarter density estimates have shown fairly stable populations of both pinyon and juniper on the site (Table - Point-Quarter Tree Data).

Herbaceous Understory: Herbaceous abundance and diversity is extremely low. Crested wheatgrass (*Agropyron cristatum*) is the only grass sampled with any notable frequency or cover. There was a large decrease in the nested frequency and cover of crested wheatgrass between the 1999 and 2004 sample years. This large decrease in crested wheatgrass is attributed to drought conditions in years prior to the 2004 sample year. Most of the crested wheatgrass plants were sampled in the shelter of shrubs. Forbs have been rare on the site since the study began with forb cover less than 1% since 1988. The most prevalent forb is basin yellow crypstantha (*Cryptantha confertiflora*) (Table - Herbaceous Trends).

Soil: The soil is a gravelly, sandy clay loam with a slightly alkaline pH and a moderately shallow effective rooting depth. Phosphorus and potassium both have a low availability for plant growth and development at 4.4 ppm and 57.6 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The majority of the protective ground cover comes from litter cover, but rock and pavement cover is also high on the site. Bare ground cover is moderately low on the site (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and slight in 2009 due primarily to pedestaling of plants, flow patterns, and soil movement.

Trend Assessments

Browse:

- **1988 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 primary browse species, black sagebrush increased slightly in decadence and poor vigor. Recruitment of young sagebrush plants decreased substantially.
- **1994 to 1999 - slightly up (+1):** Density of black sagebrush increased 15% from 9,740 plants/acre to 11,200 plants/acre, though there was little change in cover. Decadence of sagebrush decreased

slightly, but recruitment of young sagebrush plants also decreased. The density of mountain mahogany increased slightly as did cover.

- **1999 to 2004 - stable (0):** There was a slight decrease in the density of black sagebrush, though cover increased slightly. Decadence of sagebrush increased to 15% and recruitment of young black sagebrush decreased to 2%.
- **2004 to 2009 - slightly down (-1):** The density of black sagebrush decreased by 17% from 10,700 plants/acre to 8,860 plants/acre, though cover remained similar. Decadence increased to 19% and poor vigor increased from 7% to 12%. There were no young sagebrush plants sampled.

Grass:

- **1988 to 1994 - slightly down (-1):** There was an 11% decrease in the sum of nested frequency of perennial grasses. Crested wheatgrass is the only common grass species on the site.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 14% and cover increased slightly.
- **1999 to 2004 - down (-2):** There was a significant decrease in nested frequency of the dominant grass, crested wheatgrass, and cover of perennial grasses decreased from 3% to less than 0.5%.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses and cover remained less than 1%.

Forb:

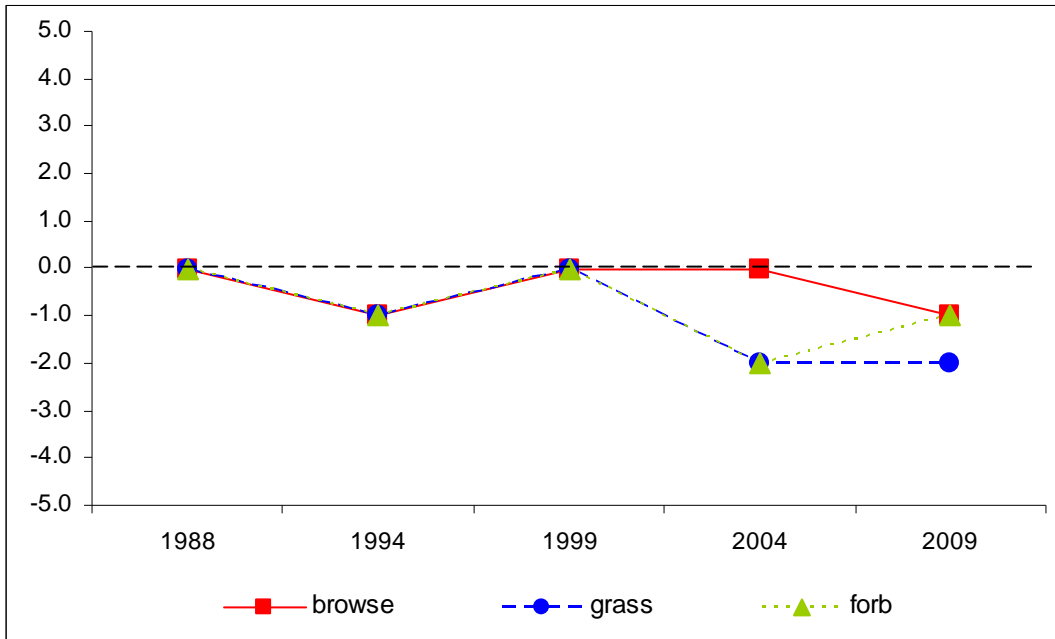
- **1988 to 1994 - slightly down (-1):** Forbs are rare on this site. The sum of nested frequency of perennial forbs decreased by 25% with a significant decrease in the nested frequency of skyrocket gilia (*Ipomopsis aggregate*) and fleshy beardtongue (*Penstemon carnosus*).
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased to near 1988 levels, though cover decreased slightly.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 58% and cover decreased slightly. There was a significant decrease in the nested frequency of mat penstemon (*Penstemon caespitosus*).
- **2004 to 2009 - slightly up (+1):** The cover and sum of nested frequency of perennial forbs increased slightly.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 16B, study no: 22

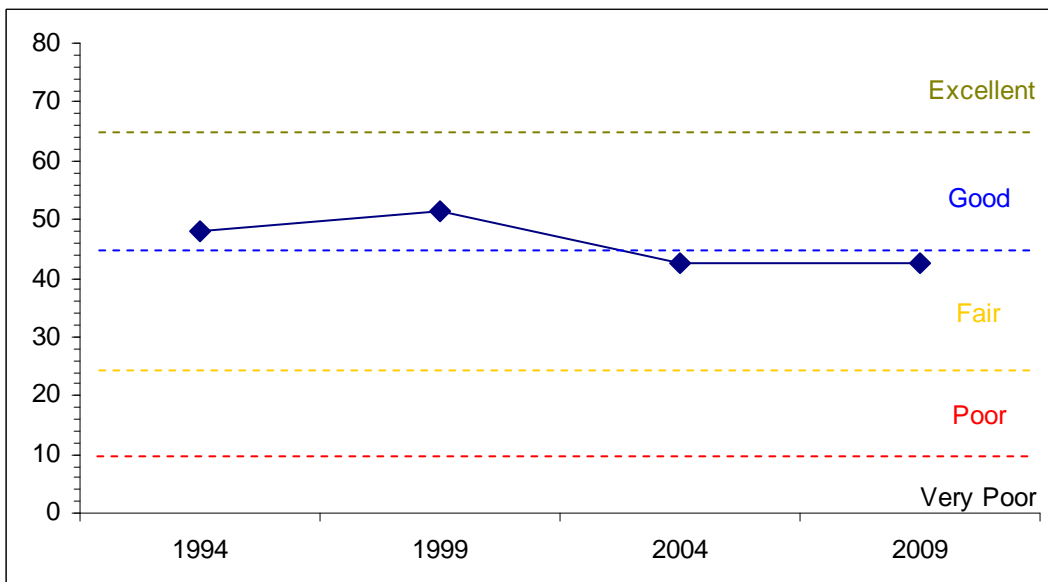
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	26.7	10.7	4.2	4.7	0.0	1.5	0.0	47.9	Good
99	29.1	12.7	2.4	6.0	0.0	1.1	0.0	51.3	Good
04	30.0	10.5	1.2	0.3	0.0	0.7	0.0	42.7	Fair
09	30.0	9.4	1.2	1.1	0.0	1.0	0.0	42.7	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16B, Study no: 22



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 16B, Study no: 22



HERBACEOUS TRENDS--

Management unit 16B, Study no: 22

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	_b 172	_b 143	_b 175	_a 30	_a 37	2.30	2.82	.14	.56
G	Elymus junceus	-	-	3	-	-	-	.15	-	-
G	Oryzopsis hymenoides	-	1	-	-	-	.00	-	-	-
G	Sitanion hystrix	6	11	2	3	1	.02	.03	.00	.00
G	Stipa comata	-	3	-	-	-	.00	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		178	158	180	33	38	2.34	3.00	0.14	0.56
Total for Grasses		178	158	180	33	38	2.34	3.00	0.14	0.56
F	Arabis sp.	4	12	9	-	1	.05	.01	-	.00
F	Castilleja linariaefolia	-	-	2	-	2	-	.03	-	.01
F	Cirsium sp.	5	-	-	-	-	-	-	-	-
F	Cruciferae	8	-	-	-	-	-	-	-	-
F	Cryptantha confertiflora	_{ab} 44	_b 51	_{ab} 46	_a 18	_{ab} 33	.56	.28	.22	.27
F	Descurainia pinnata (a)	-	1	6	5	-	.00	.01	.01	-
F	Eriogonum cernuum (a)	-	5	-	9	3	.01	-	.01	.00
F	Ipomopsis aggregata	_b 9	_a 1	_{ab} 8	_{ab} 4	_a 3	.00	.04	.01	.00
F	Lappula occidentalis (a)	-	-	-	4	-	-	-	.01	-
F	Lepidium montanum	2	6	-	7	6	.04	-	.01	.06
F	Machaeranthera spp	-	-	-	3	-	-	-	.03	-
F	Medicago sativa	3	-	3	-	-	-	.00	-	-
F	Penstemon caespitosus	_b 18	_b 19	_b 29	_a -	_a -	.11	.09	-	-
F	Penstemon carnosus	_b 22	_a -	_a 9	_{ab} 14	_{ab} 16	-	.04	.06	.03
F	Salsola iberica (a)	-	_b 13	_a -	_a 2	_a -	.07	-	.00	-
F	Schoenrambe linifolia	_a -	_a -	_a 2	_a 1	_b 9	-	.00	.00	.06
F	Senecio multilobatus	4	-	5	-	1	-	.01	-	.03
F	Townsendia sp.	-	-	-	-	1	-	-	-	.00
Total for Annual Forbs		0	19	6	20	1	0.09	0.01	0.03	0.00
Total for Perennial Forbs		119	89	113	47	74	0.77	0.54	0.34	0.49
Total for Forbs		119	108	119	67	75	0.87	0.56	0.38	0.49

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

BROWSE TRENDS--

Management unit 16B, Study no: 22

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia nova	97	98	97	95	19.75	19.35	22.97	21.48
B	Cercocarpus montanus	10	14	14	16	1.14	3.25	2.56	2.45
B	Ephedra viridis	4	7	8	8	.18	.00	.38	.15
B	Eriogonum microthecum	13	12	16	12	.06	.04	.09	.06
B	Gutierrezia sarothrae	0	4	2	1	-	.00	.00	.00
B	Juniperus osteosperma	0	3	3	4	1.78	2.67	3.05	3.17
B	Opuntia polyacantha	5	5	5	2	.00	.03	.03	.00
B	Pinus edulis	0	4	6	3	1.03	.85	2.32	3.30
B	Purshia tridentata	1	0	0	0	.03	-	-	-
Total for Browse		130	147	151	141	24.00	26.20	31.42	30.63

CANOPY COVER, LINE INTERCEPT--

Management unit 16B, Study no: 22

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	23.75	23.33
Cercocarpus montanus	-	2.83	3.31
Ephedra viridis	-	1.21	1.14
Eriogonum microthecum	-	.01	.03
Juniperus osteosperma	1.39	2.73	2.71
Pinus edulis	-	3.34	4.56

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16B, Study no: 22

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	0.7	-
Cercocarpus montanus	3.1	1.4

POINT-QUARTER TREE DATA--

Management unit 16B, Study no: 22

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	43	56	52	3.0	5.8	4.3
Pinus edulis	103	111	110	2.1	2.9	3.5

BASIC COVER--

Management unit 16B, Study no: 22

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	6.00	26.07	29.60	33.03	31.70
Rock	12.25	9.63	9.84	11.06	10.06
Pavement	7.00	4.24	8.36	8.55	13.21
Litter	56.75	38.77	41.91	38.04	40.73
Cryptogams	0	.01	1.03	.03	.72
Bare Ground	18.00	22.43	23.83	21.89	22.03

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 22, Study Name: Poison Spring Bench

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.3	7.6	50.7	27.4	21.8	3.9	4.4	57.6	0.8

PELLET GROUP DATA--

Management unit 16B, Study no: 22

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	26	18	10	15	-	-	-
Elk	7	6	7	4	8 (20)	19 (46)	3 (7)
Deer	24	24	7	19	13 (32)	5 (12)	21 (53)
Cattle	7	5	2	-	15 (36)	7 (16)	3 (7)

BROWSE CHARACTERISTICS--

Management unit 16B, Study no: 22

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Amelanchier utahensis									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	17/21
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	28/33
Artemisia nova									
88	15331	78	17	5	1399	9	0	.86	9/19
94	9740	9	76	15	-	9	.41	5	10/27
99	11200	4	88	9	80	26	0	3	9/20
04	10700	2	83	15	60	10	10	7	10/22
09	8860	0	81	19	40	8	0	12	9/22

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Atriplex canescens</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	40/37	
99	0	0	0	-	-	0	0	0	52/41	
04	0	0	0	-	-	0	0	0	36/48	
09	0	0	0	-	-	0	0	0	48/39	
<i>Atriplex confertifolia</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	20/25	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
<i>Cercocarpus montanus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	300	0	93	7	-	20	7	0	33/38	
99	400	10	90	0	60	5	70	0	36/47	
04	320	6	81	13	20	31	63	13	35/43	
09	360	22	61	17	40	22	44	0	35/46	
<i>Chrysothamnus viscidiflorus</i>										
88	66	100	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	-/-	
<i>Cowania mexicana stansburiana</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	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	-/-	
<i>Ephedra viridis</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	160	0	100	0	-	50	25	25	25/32	
99	300	13	67	20	100	33	7	0	23/30	
04	320	6	63	31	-	0	0	6	28/39	
09	280	21	71	7	-	7	0	7	29/43	
<i>Eriogonum microthecum</i>										
88	932	43	57	0	333	0	0	21	3/3	
94	620	16	84	0	-	0	0	0	3/6	
99	540	7	81	11	120	0	11	11	2/3	
04	820	0	90	10	-	10	61	2	2/4	
09	760	11	66	24	120	0	3	24	1/2	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Gutierrezia sarothrae</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	8/8
99	120	0	100	-	-	0	0	0	4/4
04	40	0	100	-	20	0	0	0	3/3
09	20	0	100	-	-	0	0	0	4/7
<i>Juniperus osteosperma</i>									
88	0	0	0	-	199	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	60	67	33	-	20	0	0	0	-/-
04	80	50	50	-	-	0	0	0	-/-
09	80	25	75	-	-	0	0	0	-/-
<i>Opuntia polyacantha</i>									
88	333	0	100	0	-	0	0	0	3/4
94	100	20	80	0	-	0	0	0	4/9
99	100	0	80	20	-	0	0	20	3/14
04	100	20	80	0	-	0	0	0	3/13
09	60	0	100	0	-	0	0	0	4/9
<i>Pinus edulis</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	80	75	25	-	-	0	0	0	-/-
04	120	33	67	-	-	0	0	0	-/-
09	60	33	67	-	20	0	0	0	51/53
<i>Purshia tridentata</i>									
88	0	0	0	-	-	0	0	0	-/-
94	20	0	100	-	-	0	0	0	8/8
99	0	0	0	-	-	0	0	0	6/11
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-

CONSUMER BENCH - TREND STUDY NO. 16B-23-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter

NRCS Ecological Site Description: Semidesert Loam (Wyoming Big Sagebrush), R034XY212UT

Land Ownership: BLM

Elevation: 6,100 ft (1,859 m)

Aspect: South

Slope: 5%

Transect bearing: 328 degrees magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

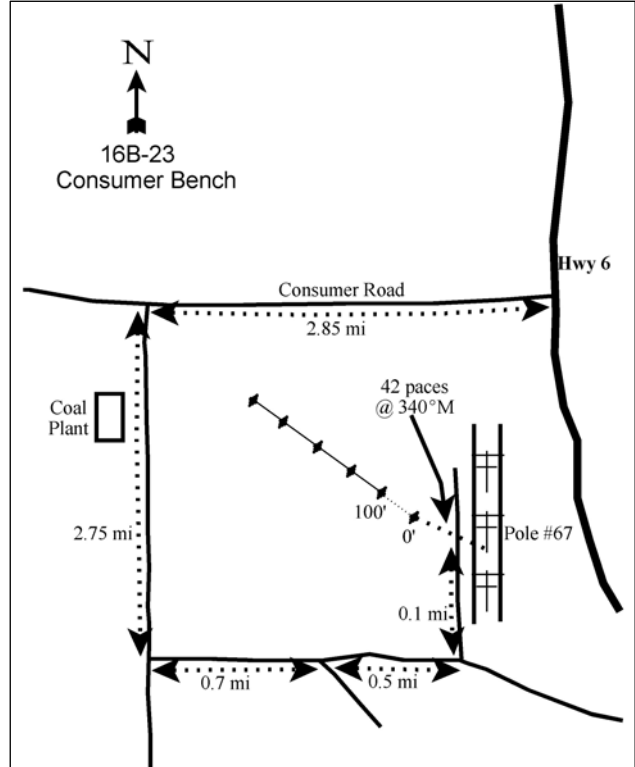
On US 6 south of Helper, turn right (west) on Consumer Road and travel 2.85 miles. Turn left on a dirt road, and go 2.75 miles passing a coal plant. Turn left and travel 0.7 miles to a fork. Stay left for an additional 0.5 miles to another fork. Turn left and go 0.1 miles to a telephone pole (#67). The 0' stake is 42 paces away at 340°M from the telephone pole.

Map Name: Standardville



Township: 14S, Range: 9E, Section: 4

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 507432 E 4386548 N

CONSUMER BENCH - TREND STUDY NO. 16B-23

Site Information

Site Description: The study monitors a big sagebrush/grass community with a few scattered junipers. The site occurs within the Consumers Wash allotment, which is allotted for winter and spring sheep grazing. The area has many other land uses than just grazing and wildlife as evidenced by an oil pad about 400 feet to the south, a pressure station about one mile to the west, a coal loading station two miles to the north, and numerous power lines that crisscross the area. The study area was treated with a double drum aerator in the fall of 2004 and spring of 2005 as part of the Price West Benches Watershed Restoration Initiative project ([project # 228](#)). Remediation treatments focused on the worst die-off areas near Price. The basic approach was to establish drought-hardy mule deer winter forage plants on contoured belts covering about one-quarter to one-third of each delineated block. Belts were about 12'-14' wide, the exact width determined by the equipment used. The project area was seeded from a seedbox mounted in front of the aerator. Forage Kochia (*Kochia prostrata*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) were seeded aurally during spring (Table - Seed Mix). Because of difficulties in differentiating between species, deer and sheep use was combined. Pellet group data indicated high sheep/deer use since 1999. Estimated elk use has declined from moderately heavy use in 1999 to lightly moderate use in 2009 (Table - Pellet Group Data).

Browse: The key browse species on the site is Wyoming big sagebrush. There was a large die-off of sagebrush between the 1999 and 2004 sample years attributed to a severe drought in the years prior to the 2004 sampling. The cover of sagebrush decreased from an average of 10% in 1994 and 1999 to around 2% after 2004 (Table - Browse Trends). Sagebrush density also decreased substantially from 1999 to 2004 with 94% of the population being classified as decadent in 2004. Sagebrush plants displaying poor vigor also increased to 90% in 2004 and recruitment of young sagebrush plants was very poor. The density of sagebrush remained low in 2009, but had increased with improved recruitment of young sagebrush. Decadence and poor vigor in sagebrush decreased in 2009, as well. Utilization of sagebrush was mostly heavy in 1999 and 2004, but was mostly light in 2009 (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is relatively abundant for a Wyoming big sagebrush site. Perennial native grasses dominate the site. There was a sharp decline in the cover and sum of nested frequency of perennial grasses in 2004, but both returned to near or above 1999 levels in 2009. There was a significant increase in the nested frequency of needle-and-thread (*Stipa comata*) making it the dominant grass on the site. Blue grama (*Bouteloua gracilis*) was the dominant grass at the outset of the study in 1994, but decreased significantly in nested frequency in 2004. Other common grasses on the site include Indian ricegrass (*Oryzopsis hymenoides*) and western wheatgrass (*Agropyron smithii*). Salina wildrye (*Elymus salina*) was prevalent on the site at the outset of the study, but decreased significantly in 2004 and is now rare on the site. Forbs have been fairly diverse and abundant in past sample years, but decreased substantially in 2009. Scarlet globemallow (*Sphaeralcea coccinea*) is the dominant forb on the site providing nearly all of the forb cover (Table -Herbaceous Trends).

Soil: The soil is a sandy loam with a slightly alkaline pH and a moderately deep effective rooting depth. Phosphorus and potassium have limited availability for plant growth and development at 3.3 ppm and 41.6 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is fairly high on the site with the majority of protective ground cover coming from litter cover. Cryptogam cover has steadily decreased since 1999 (Table - Basic Cover). A couple of active gullies were noted on the site in 2004 and the soil erosion condition was classified as slight in 2004. The soil erosion condition was classified as stable in 2009.

Trend Assessments

Browse:

- **1994 to 1999 - slightly up (+1):** Density of the primary browse species, Wyoming big sagebrush, increased by 17% from 3,820 plants/acre to 4,480 plants/acre, and cover increased slightly. Decadence and vigor of sagebrush remained good in the population. Recruitment of young sagebrush plants also remained good at 17% of the population.
- **1999 to 2004 - down (-2):** Density of sagebrush decreased by 77% to 1,040 plants/acre and cover decreased from 10% to 2%. Decadence of sagebrush was high at 94% and 90% of the population displayed poor vigor. There was minimal recruitment of young sagebrush plants in the population.
- **2004 to 2009 - slightly up (+1):** The density of sagebrush increased to 1,940 plants/acre, though there was little change in cover. Decadence and poor vigor of sagebrush both decreased to more moderate levels of 24% and 18%, respectively. Recruitment of young sagebrush plants increased to 35% of the population.

Grass:

- **1994 to 1999 - stable (0):** There was a slight increase in the sum of nested frequency and cover of perennial grasses, but no significant increases.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 44% and cover decreased from 16% to 5%. There was a significant decrease in the nested frequency many of the grass species.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased to near 1999 levels and cover increased to 24%. There was a significant increase in the nested frequency of many grasses including needle-and-thread, which also increased in cover from 3% to 14%.

Forb:

- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial forbs increased by 65%, though there was little change in cover.
- **1999 to 2004 - stable (0):** There was a 13% decrease in the sum of nested frequency of perennial forbs, but cover increased from 2% to 11%.
- **2004 to 2009 - down (-2):** The sum of nested frequency of perennial forbs decreased by 21% and cover decreased to 5%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 16B, 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
94	11.5	6.6	8.5	28.7	0.0	2.7	0.0	57.9	Good
99	12.9	6.9	8.5	30.0	0.0	4.0	0.0	62.3	Good
04	2.3	0.0	0.0	10.9	-0.1	10.0	0.0	23.1	Poor-Fair
09	2.7	0.0	0.0	30.0	-0.2	9.1	0.0	41.6	Fair

SEED MIX

Management unit 16B, study no: 23

Project name: Price West Benches Year 2-Consumers, Airport

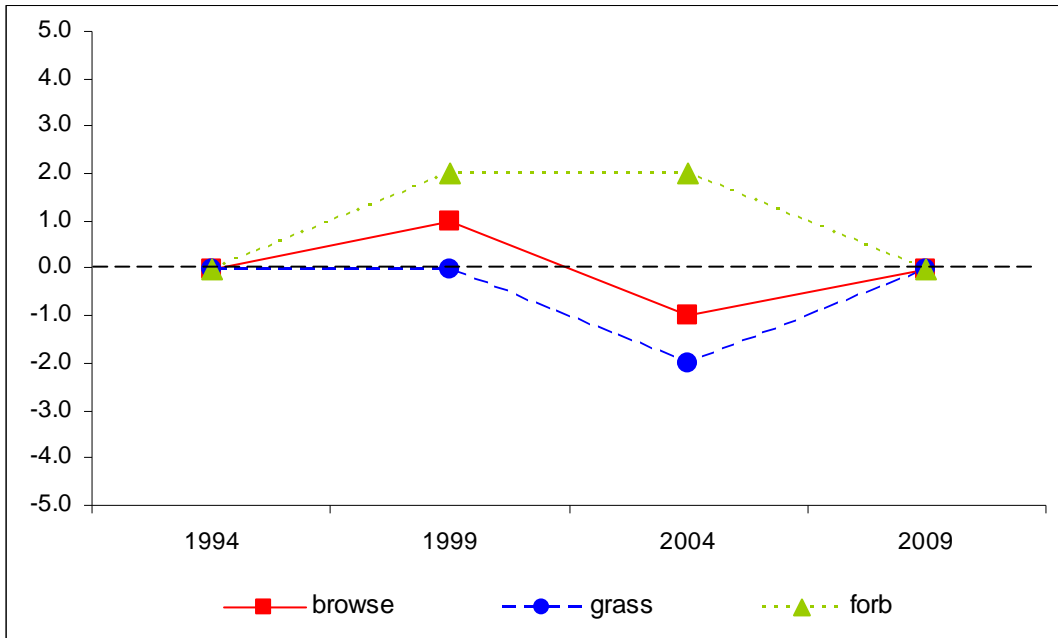
WRI Database #: 228

Aerator Mix	Size (acre):	1851	Ariel Mix	Size (acre):	3267
Seed type	lbs in mix	lbs/acre	Seed type	lbs in mix	lbs/acre
Russian wild-rye	4115	2.22	Wyoming big sagebrush	1825	0.56
Indian rice-grass 'Nezpar'	849	0.46	Forage kochia	550	0.17
Indian rice-grass 'Rimrock'	1000	0.54	TOTAL:	2375	0.73
Crested wheatgrass 'Douglas'	1150	0.62			
Crested wheatgrass 'Hycrest'	1000	0.54			
Western wheatgrass	1850	1.00			
Alfalfa 'Ladak'	750	0.41			
Alfalfa 'Nomad'	750	0.41			
Alfalfa 'Ranger'	750	0.41			
Sainfoin 'Eski'	2500	1.35			
Small burnett 'Delar'	1500	0.81			
Yellow sweet clover	416	0.22			
Fourwing saltbush	2000	1.08			
TOTAL:	18630	10.06			

Trend Summary

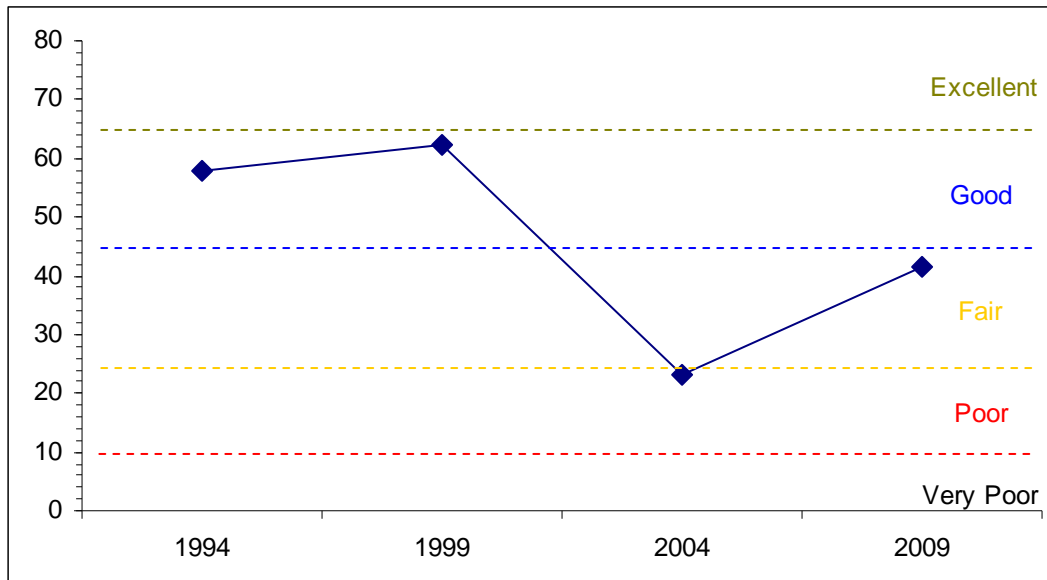
CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 16B, Study no: 23



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 16B, Study no: 23



HERBACEOUS TRENDS--

Management unit 16B, Study no: 23

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	a-	a-	b18	c34	-	-	.12	1.41
G	Bouteloua gracilis	b195	b193	a109	a109	6.22	4.79	2.02	2.91
G	Bromus tectorum (a)	-	-	-	1	-	-	-	.00
G	Elymus salina	b86	b105	a1	a3	.95	2.59	.00	.15
G	Oryzopsis hymenoides	ab114	b159	a68	b145	2.06	3.80	.22	5.14
G	Sitanion hystrix	ab24	b22	a1	b19	.39	.56	.03	.46
G	Sporobolus cryptandrus	1	-	1	1	.00	-	.00	.03
G	Stipa comata	b181	ab142	a147	c271	4.69	4.33	3.02	13.59
G	Vulpia octoflora (a)	a-	a6	b44	c70	-	.01	.10	.23
Total for Annual Grasses		0	6	44	71	0	0.01	0.10	0.24
Total for Perennial Grasses		601	621	345	582	14.33	16.10	5.44	23.88
Total for Grasses		601	627	389	653	14.33	16.11	5.53	24.13
F	Astragalus convallarius	a6	b39	b30	a10	.01	.19	1.57	.04
F	Astragalus sp.	7	-	-	-	.04	-	-	-
F	Calochortus nuttallii	a-	b11	b16	a-	-	.04	.05	-
F	Castilleja linariaefolia	a-	b17	a3	a3	-	.04	.00	.03
F	Chenopodium fremontii (a)	-	-	3	-	-	-	.04	-
F	Chenopodium leptophyllum(a)	-	a-	c162	b33	-	-	1.55	.17
F	Collinsia parviflora (a)	b17	b15	b16	a-	.06	.25	.11	-
F	Comandra pallida	a-	b10	b11	ab8	-	.02	.25	.07
F	Cordylanthus sp. (a)	-	-	1	-	-	-	.00	-
F	Cryptantha sp.	a-	a-	b11	a-	-	-	.27	-
F	Cymopterus sp.	-	3	1	-	-	.00	.00	-
F	Descurainia pinnata (a)	a3	a1	b16	a-	.00	.01	.08	-

T y p e	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
F	Eriogonum cernuum (a)	a ⁴	a ⁻	b ²²	a ¹	.01	-	.12	.00
F	Eriogonum ovalifolium	5	16	1	3	.04	.34	.03	.01
F	Gayophytum ramosissimum(a)	a ⁻	a ⁻	b ⁶⁵	a ⁻	-	-	.73	-
F	Gilia sp. (a)	a ⁻	a ⁻	b ¹¹⁴	a ⁻	-	-	.95	-
F	Lappula occidentalis (a)	a ⁻	a ⁻	b ²⁰	a ⁻	-	-	.06	-
F	Lepidium montanum	12	3	3	7	.21	.01	.07	.04
F	Lygodesmia sp.	-	-	3	-	-	-	.06	-
F	Machaeranthera canescens	1	3	2	-	.00	.03	.03	-
F	Penstemon linarioides	3	-	-	-	.00	-	-	-
F	Penstemon sp.	11	3	4	-	.02	.03	.03	-
F	Phlox longifolia	ab ²⁶	b ⁵⁰	b ³⁰	a ⁸	.05	.15	.18	.01
F	Plantago patagonica (a)	a ³	a ²	b ¹⁰³	a ⁴	.00	.01	1.00	.01
F	Salsola iberica (a)	a ⁻	a ⁻	b ³⁸	a ¹¹	-	-	.57	.07
F	Schoenrambe linifolia	a ⁷	ab ¹⁷	a ⁵	b ²²	.01	.07	.06	.11
F	Sisymbrium altissimum (a)	-	-	-	2	-	-	-	.00
F	Sphaeralcea coccinea	a ¹²⁸	ab ¹⁶⁶	b ¹⁷³	ab ¹⁶⁹	.93	1.04	8.54	4.19
F	Taraxacum officinale	-	-	1	-	-	-	.00	-
F	Tragopogon dubius	-	2	1	4	-	.00	.00	.03
Total for Annual Forbs		27	18	560	51	0.08	0.26	5.25	0.26
Total for Perennial Forbs		206	340	295	234	1.33	2.00	11.18	4.55
Total for Forbs		233	358	855	285	1.41	2.27	16.43	4.82

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

BROWSE TRENDS--

Management unit 16B, Study no: 23

T y p e	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	77	74	35	34	9.19	10.31	1.80	1.92
B	Ceratoides lanata	2	1	2	5	.00	.00	.01	.07
B	Chrysothamnus viscidiflorus	1	2	2	5	.00	.15	.01	.01
B	Gutierrezia sarothrae	28	62	11	11	.78	.97	.25	.22
B	Kochia prostrata	0	0	0	0	-	-	-	.15
B	Opuntia polyacantha	29	21	20	20	.51	.66	.64	1.10
B	Pinus edulis	0	1	1	0	-	.00	.03	-
B	Sclerocactus sp.	0	0	0	0	-	-	-	.03
Total for Browse		137	161	71	75	10.49	12.11	2.74	3.50

CANOPY COVER, LINE INTERCEPT--

Management unit 16B, Study no: 23

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	1.23	1.00
Ceratoides lanata	.01	.11
Chrysothamnus viscidiflorus	.01	.08
Gutierrezia sarothrae	.20	-
Opuntia polyacantha	.35	.46

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16B, Study no: 23

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	4.3	1.9
Ceratoides lanata	9.4	4.4

BASIC COVER--

Management unit 16B, Study no: 23

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	24.62	32.35	26.23	31.95
Rock	.05	.01	.00	.01
Pavement	.44	.26	.60	.26
Litter	17.95	24.32	30.77	32.55
Cryptogams	1.43	11.09	2.56	.19
Bare Ground	45.88	36.49	51.98	45.53

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 23, Study Name: Consumer Bench

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.4	7.8	54.7	27.4	17.8	1.7	3.3	41.6	0.6

PELLET GROUP DATA--

Management unit 16B, Study no: 23

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Sheep	-	-	-	12	-	-	53 (131)
Rabbit	6	66	36	38	-	-	-
Elk	20	17	16	10	64 (159)	25 (63)	17 (43)
Sheep/Deer	55	58	62	53	90 (223)	106 (263)	137 (339)
Cattle	-	-	-	4	-	1 (2)	2 (4)

BROWSE CHARACTERISTICS--
Management unit 16B, Study no: 23

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata wyomingensis</i>									
94	3820	17	54	28	260	15	0	10	16/26
99	4480	17	55	27	300	26	47	11	17/30
04	1040	2	4	94	-	38	54	90	16/19
09	1940	35	41	24	60	13	6	18	10/14
<i>Atriplex canescens</i>									
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	34/26
<i>Ceratoides lanata</i>									
94	60	0	100	-	-	0	0	0	9/8
99	20	100	0	-	-	0	0	0	3/4
04	40	0	100	-	20	0	100	0	11/13
09	220	36	64	-	20	0	0	0	9/12
<i>Chrysothamnus viscidiflorus</i>									
94	60	0	100	-	-	0	0	0	7/18
99	60	100	0	-	-	0	0	0	4/10
04	60	0	100	-	140	0	0	0	9/13
09	220	9	91	-	-	36	0	0	6/10
<i>Gutierrezia sarothrae</i>									
94	1020	0	96	4	-	0	4	0	8/9
99	6460	50	50	0	2220	.30	.61	.30	4/4
04	340	6	94	0	-	6	0	0	6/8
09	240	42	58	0	-	0	8	0	6/8
<i>Kochia prostrata</i>									
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	9/6
<i>Opuntia polyacantha</i>									
94	920	4	91	4	-	0	0	0	3/10
99	700	14	71	14	40	0	0	6	3/9
04	740	19	81	0	40	0	0	0	4/12
09	740	3	86	11	40	0	0	14	3/11
<i>Pinus edulis</i>									
94	0	0	0	-	-	0	0	0	-/-
99	20	100	0	-	-	0	0	0	-/-
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)
Sclerocactus sp.									
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	-	20	0	0	0	2/3

WIREGRASS BENCH - TREND STUDY NO. 16B-24-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: [Upland Loam \(Basin Big Sagebrush\), R047XA308UT](#)

Land Ownership: BLM

Elevation: 6,900 ft (2,103 m)

Aspect: Northwest

Slope: 5%-10%

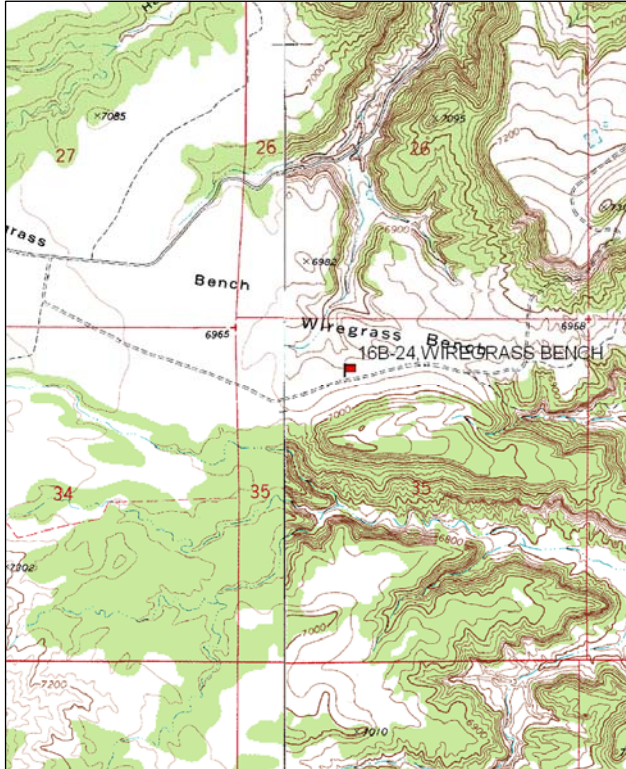
Transect bearing: 0 degrees magnetic

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

Directions:

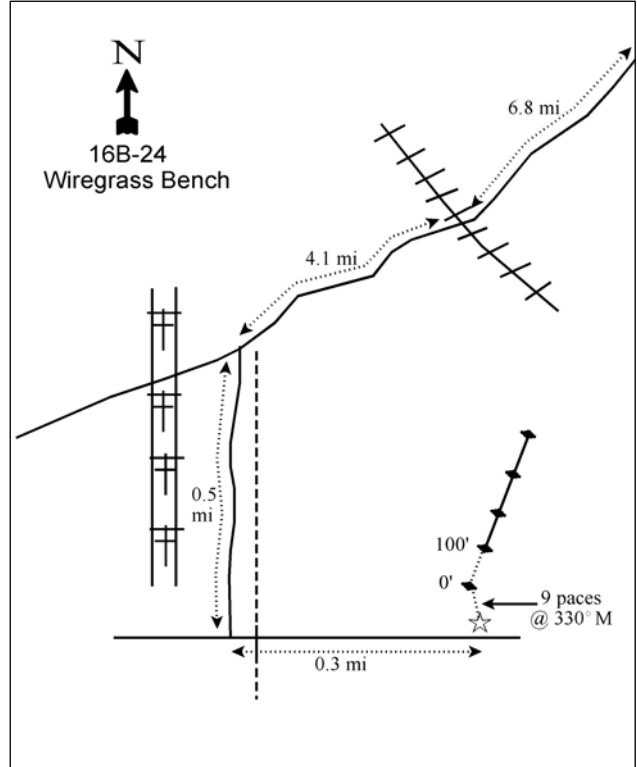
Take exit 240 on highway 6 in Price just past the hospital. Turn right at the stop sign, continue to another stop sign and turn right again. Stay on this road until you go over a canal, then turn right at the first road on the right. Proceed 6.8 miles to a railroad crossing. From the railroad tracks, travel 4.1 miles. Just before reaching the power lines turn left and travel 0.5 miles along the fence to a "T" in the road. Turn left through a gate and travel 0.3 miles to the witness post on the left. The 0' stake is 9 paces at 330° M. The baseline runs in the direction of 0°M.

Map Name: Pinnacle Peak



Township: 14S, Range: 8E, Section: 35

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 500228 E 4379946 N

WIREGRASS BENCH - TREND STUDY NO. 16B-24

Site Information

Site Description: The study is located on Wiregrass Bench, about 10 miles west of Price. This study was established to monitor possible sagebrush die-off on important deer winter range. The site is on the Haley allotment which is grazed from May 16 to October 31 by cattle and is managed by the BLM. Energy developments are prevalent in the area and there were expanded roads and a new oil/gas rig 500 feet to the west of the site in 2009. Pellet group data has indicated a steady increase in deer use since 1999 with deer use estimated to be very heavy in 2009. Estimated elk and cattle use has been mostly light to moderate since 1999 (Table - Pellet Group Data).

Browse: The key browse species on this site is Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). The sagebrush population on this site is quite dynamic with large fluctuations in most of the measured parameters. Cover of sagebrush has fluctuated over the sample years from a high of 10% in 1999 to a low of 5% in 2004 (Table - Browse Trends). Density, decadence, vigor, and recruitment of young sagebrush have also fluctuated greatly over the sample years. Utilization of sagebrush has been mostly light to moderate on the site over the sample years except for 2004 when use of sagebrush was mostly heavy (Table - Browse Characteristics).

The most numerous browse species on the site is stickleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), but this species does not contribute much cover. Broom snakeweed (*Gutierrezia sarothrae*) is present at the site in low cover (Table - Browse Trends). Utah serviceberry (*Amelanchier utahensis*) is also present in low numbers and has experienced increased use since 1999 (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is abundant and diverse on the site. Native perennial grasses provide the majority of the cover on the site and Salina wildrye (*Elymus salina*) and blue grama (*Bouteloua gracilis*) are the dominant species on the site. These two species provide the majority of the grass cover, but other native perennial grasses are common (Table - Herbaceous Trends). Forbs are diverse but not as abundant as grasses. A few important perennial species on the site include narrowleaf paintbrush (*Castilleja linariaefolia*), redroot eriogonum (*Eriogonum racemosum*), and scarlet globemallow (*Sphaeralcea coccinea*).

Soil: The soil is a loam with a slightly alkaline pH and a deep effective rooting depth (Table - Soil Analysis Data). Bare ground cover has been low to moderate for a Wyoming big sagebrush site over the sample years. Most of the protective ground cover is provided by vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 with signs of erosion from rills, gullies, and pedestaling, but was classified as stable in 2009.

Trend Assessments

Browse:

- **1994 to 1999 - up (+2):** The density of the primary browse species, Wyoming big sagebrush, increased by 26% from 1,880 plants/acre to 2,380 plants/acre, and cover increased from 6% to 10%. Recruitment of young sagebrush plants increased from 10% to 18%, and decadence and poor vigor both decreased.
- **1999 to 2004 - slightly down (-1):** Density of sagebrush decreased 18% to 1,940 plants/acre and cover decreased to 5%. There was a large decrease in the density of mature sagebrush plants and decadence increased to 63% of the population. Sagebrush plants displaying poor vigor increased to 44% and recruitment of young sagebrush plants decreased slightly to 13%.
- **2004 to 2009 - up (+2):** Density of sagebrush increased more than two-fold to 4,680 plants/acre primarily due to a large increase in the recruitment of young plants. The density of mature sagebrush

plants nearly doubled, and decadence decreased to 22%. Plants displaying poor vigor also decreased to 14%.

Grass:

- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover decreased slightly. There was a significant decrease in the nested frequency of bottlebrush squirreltail (*Sitanion hystrix*).
- **1999 to 2004 - slightly up (+1):** There was a 13% increase in the sum of nested frequency of perennial grasses and cover increased slightly. There was a significant increase in the nested frequency of needle-and-thread (*Stipa comata*), and western wheatgrass (*Agropyron smithii*) and Sandberg bluegrass (*Poa secunda*) were sampled for the first time in 2004.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, but cover increased to 26%. There was a significant increase in nested frequency of Salina wildrye, Sandberg bluegrass, and Indian ricegrass (*Oryzopsis hymenoides*).

Forb:

- **1994 to 1999 - up (+2):** There was a substantial increase in the sum of nested frequency of perennial forbs and cover increased from 2% to 3%.
- **1999 to 2004 - down (-2):** There was a 33% decrease in the sum of nested frequency of perennial forbs, though cover increased slightly to near 4%.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, but cover decreased to near 3%.

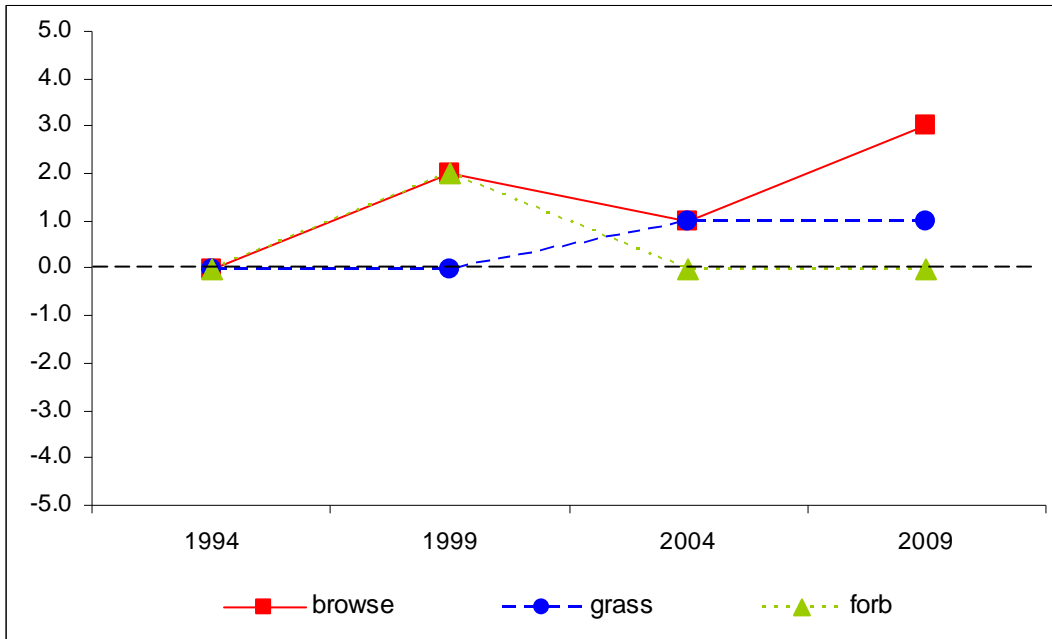
DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 16B, study no: 24

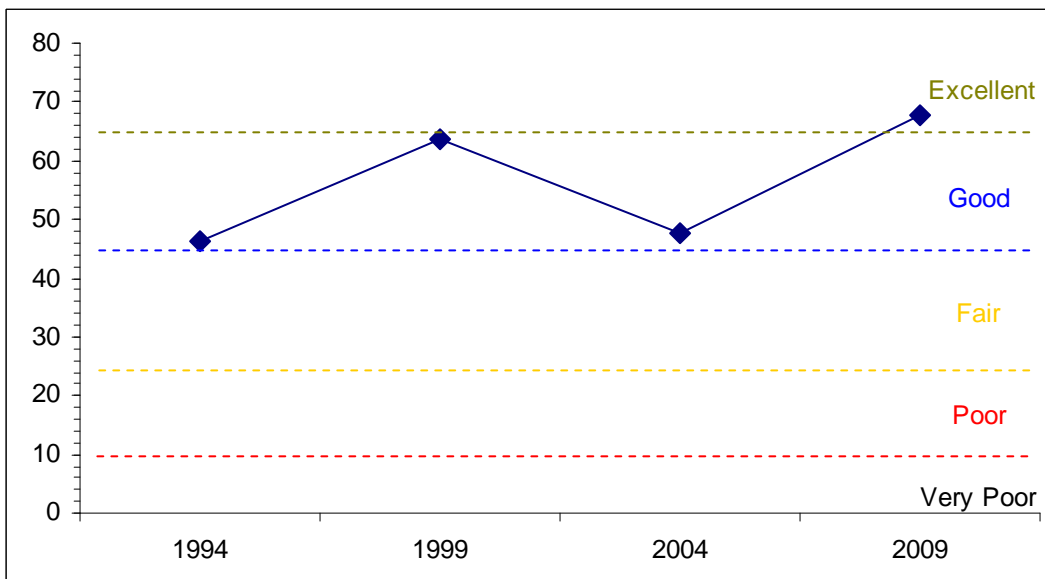
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	6.9	0.3	5.0	30.0	0.0	4.1	0.0	46.3	Fair-Good
99	12.2	6.3	9.0	30.0	-0.2	6.3	0.0	63.6	Good-Excellent
04	6.7	-2.5	6.0	30.0	0.0	7.5	0.0	47.7	Good
09	8.6	8.8	15.0	30.0	0.0	5.3	0.0	67.7	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16B, Study no: 24



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 16B, Study no: 24



HERBACEOUS TRENDS--
Management unit 16B, Study no: 24

T y p e	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	a-	a-	b42	b31	-	-	.32	.16
G	Agropyron spicatum	10	2	12	9	.53	.01	.05	.16
G	Bouteloua gracilis	b274	a230	ab254	ab245	10.33	4.77	6.64	7.75
G	Bromus tectorum (a)	5	20	-	5	.01	.20	-	.03
G	Elymus salina	c263	b294	a265	b306	9.56	8.72	10.01	16.88
G	Oryzopsis hymenoides	c25	bc19	a-	b14	.38	.20	-	.27
G	Poa fendleriana	b44	b98	b71	a-	.51	1.27	.66	-
G	Poa secunda	a-	a-	b59	c160	-	-	.61	.86
G	Sitanion hystrix	c95	b53	a15	a15	1.06	1.19	.07	.20
G	Sporobolus cryptandrus	-	-	5	-	-	-	.00	-
G	Stipa comata	a17	a4	b70	a1	.32	.00	.93	.03
G	Vulpia octoflora (a)	-	-	2	-	-	-	.01	-
Total for Annual Grasses		5	20	2	5	0.00	0.20	0.00	0.03
Total for Perennial Grasses		728	700	793	781	22.71	16.18	19.34	26.34
Total for Grasses		733	720	795	786	22.72	16.38	19.35	26.37
F	Agoseris glauca	a-	b55	ab10	a6	-	.24	.05	.02
F	Arabis sp.	-	-	2	1	-	-	.00	.00
F	Astragalus convallarius	b42	b38	b57	a7	.41	.14	1.11	.06
F	Astragalus sp.	7	13	-	1	.30	.21	-	.00
F	Calochortus nuttallii	a3	b31	b37	a3	.00	.07	.14	.00
F	Castilleja linariaefolia	a14	b51	a13	b34	.05	.38	.08	.29
F	Chenopodium sp. (a)	-	-	2	-	-	-	.01	-
F	Collinsia parviflora (a)	b21	b27	a3	a4	.05	.06	.00	.01
F	Comandra pallida	b35	c69	c59	a5	.36	.19	.45	.01
F	Crepis acuminata	-	3	-	-	-	.03	-	-
F	Cryptantha sp.	2	-	-	-	.01	-	-	-
F	Cymopterus sp.	-	7	-	-	-	.04	-	-
F	Delphinium nuttallianum	-	5	-	1	-	.00	-	.00
F	Descurainia pinnata (a)	1	-	3	-	.00	-	.01	-
F	Epilobium brachycarpum (a)	a-	a-	a-	b63	-	-	-	.11
F	Erigeron eatonii	-	-	-	1	-	-	-	.00
F	Eriogonum alatum	a4	b33	a3	a-	.03	.16	.03	-
F	Eriogonum racemosum	44	45	31	32	.39	.32	.27	.74
F	Eriogonum umbellatum	3	1	3	4	.03	.00	.03	.06
F	Gayophytum ramosissimum(a)	a-	a-	b24	a3	-	-	.10	.00
F	Hedysarum boreale	-	-	5	7	-	-	.12	.10
F	Hymenoxys acaulis	a1	a-	a-	b6	.00	-	-	.16
F	Lappula occidentalis (a)	a-	a3	b25	a1	-	.00	.10	.00
F	Lepidium densiflorum (a)	b18	ab15	ab9	a-	.04	.02	.02	-
F	Lesquerella sp.	a1	a-	a1	b18	.00	-	.00	.09
F	Machaeranthera grindelioides	ab8	b11	a-	b13	.06	.10	-	.22
F	Penstemon caespitosus	5	20	8	7	.05	.09	.05	.01
F	Penstemon carnosus	-	-	3	5	-	-	.01	.05

T y p e	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
F	Penstemon palmeri	3	-	-	2	.01	-	-	.00
F	Phlox longifolia	_a 43	_a 74	_a 80	_b 128	.08	.56	.35	.49
F	Plantago patagonica (a)	_b 42	_{ab} 37	_c 78	_a 8	.12	.08	.19	.01
F	Polygonum douglasii (a)	_a 21	_a 6	_b 146	_a 11	.04	.01	.31	.02
F	Ranunculus testiculatus (a)	_a -	_a -	_a 4	_b 29	-	-	.01	.09
F	Schoenrambe linifolia	14	12	19	20	.03	.02	.27	.06
F	Sphaeralcea coccinea	_{ab} 52	_{ab} 48	_a 37	_b 55	.18	.48	.72	.22
F	Taraxacum officinale	7	12	2	-	.01	.02	.00	-
F	Zigadenus paniculatus	_a -	_b 24	_a -	_a 5	-	.06	.00	.01
Total for Annual Forbs		103	88	294	119	0.26	0.19	0.77	0.25
Total for Perennial Forbs		288	552	370	361	2.05	3.16	3.74	2.66
Total for Forbs		391	640	664	480	2.31	3.35	4.51	2.92

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

BROWSE TRENDS--

Management unit 16B, Study no: 24

T y p e	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	2	2	3	1	.00	.00	.38	.38
B	Artemisia tridentata wyomingensis	58	66	56	74	5.51	9.74	4.90	6.46
B	Chrysothamnus viscidiflorus viscidiflorus	72	76	86	67	2.94	2.96	2.96	1.96
B	Echinocereus sp.	0	4	0	0	-	.00	-	-
B	Gutierrezia sarothrae	63	34	13	34	.61	.18	.00	.76
B	Opuntia sp.	9	3	2	3	.01	.00	.00	.00
B	Pediocactus simpsonii	0	0	2	1	-	-	.00	.00
B	Pinus edulis	0	1	0	0	.38	.15	-	-
Total for Browse		204	186	162	180	9.46	13.05	8.25	9.57

CANOPY COVER, LINE INTERCEPT--

Management unit 16B, Study no: 24

Species	Percent Cover	
	'04	'09
Amelanchier utahensis	.16	.18
Artemisia tridentata wyomingensis	5.13	6.55
Chrysothamnus viscidiflorus viscidiflorus	2.71	1.76
Gutierrezia sarothrae	.25	3.59
Opuntia sp.	.23	.38

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16B, Study no: 24

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	2.6	1.3
Artemisia tridentata wyomingensis	2.5	1.7

BASIC COVER--

Management unit 16B, Study no: 24

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	34.32	32.04	34.01	36.34
Rock	1.33	.57	.25	.11
Pavement	.41	.33	3.89	.97
Litter	23.33	24.23	26.12	35.93
Cryptogams	3.75	13.03	1.58	1.09
Bare Ground	31.76	32.17	47.34	41.59

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 24, Study Name: Wiregrass Bench

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
20.2	7.6	34.7	41.4	23.8	1.7	6.8	121.6	0.6

PELLET GROUP DATA--

Management unit 16B, Study no: 24

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	33	56	25	69	-	-	-
Elk	12	5	6	-	23 (56)	13 (31)	8 (17)
Deer	36	53	50	49	38 (93)	69 (170)	125 (309)
Cattle	6	7	4	9	15 (38)	12 (30)	15 (38)

BROWSE CHARACTERISTICS--

Management unit 16B, 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)	
Amelanchier utahensis										
94	40	0	100	-	-	50	0	0	17/20	
99	60	67	33	-	-	33	0	0	37/42	
04	60	0	100	-	-	0	100	0	24/22	
09	20	0	100	-	-	0	100	0	33/30	
Artemisia tridentata wyomingensis										
94	1880	10	41	49	20	16	1	14	22/33	
99	2380	18	54	29	260	50	10	4	23/34	
04	1940	13	24	63	30460	40	45	44	23/33	
09	4680	59	19	22	4880	21	17	14	20/27	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
94	4400	1	99	0	-	0	0	0	21/25
99	7480	17	83	0	200	4	.26	0	4/8
04	6360	13	84	3	480	17	3	3	5/9
09	5100	22	76	2	300	10	.39	0	4/10
<i>Echinocereus sp.</i>									
94	0	0	0	-	-	0	0	0	-/-
99	80	0	100	-	-	0	0	0	1/2
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
94	3260	1	98	1	-	0	0	.61	31/6
99	3480	16	84	1	-	0	0	0	3/4
04	460	13	87	0	-	0	0	0	4/5
09	2480	19	81	1	480	.80	0	.80	4/6
<i>Opuntia sp.</i>									
94	260	0	100	-	-	0	0	0	3/7
99	80	0	100	-	-	0	0	0	2/5
04	40	0	100	-	-	0	0	0	3/16
09	140	29	71	-	-	29	0	0	4/13
<i>Pediocactus simpsonii</i>									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	60	33	67	-	-	0	0	0	1/2
09	20	0	100	-	-	0	0	0	-/-
<i>Pinus edulis</i>									
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	-/-

NORTH SLACKPILE - TREND STUDY NO. 16R-6-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: Upland Loam (Wyoming Big Sagebrush), R034XY306UT

Land Ownership: DWR

Elevation: 6,600 ft (2,012 m)

Aspect: Southeast

Slope: 5%

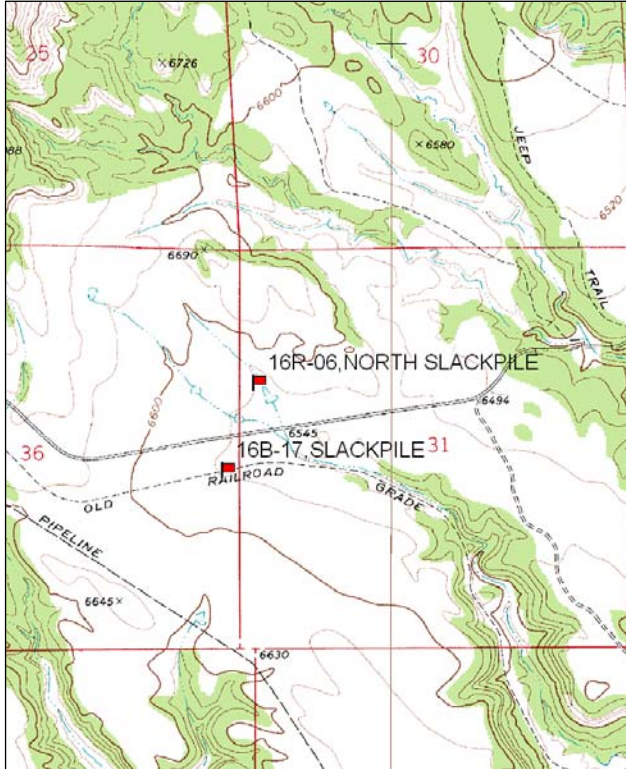
Transect bearing: 283 degrees magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

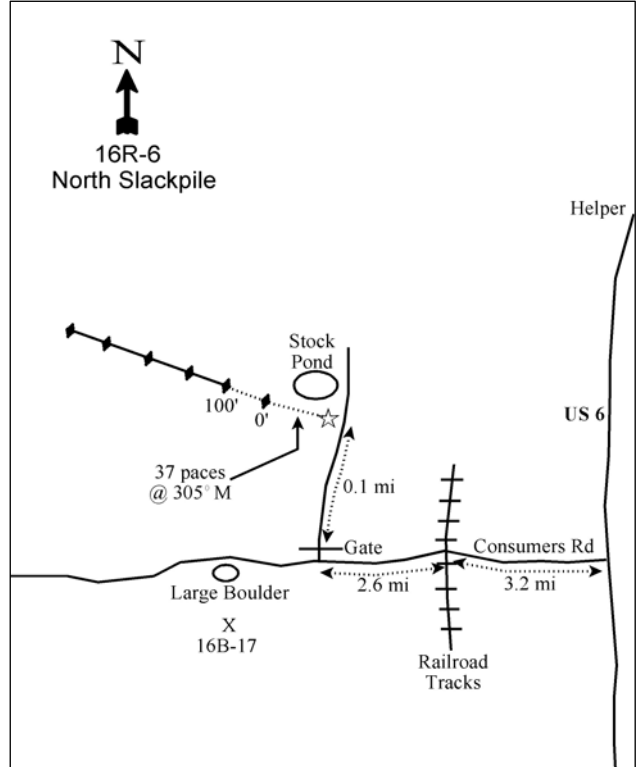
On US 6 south of Helper, turn west on to Consumer Road. Proceed west 3.2 miles to railroad tracks. Cross the tracks and continue 2.6 miles to a road on the right with a gate. Go through the gate and travel 0.1 miles to a witness post before a stock pond on the left. Walk 37 paces at 305°M to the start of the frequency baseline. The first stake is marked with a browse tag #453.

Map name: Standardville



Township: 13S, Range 9E, Section: 31

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 502958 E 4389352 N

NORTH SLACKPILE - TREND STUDY NO. 16R-6

Site Information

Site Description: The study is located about a quarter mile north of the Slackpile (16B-17) trend study. This area is managed by the Utah Division of Wildlife Resources and is usually grazed every other year. The pasture to the south, across the road, is grazed the other year. The regular trend study Slackpile 16B-17 is in the south pasture. A stock pond is located about 150 feet from the 0-foot post of the transect. The site was treated between the 2004 and 2009 sample years, likely as part of the Gordon Creek Roller Chopping Watershed Restoration Initiative project ([project # 513](#)) that was implemented in the fall of 2006. No seed mix was provided, but several introduced species, including crested wheatgrass (*Agropyron cristatum*), Russian wildrye (*Elymus junceus*) and prostrate kochia (*Kochia prostrata*), were sampled for the first time in 2009. Pellet group data indicates a steady decrease in deer use from heavy use in 1998 to moderate use in 2009. Estimated elk and cattle use has been light since 1998 (Table - Pellet Group Data).

Browse: The primary browse species on the site is Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). There was a large die-off of sagebrush between the 1999 and 2004 sample years that is attributed to drought conditions in the years prior to the 2004 sampling. Cover of sagebrush decreased from 14% to 3% between those sample years (Table - Browse Trends). There was also a large decrease in the density of sagebrush with 80% of the population classified as decadent in 2004. The sagebrush population recovered in 2009 with a large increase in density due to a large recruitment of young sagebrush plants. The sagebrush population was mostly young and the average height/crown of sagebrush has steadily decreased since 1998. Utilization of sagebrush has been mostly light to moderate with heavier use in 2004 (Table - Browse Characteristics). Broom snakeweed (*Gutierrezia sarothrae*) and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) are both prevalent on the site. The introduced species prostrate kochia was sampled for the first time in 2009.

Herbaceous Understory: Grasses are abundant on the site and provide the majority of the vegetation cover. The warm season grass Blue grama (*Bouteloua gracilis*) is the dominant species on the site. Blue grama provides most of the grass cover on the site. Other common perennial grasses on the site are bluebunch wheatgrass (*Agropyron spicatum*), bottlebrush squirreltail (*Sitanion hystrix*), and needle-and-thread (*Stipa comata*). The seeded species crested wheatgrass and Russian wildrye were sampled for the first time in 2009. Perennial forbs are rare on the site with scarlet globemallow (*Sphaeralcea coccinea*) providing nearly all of the forb cover (Table - Herbaceous Trends).

Soil: Soil texture is a loam with a slightly acidic pH and a moderately deep effective rooting depth (Table - Soil Analysis Data). There is a considerable amount of bare ground cover on the site with most protective cover coming from vegetation and litter cover. Cryptogam cover has steadily decreased since 1998 (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 and 2009 due to signs of rills, gullies, pedestaling of plants, flow patterns, and soil movement.

Trend Assessments

Browse:

- **1998 to 2004 - down (-2):** The density of the primary browse species, Wyoming big sagebrush, decreased 66% from 3,180 plants/acre to 1,080 plants/acre and cover decreased from 14% to 3%. Decadence of sagebrush increased from 19% to 80% and poor vigor increased from 19% to 65%. Recruitment of young sagebrush was low at 6% of population in 2004.
- **2004 to 2009 - up (+2):** There was a marked increase in the density of sagebrush to 18,200 plants/acre due to a large recruitment of young sagebrush plants. Decadence and poor vigor of sagebrush both decreased to 3%. The population is younger, evidenced by a decrease in the average height/crown of mature sagebrush plants.

Grass:

- **1998 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased 33%, though cover remained similar. There was a significant decrease in the nested frequency of blue grama.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased 42% and cover increased from 12% to 24%. There was a significant increase in the nested frequency of blue grama, Indian ricegrass, and bottlebrush squirreltail. Crested wheatgrass and Russian wildrye were sampled for the first time in 2009.

Forb:

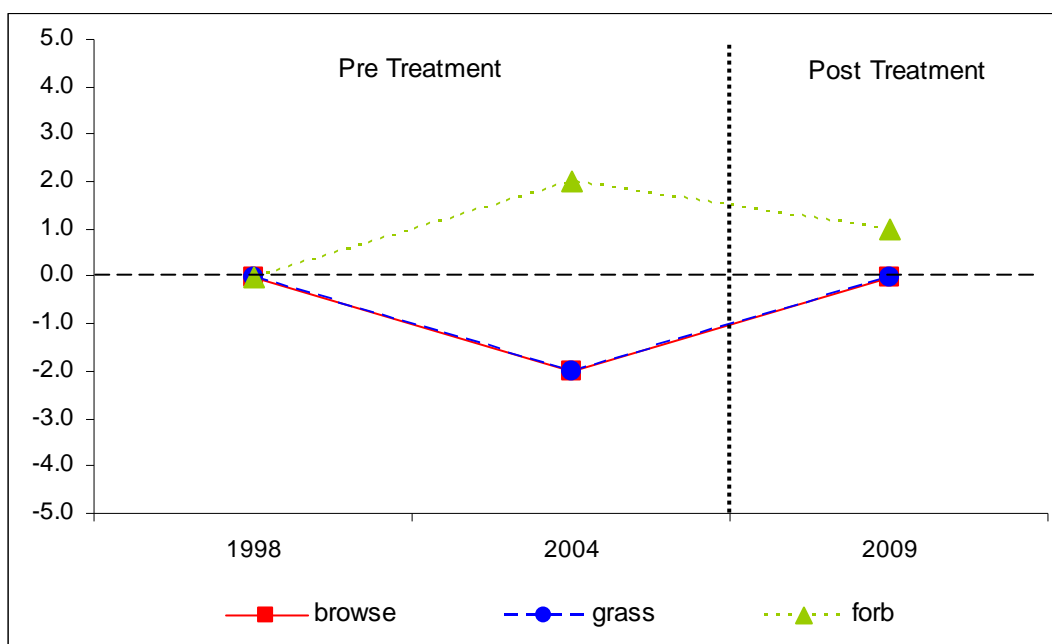
- **1998 to 2004 - up (+2):** Forbs are rare on this site, but sum of nested frequency of perennial forbs increased by 51% and cover increased from less than 1% to 3%.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 20%, though there was little change in cover. There was a significant increase in the nested frequency of scarlet globemallow.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 16R, 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
98	17.3	9.3	13.0	23.9	0.0	1.3	0.0	64.7	Good-Excellent
04	4.6	0.0	0.0	24.2	0.0	6.0	0.0	34.8	Fair
09	8.2	13.9	15.0	30.0	0.0	5.0	0.0	72.1	Excellent

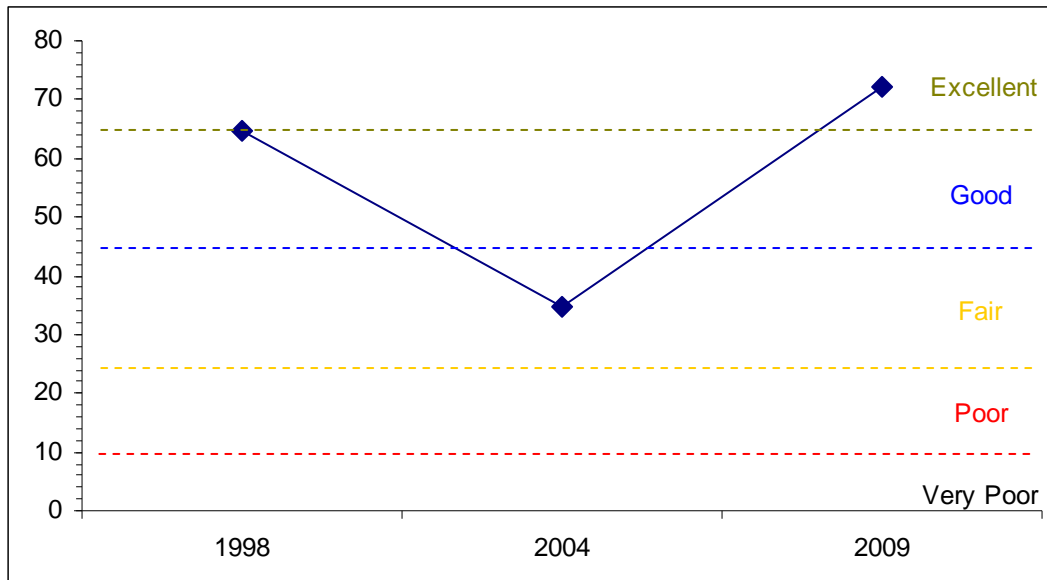
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16R Study no: 6



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 16R, Study no: 6



HERBACEOUS TRENDS--

Management unit 16R, Study no: 6

Type	Species	Nested Frequency			Average Cover %		
		'98	'04	'09	'98	'04	'09
G	Agropyron cristatum	a-	a-	b20	-	-	.25
G	Agropyron smithii	b148	a9	a16	1.34	.16	.20
G	Agropyron spicatum	a5	b22	b22	.03	.13	1.33
G	Bouteloua gracilis	b301	a240	b287	10.07	10.48	18.76
G	Bromus tectorum (a)	-	-	2	-	-	.01
G	Elymus junceus	a-	a-	b10	-	-	.10
G	Elymus salina	-	2	-	-	.15	-
G	Oryzopsis hymenoides	a5	a11	b33	.03	.07	.55
G	Sitanion hystrix	a37	a28	b68	.31	.58	1.27
G	Stipa comata	a10	b29	b27	.15	.49	1.14
Total for Annual Grasses		0	0	2	0	0	0.00
Total for Perennial Grasses		506	341	483	11.94	12.09	23.63
Total for Grasses		506	341	485	11.94	12.09	23.64
F	Alyssum alyssoides (a)	-	-	2	-	-	.00
F	Arabis sp.	-	-	-	.00	-	-
F	Calochortus nuttallii	a-	b33	a-	-	.09	-
F	Chenopodium fremontii (a)	-	-	-	-	.03	-
F	Chenopodium leptophyllum(a)	a-	c67	b6	-	.42	.02
F	Descurainia pinnata (a)	-	9	3	-	.07	.00
F	Gayophytum ramosissimum(a)	-	5	-	-	.01	-
F	Lappula occidentalis (a)	-	3	2	-	.01	.00
F	Lomatium sp.	-	2	-	-	.00	-
F	Lygodesmia grandiflora	-	4	-	-	.03	-
F	Phlox longifolia	b40	b48	a8	.09	.20	.04

T y P e	Species	Nested Frequency			Average Cover %		
		'98	'04	'09	'98	'04	'09
F	Plantago patagonica (a)	a ⁻	b ¹²	b ⁹	-	.06	.02
F	Ranunculus testiculatus (a)	a ⁻	b ¹⁹	b ¹⁶	-	.03	.06
F	Salsola iberica (a)	-	-	2	-	-	.03
F	Schoenocrambe linifolia	-	2	-	-	.01	-
F	Sphaeralcea coccinea	a ⁷⁶	a ⁷³	b ¹³⁷	.54	2.54	2.45
F	Tragopogon dubius	-	1	-	-	.00	-
F	Trifolium sp.	a ⁻	b ¹⁹	a ⁻	-	.10	-
Total for Annual Forbs		0	115	40	0	0.64	0.15
Total for Perennial Forbs		116	182	145	0.63	3.00	2.50
Total for Forbs		116	297	185	0.63	3.64	2.65

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

BROWSE TRENDS--

Management unit 16R, Study no: 6

T y P e	Species	Strip Frequency			Average Cover %		
		'98	'04	'09	'98	'04	'09
B	Artemisia tridentata wyomingensis	83	40	90	13.80	3.04	6.16
B	Atriplex canescens	1	2	5	.03	.63	.33
B	Ceratoides lanata	0	0	2	-	-	.03
B	Chrysothamnus nauseosus	2	0	0	.00	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	38	13	13	1.07	.06	.21
B	Gutierrezia sarothrae	86	39	80	3.89	.66	2.51
B	Kochia prostrata	0	0	1	-	-	.00
B	Opuntia sp.	9	10	16	.36	.30	.04
B	Pediocactus simpsonii	0	3	4	-	.03	.00
B	Ribes sp.	1	0	0	.00	-	-
B	Tetradymia canescens	0	1	0	-	.00	-
Total for Browse		220	108	211	19.17	4.73	9.30

CANOPY COVER, LINE INTERCEPT--

Management unit 16R, Study no: 6

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	2.08	4.83
Atriplex canescens	.66	.85
Ceratoides lanata	-	.13
Chrysothamnus viscidiflorus viscidiflorus	.05	.11
Gutierrezia sarothrae	.53	3.18
Opuntia sp.	-	.01
Pediocactus simpsonii	.05	-
Tetradymia canescens	.06	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16R, Study no: 6

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	3.2	-
Atriplex canescens	4.2	-

BASIC COVER--

Management unit 16R, Study no: 6

Cover Type	Average Cover %		
	'98	'04	'09
Vegetation	34.43	19.45	38.72
Rock	.39	.41	.07
Pavement	.39	.84	.21
Litter	13.63	23.67	35.43
Cryptogams	5.50	2.01	.39
Bare Ground	50.01	51.99	41.17

SOIL ANALYSIS DATA --

Management unit 16R, Study no: 6, Study Name: North Slackpile

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.6	6.4	40.7	34.7	24.6	1.9	9.7	83.2	1

PELLET GROUP DATA--

Management unit 16R, Study no: 6

Type	Quadrat Frequency		
	'98	'04	'09
Rabbit	15	22	17
Elk	3	3	9
Deer	41	35	17
Cattle	4	1	-
Antelope	1	-	-
Horse	-	-	-

Days use per acre (ha)		
'98	'04	'09
-	-	-
7 (17)	2 (5)	2 (5)
86 (213)	42 (104)	27 (68)
17 (41)	3 (7)	3 (7)
-	-	-
-	-	1 (1)

BROWSE CHARACTERISTICS--
Management unit 16R, Study no: 6

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata wyomingensis</i>									
98	3180	26	55	19	280	48	19	19	27/41
04	1080	6	15	80	820	33	35	65	19/25
09	18200	71	26	3	4540	.43	.43	3	11/12
<i>Atriplex canescens</i>									
98	20	0	100	0	-	0	100	0	27/45
04	40	0	0	100	-	100	0	0	24/37
09	140	14	71	14	-	43	0	14	23/41
<i>Atriplex confertifolia</i>									
98	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	20/24
09	0	0	0	-	-	0	0	0	-/-
<i>Ceratoides lanata</i>									
98	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	40	0	100	-	-	0	0	0	7/10
<i>Chrysothamnus nauseosus</i>									
98	60	67	33	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
98	2360	20	79	1	-	36	52	.84	7/12
04	720	11	81	8	620	0	0	3	6/7
09	700	14	66	20	-	0	0	69	7/13
<i>Gutierrezia sarothrae</i>									
98	15440	2	97	0	-	0	0	.25	10/8
04	1600	10	88	3	300	8	4	1	6/6
09	4740	2	74	24	-	5	0	24	8/8
<i>Kochia prostrata</i>									
98	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	20	0	100	-	-	0	0	0	7/13
<i>Opuntia sp.</i>									
98	220	18	73	9	-	0	0	9	3/5
04	240	17	83	0	-	0	0	0	4/10
09	380	5	95	0	20	0	11	26	3/10
<i>Pediocactus simpsonii</i>									
98	0	0	0	-	-	0	0	0	-/-
04	60	0	100	-	-	0	0	0	1/2
09	80	0	100	-	-	0	0	0	1/2

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Ribes sp.										
98	220	0	100	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
Tetradymia canescens										
98	0	0	0	-	-	0	0	0	-/-	
04	20	0	100	-	-	100	0	0	10/10	
09	0	0	0	-	40	0	0	0	-/-	

GORDON CREEK BURN - TREND STUDY NO. 16R-10-09

Vegetation Type: Prostrat Kochia

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: Semidesert Loam (Wyoming Big Sagebrush), R034XY212UT

Land Ownership: DWR

Elevation: 6,430 ft (1,960 m)

Aspect: Southeast

Slope: 0%-2%

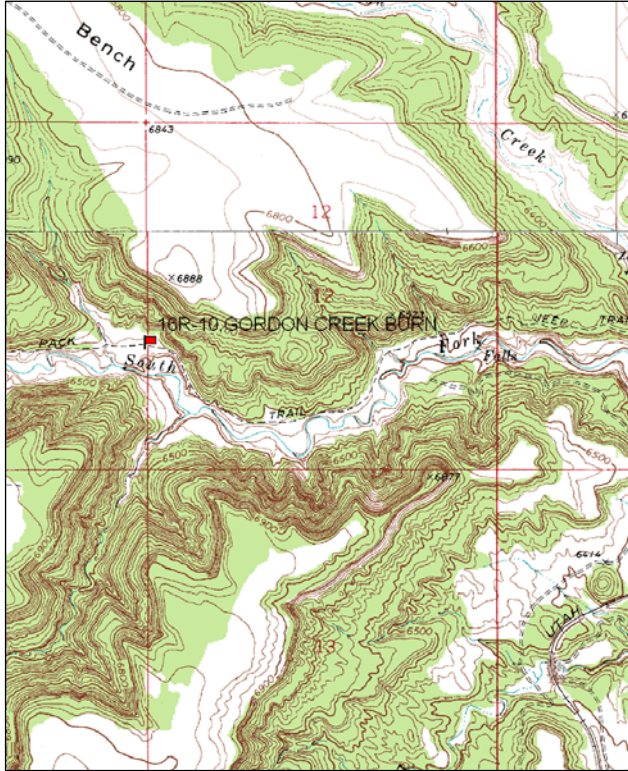
Transect bearing: westerly direction

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar on each end of belts.

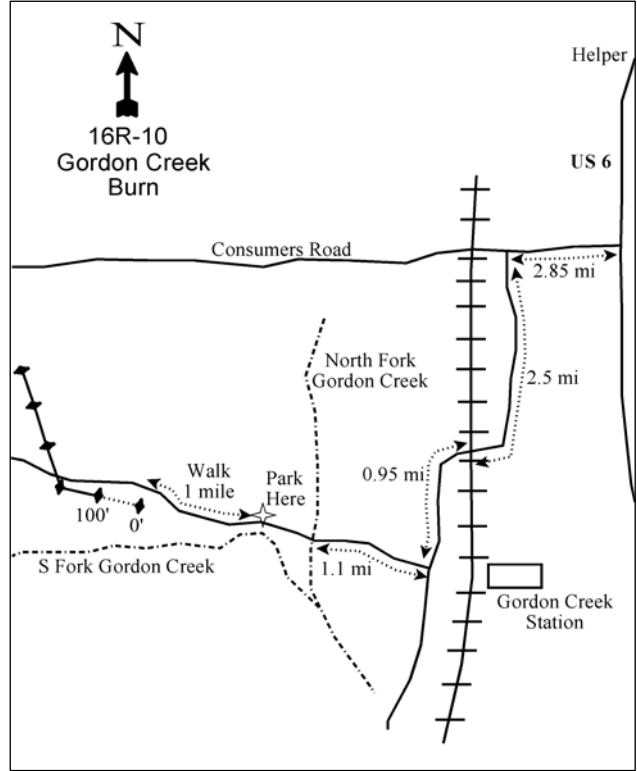
Directions:

Travel west on Consumers Road (off of US 6 south of Helper) 2.85 miles and turn left. Continue 2.5 miles and cross the railroad tracks. Continue 0.95 miles, staying left, to the Gordon Creek Station. Turn right off the main road and proceed 1.1 miles, crossing the North Fork of Gordon Creek. Continue on this road over the next ridge to the South Fork of Gordon Creek. Park where the road is washed out. From here walk up the canyon about 1 mile to a flat that opens up on both sides of the road. The 0-foot baseline stake is located on the south side of the road. The baseline doglegs to the north after 200 feet. The 0-foot stake is marked by browse tag #187.

Map name: Pinnacle Peak



Diagrammatic Sketch:



Township: 14S, Range: 8E, Section: 11

GPS: NAD 83, UTM 12S 501351 E 4385597 N

GORDON CREEK BURN - TREND STUDY NO. 16R-10

Site Information

Site Description: The study is located west of Price on the South Fork of Gordon Creek. The site was established to monitor a 160-acre prescribed burn/seeding project of an overly mature stand of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) that was conducted as part of a cooperative effort by the BLM, Division of Wildlife Resources, and the River Gas Corporation. In March of 1999, the site was burned using a helitorch, aerially seeded, and then lightly harrowed using ATVs to cover the seed. No seed mix information was available, but it was noted that seeded species included basin wildrye (*Elymus cinereus*), Russian wildrye (*E. junceus*), intermediate wheatgrass (*Agropyron intermedium*), crested wheatgrass (*A. cristatum*), alfalfa (*Medicago sativa*), Lewis flax (*Linum lewisii*), small burnet (*Sanguisorba minor*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), fourwing saltbush (*Atriplex canescens*), forage kochia (*Kochia prostrata*) and winterfat (*Ceratoides lanata*). Pellet group data has indicated no to light use by deer and cattle since 1999. There was no sign of elk measured in 1999, but elk use has been heavy since 2001 (Table - Pellet Group Data). This particular area appears to be attracting elk due to the abundance of the seeded species forage kochia.

Browse: Forage kochia was seeded as part of the seed mix in 1999 and has become the dominant species on the site. The cover of forage kochia has increased substantially since it was seeded and has provided an average of 50% of the cover since 2004 (Table - Browse Trends). Due to the high density of forage kochia, the method for sampling was altered in 2001. Density was estimated by counting mature kochia plants within each quadrat rather than strips. In the 2001 and 2004 sample years, young and seedling kochia plants were so numerous they were too difficult to count. It was noted that seedling and recruitment of young plants had decreased in 2009, but young plants were not sampled. They occupy all interspaces between mature plants. Density of mature plants has steadily increased since the study outset in 1999. Decadence and poor vigor of forage kochia have been minimal in the kochia population (Table - Browse Characteristics). Estimating utilization on this species is extremely difficult due to their low growth form and abundant annual leader growth and heavy use has little effect on kochia. With the high number of elk pellet groups sampled, it appears that kochia is the primary forage for elk.

Other important browse species that were seeded on the site include fourwing saltbush, winterfat and Wyoming big sagebrush. Populations of young plants of both fourwing saltbush and Wyoming big sagebrush were sampled from 1999 to 2004, but neither species was sampled in 2009. Winterfat has been sampled in low and decreasing density since 1999 (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory was initially diverse after the seeding, but many species were not sampled in 2009 and none were abundant. Basin wildrye, Russian wildrye, intermediate wheatgrass, and crested wheatgrass were all seeded grass species. Basin and Russian wildrye were the only seeded grass species sampled since 2004. Russian wildrye is the only species other than forage kochia that provides a notable amount of cover. Cheatgrass (*Bromus tectorum*) was sampled each year, but it is infrequent and will likely be held in check by the abundance and competition of forage kochia. Several of the seeded forb species, alfalfa, Lewis flax, and small burnet, established well after seeding, but all declined over the sample years. Forbs declined significantly between 2001 and 2004, and no forbs were sampled on the site in 2009 (Table - Herbaceous Trends).

Soil: Soils on the site are loam with a slightly alkaline pH and very deep effective rooting depth (Table - Soil Analysis Data). Bare ground cover was high initially in 1999 after treatment, but has been more moderate since 2001. Since 2001 the vegetation has been better established and provided most of the protective ground cover (Table - Basic Cover). The soil erosion condition was classified as stable in both 2001 and 2004. In 2009, the soil erosion condition was classified as moderate due to a large amount of pedestaling around plants, gullies, and soil movement.

Trend Assessments

Browse:

- **1999 to 2001 - up (+2):** Diversity of browse is low on the site with the seeded species forage kochia beginning to out-compete other browse species. Density and cover of forage kochia both increased substantially. The kochia population is healthy and vigorous. Fourwing saltbush and Wyoming big sagebrush appear to be persisting on the site, but may not increase.
- **2001 to 2004 - up (+2):** There was a two-fold increase in the density of forage kochia and cover increased to over 50%. The density of fourwing saltbush and Wyoming big sagebrush declined markedly.
- **2004 to 2009 - stable (0):** There was little change in the density or cover of forage kochia. Fourwing saltbush and Wyoming big sagebrush were not sampled on the site.

Grass:

- **1999 to 2001 - down (-2):** The sum of nested frequency of perennial grasses decreased by 30% and cover decreased slightly.
- **2001 to 2004 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though there was a change in composition. Russian wildrye increased significantly in nested frequency and is now the dominant grass on the site.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency and cover of perennial grasses. Diversity of grasses has decreased with only six species sampled in 2009.

Forb:

- **1999 to 2001 - down (-2):** The sum of nested frequency of perennial forbs decreased by 58% and cover decreased from 14% to 11%. There was a significant decrease in the nested frequency of all of the seeded species.
- **2001 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 89% and cover decreased to less than 1%.
- **2004 to 2009 - down (-2):** There were no forbs sampled in 2009.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 16R, study no: 10

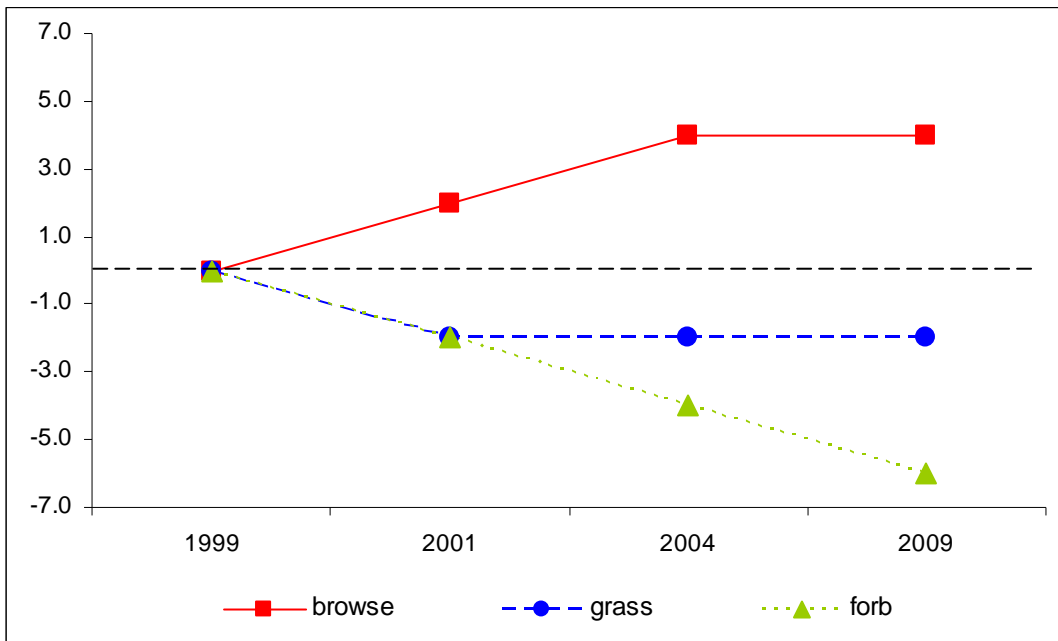
Year	Preferred Browse Cover	Preferred Browse Decadence	*Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	4.0	0.0	0.0	6.3	-0.4	10.0	0.0	19.9	Poor
01	30.0	15.0	0.3	4.8	-0.8	10.0	0.0	59.4	Good
04	30.0	15.0	0.0	7.4	-0.7	1.7	0.0	53.4	Good
09	30.0	15.0	0.0	6.8	-0.6	0.0	0.0	51.2	Good

*Young plants were not counted for forage kochia.

Trend Summary

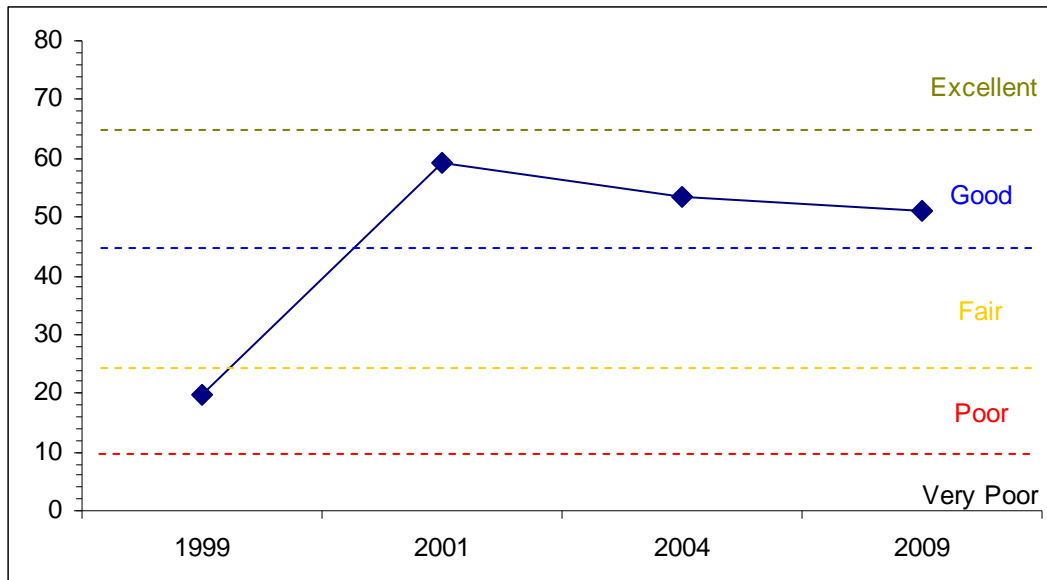
CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 16R, Study no: 10



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 16R, Study no: 10



HERBACEOUS TRENDS--

Management unit 16R, Study no: 10

Type	Species	Nested Frequency				Average Cover %			
		'99	'01	'04	'09	'99	'01	'04	'09
G	<i>Agropyron cristatum</i>	6	-	-	-	.13	-	-	-
G	<i>Agropyron intermedium</i>	b15	ab8	a-	a-	.69	.56	-	-
G	<i>Agropyron smithii</i>	b27	ab11	a5	a1	1.68	.82	.03	.03
G	<i>Bouteloua gracilis</i>	5	6	-	-	.15	.53	-	-
G	<i>Bromus inermis</i>	4	-	-	-	.03	-	-	-
G	<i>Bromus japonicus (a)</i>	2	-	-	-	.06	-	-	-
G	<i>Bromus tectorum (a)</i>	a36	b76	ab50	ab50	.46	1.03	.88	.84
G	<i>Elymus cinereus</i>	-	-	5	5	-	-	1.03	.15
G	<i>Elymus junceus</i>	a-	b9	c31	c44	-	.15	2.46	3.13
G	<i>Elymus salina</i>	-	-	3	-	-	-	.06	-
G	<i>Festuca ovina</i>	-	3	-	1	-	.03	-	.03
G	<i>Oryzopsis hymenoides</i>	b14	ab4	b13	a-	.23	.15	.08	-
G	<i>Sitanion hystrix</i>	b11	a-	ab2	a-	.02	.00	.00	-
G	<i>Sporobolus cryptandrus</i>	a1	b15	a1	a3	.21	.15	.01	.06
G	<i>Stipa lettermani</i>	-	2	-	-	-	.00	-	-
Total for Annual Grasses		38	76	50	50	0.52	1.03	0.87	0.84
Total for Perennial Grasses		83	58	60	54	3.16	2.42	3.70	3.40
Total for Grasses		121	134	110	104	3.68	3.46	4.58	4.24
F	<i>Chenopodium fremontii (a)</i>	c58	b17	d111	a-	7.25	.03	.71	-
F	<i>Chenopodium leptophyllum(a)</i>	a-	a-	b9	a-	-	-	.02	-
F	<i>Descurainia pinnata (a)</i>	a-	b13	ab5	a-	-	.05	.01	-
F	<i>Lappula occidentalis (a)</i>	a-	b29	b22	a-	-	.14	.10	-
F	<i>Lepidium montanum</i>	-	-	5	-	.00	-	.63	-
F	<i>Linum lewisii</i>	b43	a1	a-	a-	.77	.06	-	-

Type	Species	Nested Frequency				Average Cover %			
		'99	'01	'04	'09	'99	'01	'04	'09
F	Medicago sativa	c178	b142	a7	a-	6.57	10.65	.21	-
F	Physalis longifolia	b91	a-	a-	a-	5.83	-	-	-
F	Physaria sp.	2	-	-	-	.01	-	-	-
F	Salsola iberica (a)	-	7	1	-	-	.15	.00	-
F	Sanguisorba minor	b25	a-	a-	a-	.61	-	-	-
F	Sisymbrium altissimum (a)	a-	b96	a-	a-	-	2.62	-	-
F	Taraxacum officinale	-	-	-	-	.00	-	-	-
F	Trifolium sp.	-	-	4	-	-	-	.00	-
F	Unknown forb-annual (a)	-	-	2	-	-	-	.00	-
Total for Annual Forbs		58	162	150	0	7.25	3.00	0.86	0
Total for Perennial Forbs		339	143	16	0	13.82	10.71	0.85	0
Total for Forbs		397	305	166	0	21.07	13.72	1.71	0

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

BROWSE TRENDS--

Management unit 16R, Study no: 10

Type	Species	Strip Frequency				Average Cover %			
		'99	'01	'04	'09	'99	'01	'04	'09
B	Artemisia tridentata wyomingensis	2	16	1	0	.02	.06	.00	-
B	Atriplex canescens	33	34	6	0	.41	.07	.01	-
B	Ceratoides lanata	24	17	13	4	.09	.06	.09	.00
B	Gutierrezia sarothrae	0	1	0	0	-	.03	-	-
B	Kochia prostrata	93	71	85	94	2.20	28.48	53.82	45.91
B	Opuntia sp.	0	3	1	1	-	.00	.00	.00
Total for Browse		152	142	106	99	2.72	28.71	53.93	45.91

CANOPY COVER, LINE INTERCEPT--

Management unit 16R, Study no: 10

Species	Percent Cover	
	'04	'09
Kochia prostrata	39.66	57.29

BASIC COVER--

Management unit 16R, Study no: 10

Cover Type	Average Cover %			
	'99	'01	'04	'09
Vegetation	33.91	43.19	63.50	49.86
Rock	.06	.04	.03	0
Pavement	.04	.09	.03	.39
Litter	10.20	34.84	16.26	28.84
Cryptogams	0	0	0	.08
Bare Ground	69.72	35.97	33.64	36.39

SOIL ANALYSIS DATA --

Management unit 16R, Study no: 10, Study Name: Gordon Creek Burn

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.3	7.5	41.3	44.2	14.5	1.9	6.6	144	0.8

PELLET GROUP DATA--

Management unit 16R, Study no: 10

Type	Quadrat Frequency				Days use per acre (ha)			
	'99	'01	'04	'09	'99	'01	'04	'09
Rabbit	21	29	2	2	-	-	-	-
Elk	-	56	83	62	-	139 (344)	130 (321)	77 (190)
Deer	1	4	5	11	4 (10)	5 (12)	1 (2)	13 (31)
Cattle	-	2	-	5	-	9 (23)	2 (5)	6 (14)

BROWSE CHARACTERISTICS--

Management unit 16R, 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)	
<i>Artemisia tridentata wyomingensis</i>										
99	40	100	0	-	140	0	0	0	-/-	
01	500	96	4	-	-	0	0	0	11/7	
04	20	100	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	18/17	
<i>Atriplex canescens</i>										
99	1880	100	0	0	100	0	0	0	-/-	
01	1520	100	0	0	20	1	0	0	19/10	
04	120	33	17	50	-	0	67	33	17/11	
09	0	0	0	0	-	0	0	0	19/17	
<i>Ceratoides lanata</i>										
99	680	68	32	0	180	0	0	0	13/5	
01	480	67	33	0	-	4	0	0	10/8	
04	320	6	88	6	-	13	38	6	7/7	
09	100	0	80	20	-	0	0	0	6/6	
<i>Chrysothamnus nauseosus</i>										
99	0	0	0	-	-	0	0	0	-/-	
01	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	11/11	
09	0	0	0	-	-	0	0	0	-/-	
<i>Gutierrezia sarothrae</i>										
99	0	0	0	0	-	0	0	0	-/-	
01	20	0	0	100	-	0	0	100	-/-	
04	0	0	0	0	-	0	0	0	-/-	
09	0	0	0	0	-	0	0	0	-/-	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Juniperus osteosperma</i>									
99	0	0	0	-	-	0	0	0	-/-
01	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Kochia prostrata</i> - young plants were not counted after 1999.									
99	14300	11	89	-	20	0	0	0	16/16
01	22986	0	100	-	-	0	0	0	16/21
04	46620	0	100	-	-	13	16	0	8/15
09	51476	0	100	-	-	29	1	.31	8/14
<i>Opuntia</i> sp.									
99	0	0	0	-	-	0	0	0	-/-
01	60	67	33	-	-	0	0	0	-/-
04	20	0	100	-	-	0	0	0	4/12
09	20	0	100	-	-	0	0	0	4/16

SUMMARY
WILDLIFE MANAGEMENT UNIT 16B - CENTRAL MOUNTAINS, MANTI NORTH

Community Types

There were ten Range Trend studies sampled in WMU 16B during the summer of 2009. Six study sites [Slackpile (16B-17), Porphyry Bench (16B-18), North Spring Bench (16B-19), Consumer Bench (16B-23), Wire Grass Bench (16B-24) and North Slackpile (16R-6)] sample Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities. All six of these studies are considered to be crucial deer winter habitat and four of these studies (16B-17, 16B-19, 16B-24 and 16R-6) are also within crucial elk winter habitat. One study [Poison Spring Bench (16B-22)] sampled an area that had been chained and seeded in the past to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and is considered to be crucial deer and elk winter habitat. One study [Telephone Bench (16B-20)] samples a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush community within crucial deer and elk winter habitat. One study [Huntington Canyon (16B-21)] samples a perennial grass community within crucial deer spring/fall habitat and crucial elk winter habitat. The final study [Gordon Creek Burn (16R-10)] samples a burned area that was seeded to forage kochia (*Kochia prostrata*) that is within crucial deer and elk winter habitat.

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation data from this herd unit were compiled from the Price Warehouses, Helper UP&L and Wellington 3E weather stations (Figures 1 and 2). The unit's 27 year annual mean was 11.15 inches, the 28 year spring (March to May) mean was 2.56 inches, and the 27 year fall (Sept. to Nov.) mean was 3.41 inches. Annual precipitation data were not available for the years 1993, 1997 and 2005. The unit's annual precipitation was below 75% of the normal annual mean (drought conditions) in 1988, 1989, 1990, 1991, 2001, 2002, 2003, 2006, 2007 and 2008 (Figure 1). Spring precipitation was below 75% of normal in 1984, 1989, 1990, 1998, 2002, 2003, 2004, 2005, 2006, 2007 and 2008 (Figure 2). Fall precipitation was below 75% of normal in 1988, 1989, 1995, 1999, 2001, 2003, 2007 and 2008 (Figure 2) (Utah Climate Summary 2009).

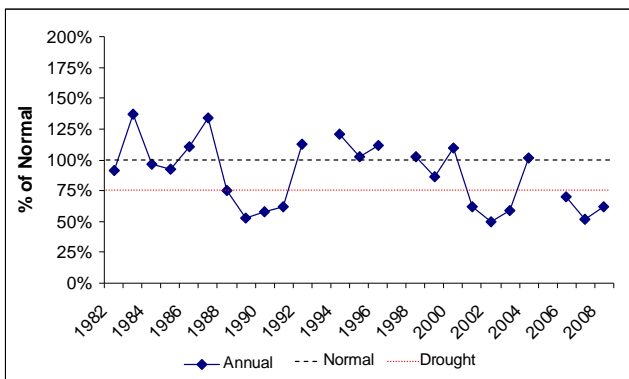


Figure 1. Percent annual precipitation based on the 27 year mean precipitation for WMU 16B, Central Mountains, Manti North. Precipitation data were collected at the Price Warehouses, Helper UP&L and Wellington 3E weather stations (Utah Climate Summary 2009).

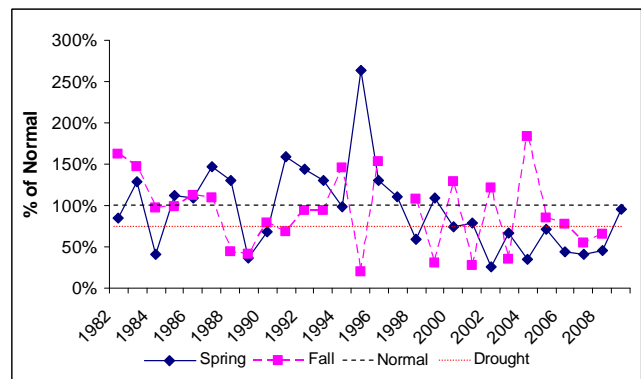


Figure 2. Percent annual precipitation based on the 27 year mean for spring (March-May) and fall (Sept.-Nov.) precipitation for WMU 16B, Central Mountains, Manti North. Precipitation data were collected at the Price Warehouses, Helper UP&L and Wellington 3E weather stations (Utah Climate Summary 2009).

Browse

The median browse trend (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 seven study sites in the unit: 16B-17, 16B-18, 16B-19, 16B-23, 16B-24, 16R-6 and 16R10. The mean density and cover of Wyoming big sagebrush decreased significantly between 1998/1999 and 2004 (Figure 3a and 3b). There was a large sagebrush die-off in the foothills east of Price during this period that affected many of the study sites. The density of Wyoming big sagebrush increased significantly again in 2009 (Figure 3a) primarily due to large increases in the recruitment of young plants on the studies 16B-17, 16B-24 and 16R-6. The mean Wyoming big sagebrush population decadence reflected the die-off and increased significantly from 1998/1999 to 74% in 2004. Decadence decreased to more moderate levels in 2009 (Figure 3c). Mountain big sagebrush was sampled on two sites in the unit: 16B-20 and 16B-21. The mean density and cover of mountain big sagebrush was low compared to the other sagebrush species, but remained relatively similar throughout the sample years (Figure 3a and 3b). The mean population decadence of mountain big sagebrush increased significantly from 19% in 1998/1999 to 52% in 2004. Decadence decreased in 2009 to 36%, though the decrease was not significant (Figure 3c). Black sagebrush was sampled on two studies in the unit: 16B-20 and 16B-22. The mean density of black sagebrush increased significantly from 2004 to 2009 (Figure 3a) due to a large increase in the recruitment of young plants on the 16B-20 study site. Because young plants provide little cover, the mean cover of black sagebrush changed little through the sample years, though it has steadily increased from 1994 to 2009 (Figure 3b). The mean decadence of black sagebrush has fluctuated throughout the sample years from a high of 35% in 1994 to a low of 11% in 2009 (Figure 3c).

Herbaceous Understory

The median grass trend (Figure 5). The mean perennial grass sum of nested frequency decreased significantly from 1998/1999 to 2004, but increased significantly again in 2009, returning to 1998/1999 levels (Figure 4a). The mean cover of perennial grass showed a similar trend (Figure 4b). Cheatgrass (*Bromus tectorum*) was sampled on many of the studies, but at very low frequency and cover (Figure 4a and 4b).

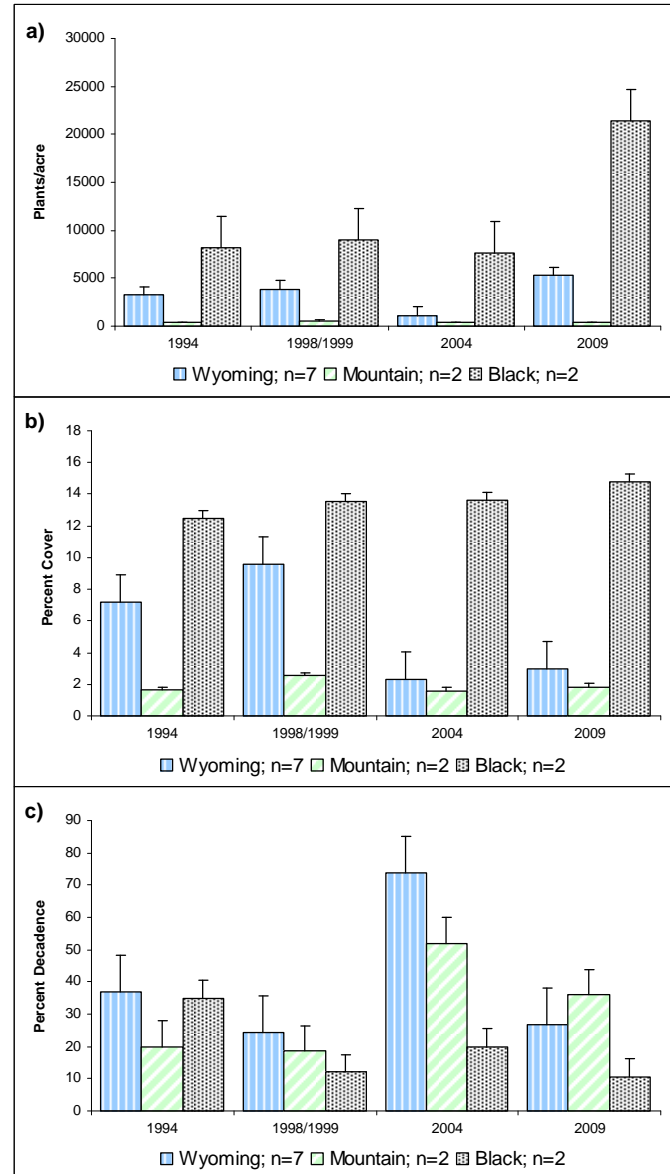


Figure 3. a) Mean density of sagebrush (*Artemisia* spp.) by year for WMU 16B, Central Mountains, Manti North. b) Mean cover of sagebrush by year for WMU 16B. c) Mean population decadence of sagebrush by year for WMU 16B.

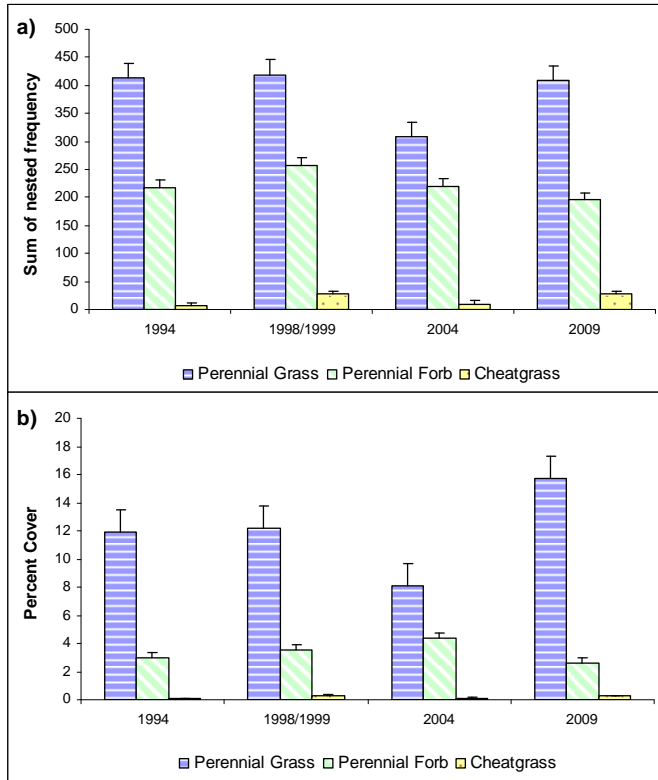


Figure 4. a) Mean perennial grass, perennial forb and cheatgrass sum of nested frequency by year for WMU 16B, Central Mountains, Manti North. b) Mean perennial grass, perennial forb and cheatgrass cover by year for WMU 16B.

The median forb trend (Figure 5). The mean perennial forb sum of nested frequency and mean cover were similar throughout the sample years (Figure 4a and 4b). No noxious weeds were sampled on the studies in this herd unit.

Desirable Components Index

Eight of the studies that sample deer winter habitat, 16B-17, 16B-18, 16B-19, 16B-20, 16B-22, 16B-23, 16B-24, 16R-6 and 16R-10, are considered to be within the low potential scale for the deer Desirable Components Index (DCI). The mean DCI ranking for these studies has fluctuated from Fair to Good over the sample years (Figure 6 and Table 1). Much of the change in scores has come from either the Preferred Browse Cover scores or from Perennial Grass Cover scores (Table 1). Only one sampled study, Telephone Bench (16B-20) was within the mid-level potential scale; therefore, it was not included in the unit summary. For more details on the mid-level potential DCI trend, refer to the Telephone Bench (16B-20) discussion section. No studies were within the high potential scale for 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	12.3	2.9	3.4	20.3	-0.1	3.4	0.0	42.2	Fair
98/99	18.0	8.3	5.9	20.9	-0.2	4.4	0.0	57.2	Good
04	11.0	3.3	1.0	10.3	-0.1	6.4	0.0	31.9	Fair
09	11.4	4.7	2.3	20.3	-0.2	4.9	0.0	43.3	Fair-Good

Table 1. Low potential scale mean deer DCI scores (n=8) by year for WMU 16B, Central Mountains, Manti North. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

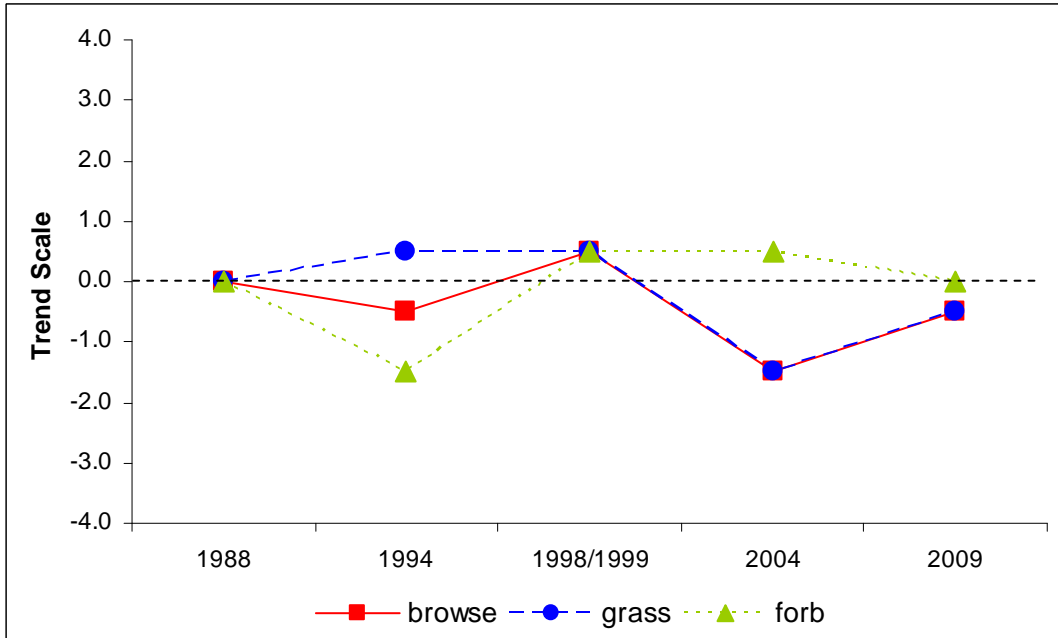


Figure 5. Cumulative median browse, grass and forb trends by year for WMU 16B, Central Mountains, Manti North.

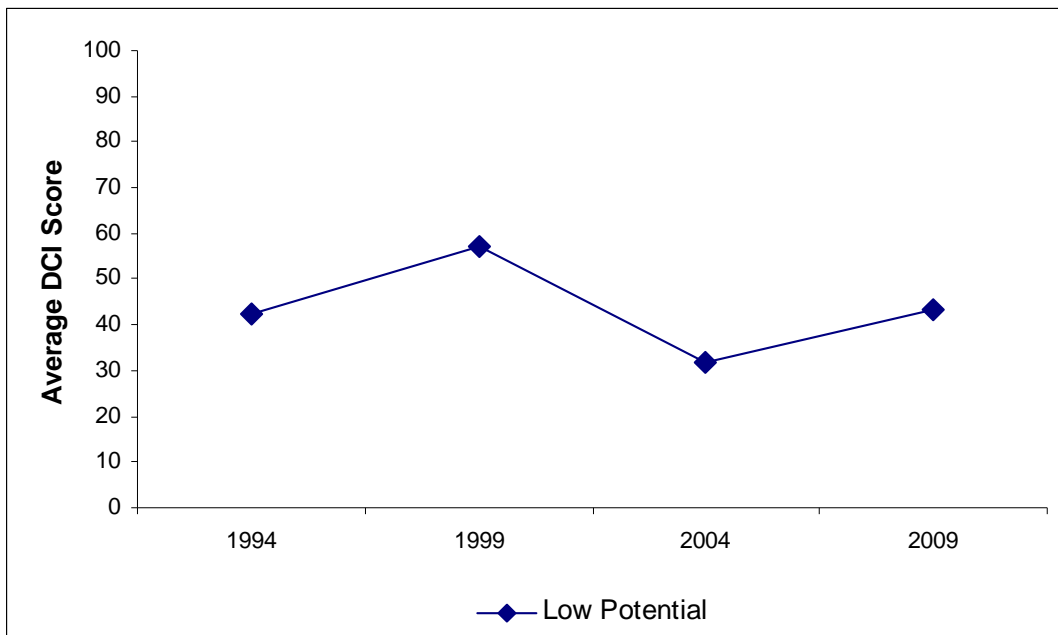
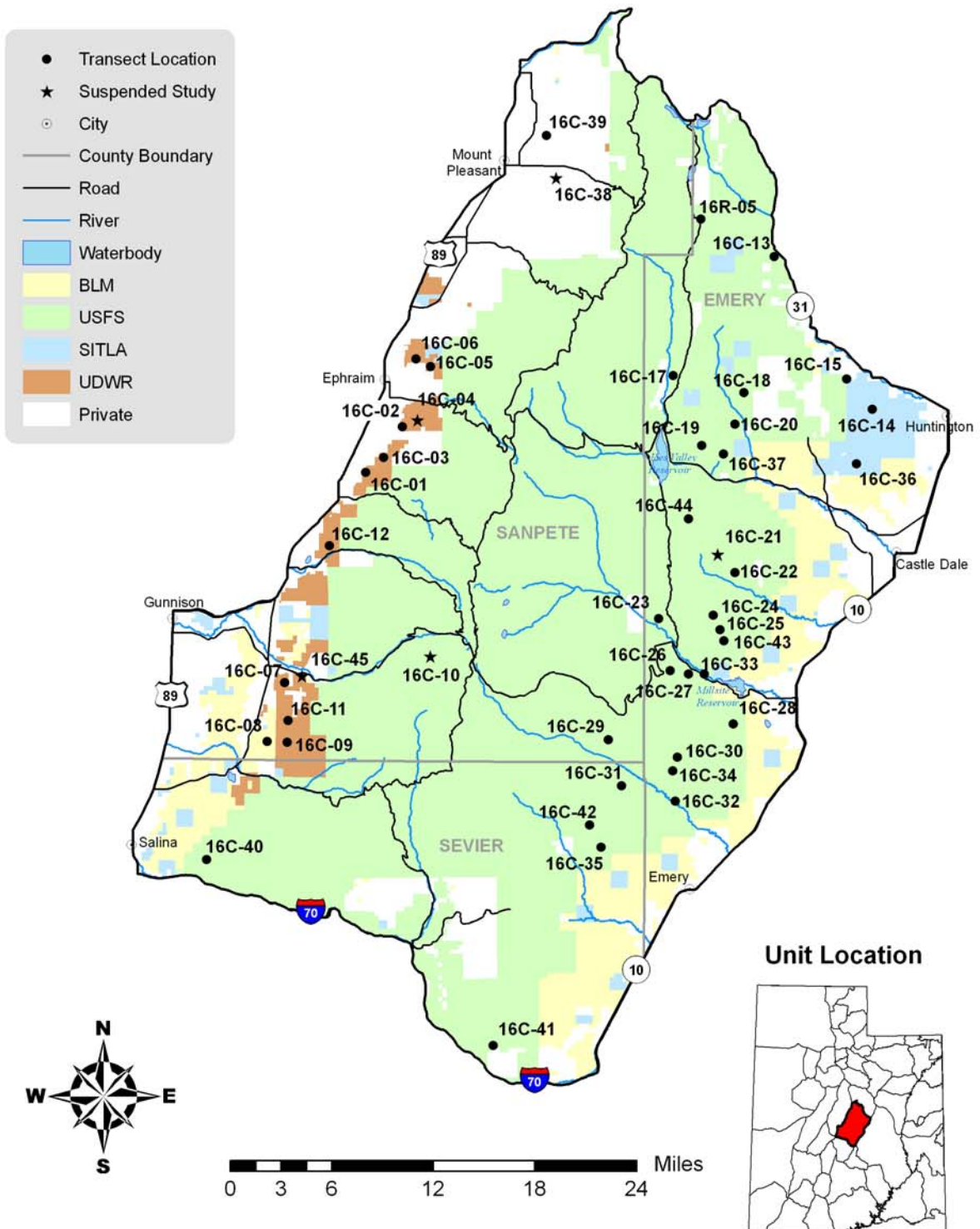


Figure 6. Mean low (n=8) potential scale deer DCI scores by year for WMU 16B, Central Mountains, Manti North. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

Management Unit 16C



WILDLIFE MANAGEMENT UNIT 16C - CENTRAL MOUNTAINS, MANTI SOUTH

Boundary Description

Sanpete, Emery, and Sevier counties - Boundary begins at the junction of Highway SR-10 and Highway SR-31 at Huntington; then south on SR-10 to Interstate 70; west on I-70 to Highway US-89 at Salina; north on US-89 to SR-31 at Fairview; southeast on SR-31 to SR-10 at the beginning point at Huntington.

Management Unit Description

The eastern portion of the unit, managed as part of the Southeastern Region, was sampled in 2009 and will be resampled in 2014. The western portion, managed as part of the Central Region, was sampled in 2007 and will be resampled in 2012. Unit 16C was previously called Deer Herd Unit 31- South East Manti. It was enlarged in the spring of 1998 to include both the east and west sides of the Wasatch Plateau and renamed Wildlife Management Unit 16C. Unit 16C is a subunit of the very large management unit 16 which encompasses areas in Utah, Carbon, Juab, Sevier, and Sanpete Counties. Approximately 54% of unit 16's winter range is on land administered by the U.S. Forest Service and the BLM. Another 35% is on private land. The U.S. Forest Service administers 72% of the summer range, while 22% is private.

The upper limits of the winter range on subunit 16C - South-East Manti, generally follow the rim of the plateau and the 9,000 foot level of the south and west exposures of the large canyons and mountain slopes. A good description of winter range limits and prominent vegetative types can be found in the 1980 Utah Big Game Range Inventory (Giunta 1982).

The upper portions of the winter range on Forest Service lands are managed primarily for livestock grazing. Widespread watershed rehabilitation, contour trenching and seeding, was done on this rangeland in the 1960's. An extensive road system provides access to a large percentage of the winter range. Many roads in crucial areas are open or maintained and used winter long in relation to various activities, namely mining, gas wells, the Horn Mountain TV towers, and for recreation. Access is more restricted further south in the Ferron and Muddy Creek drainages.

The lowest foothill ranges are accessible year-round and are usually adjacent to agricultural areas. Coal mining and the power plants are the major economic activities in the area. Other associated impacts include road improvements, truck traffic, and an increased human population. Outdoor recreation is popular in the area. These activities include camping, hunting, fishing, four-wheeling, and snowmobiling which are facilitated by the extensive road system in the mountains and foothills. The very lowest portion of the herd unit supports a low desert shrub type on unproductive shale hills. This acreage is not considered part of the winter range.

Key Areas

The key deer wintering areas are the lower end of Muddy Creek and Ferron Creek, Black Dragon, Biddlecome Hollow, Cottonwood Canyon, and Huntington Canyon. Elk winter higher on Trail Mountain, North and South Horn Mountain, and Sage Flat. Deer also utilize these areas during mild winters. Elk utilize the mahogany and sagebrush on the lower points of the plateau, such as North and South Horn Mountain and Trail Mountain.

On the Southeast Manti Unit, much of the key winter range is on Forest Service lands. Pinyon-juniper benches become more limited to the south and there are mostly low desert shrub foothills associated with Muddy Creek. Overall, the pinyon-juniper type occupies a fair amount of the winter range at low elevations, but is not critical to the trend monitoring program. However, the chained and seeded portions of this type provide important wintering areas where many are monitored for trend. Chainings are sampled in the foothills from

Huntington Canyon to south of Dry Wash. Other key areas at Middle Mountain and Dry Mountain are also sampled. The big sagebrush/grass range type is found on many key areas, especially on the North East Manti Unit, but also on high elevation elk winter range on Trail, East, and Horn Mountains. Big sagebrush/grass is limited on crucial deer winter range, but key areas are found on Black Dragon and Muddy Creek. Large areas of key winter range, also identified by the U.S. Forest Service in their Land and Resource Management Plan, are found on Trail Mountain, North Horn and South Horn Mountain, in lower Dry Wash, and along Muddy Creek. Mixed mountain brush and curlleaf mountain mahogany types are especially important in these areas.

Range Trend Studies

Unit 16C contains 29 trend study sites. Eighteen sites were originally established in 1988 and monitored through 2009. Of these six of the studies sample chained and seeded pinyon-juniper communities [Red Point (16C-14), Howard FS Chaining (16C-15), Middle Mountain (16C-17), Dry Mountain (16C-26), Birch Creek Chaining (16C-27) and South of Dry Wash (16C-28)], seven studies sample sagebrush-grass communities [East Mountain (16C-18), Miles Point (16C-20), North Horn-Rock Canyon (16C-22), Black Dragon (16C-23), South Horn 1/4 Corner (16C-25), Box Canyon Knolls (16C-31) and Muddy Creek (16C-32)], three studies sample mixed mountain brush communities [Trail Mountain Enclosure (16C-19), South Horn Enclosure (16C-24) and Upper Hole Trail (16C-30)], and two studies samples curlleaf mountain mahogany communities [West Huntington Canyon (16C-13) and Scab Hollow (16C-29)]. In the summer of 1994 five new studies were established. Three of these studies [Little Nelson Mountain (16C-33), South Sage Flat (16C-34) and Wildcat Knolls (16C-35)] sample sagebrush-grass communities, one study [Danish Bench (16C-36)] samples a chained and seeded pinyon-juniper communities and one study [Joes Valley Overlook (16C-37)] samples a mixed mountain brush community. The study at Danish Bench was established to replace Church Mine Road (16C-16), which was eliminated due to light utilization. Two trend studies [Cedar Mountain (16C-40) and Trough Hollow (16C-41)] were originally in other herd units but are now part of the Manti-Nebo Manti South unit. These two studies were established in 1985 and monitored regularly through 2009. In 2004, two study sites [Box Canyon Sage Grouse (16C-42) and Olson Draw Sage Grouse (16c-43)] were established to monitor sage grouse nesting and brooding habitat, both receive moderate elk use as well. Another new study [North Horn (16C-44)] was established in 2005 to monitor a mixed mountain brush community and replaced the North Horn Cap (16C-21) study, which was suspended. One special study [Scad Hollow (16R-5)] was established in 1998 and samples a wet meadow.

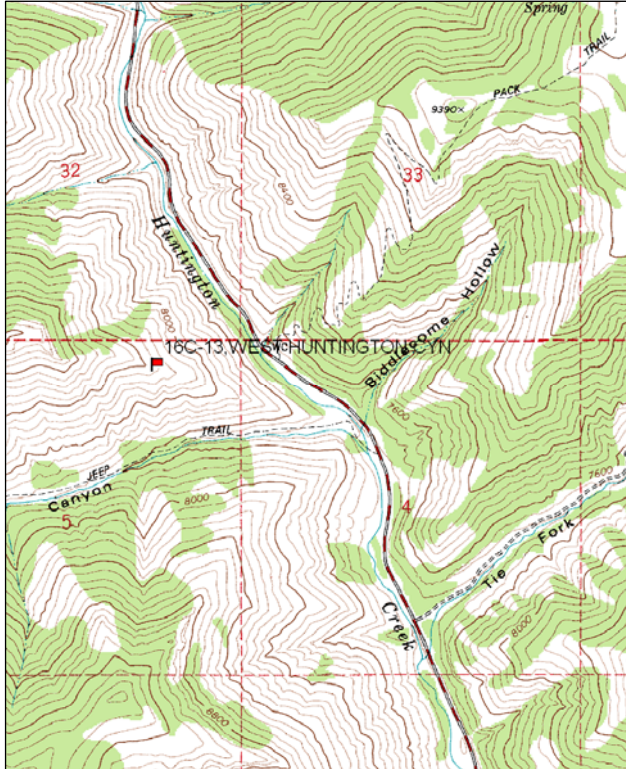
WEST HUNTINGTON CANYON - TREND STUDY NO. 16C-13-09

Vegetation Type: Curleaf Mountain Mahogany
Range Type: Crucial Deer Winter, Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 7,600 ft (2,316 m)
Aspect: Southeast
Slope: 45%
Transect bearing: 117 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

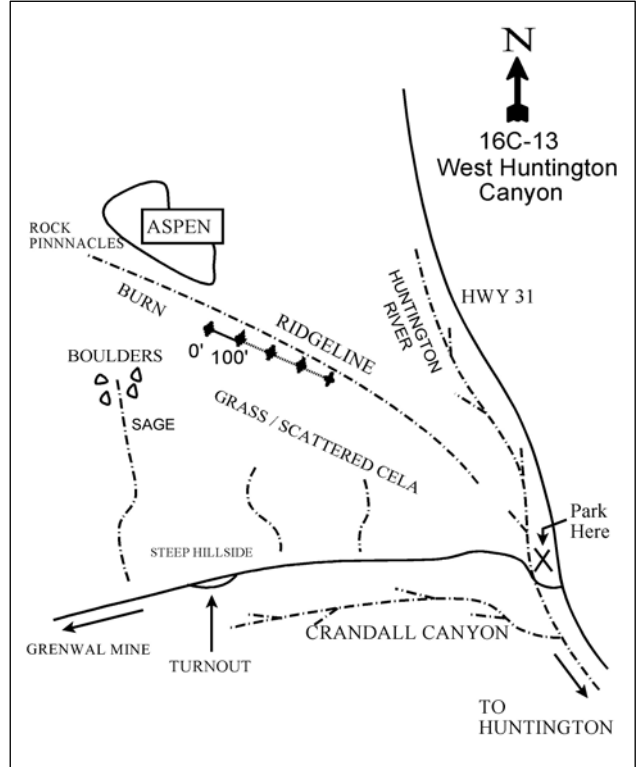
From Highway 31, the Huntington Canyon road, turn onto the Crandall Canyon road. From the turnout, look up the ridge to the north. The study site is on the top of the ridge on the eastern edge of an old burn; now sagebrush/grass and scattered mahogany. The site can be reached by a 1/4 mile hike up the steep rocky face, or a 3/4 mile hike up the ridge starting by the Huntington River. Once the top of the ridge below the rock pinnacles is reached, the study stakes are not difficult to locate. The 0-foot baseline stake is marked by browse tag #902S.

Map Name: Rilda Canyon



Township: 16S, Range: 7E, Section: 5

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 486488 E 4368520 N

WEST HUNTINGTON CANYON - TREND STUDY NO. 16C-13

Site Information

Site Description: The study is located on the west side of Huntington Canyon, along the top of the ridge north of Crandall Canyon. The south-facing slopes and ridge tops in this area are used by elk in the winter. Clumps of aspen (*Populus tremuloides*) higher up the ridge also provide summering habitat for deer. The study is within a curlleaf mountain mahogany (*Cercocarpus ledifolius*) community that burned many years ago. This area does not appear to be used by livestock, probably due to its inaccessibility and lack of water. Pellet group data has indicated light use by deer and very heavy use by elk since 1999, though estimated elk use was considerably lighter in 2009 (Table - Pellet Group Data).

Browse: The dominant overstory on the site consists of a few scattered mature curlleaf mountain mahogany, most of which are large, tree like, and mostly unavailable due to height and highlining. Smaller, more available mahogany sampled on the site are heavily browsed. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), the key browse species on the site, has provided more than half of the browse coversince 1994. The density of sagebrush has fluctuated slightly, but averaged about 1,500 plants/acre since 1994. The sagebrush population is mostly mature, but healthy with low decadence and good vigor. Recruitment of young sagebrush plants was good from 1988 to 1999, but has been poor since 2004. Sagebrush has been mostly light to moderately browsed over all sampling periods (Table - Browse Characteristics).

Herbaceous Understory: Salina wildrye (*Elymus salina*) is the most abundant grass followed by bluebunch wheatgrass (*Agropyron spicatum*). Combined, the two grasses provide nearly all of the grass cover on the site. Other grasses are extremely rare on the site. It appears that there was an identification problem between bluebunch wheatgrass and Salina wildrye in 1994. Forbs are not abundant and no species are common. There was a large decrease in forb nested frequency from 1999 to 2004.

Soil: The soil is a clay with a slightly alkaline pH. Phosphorus has limited availability for plant growth and development at only 5.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover has been fairly low in most sample years except for 2004 when it increased substantially. Protective ground cover is provided primarily by the large bluebunch wheatgrass and Salina wildrye populations, which play a major role in holding the soil in place. For the most part, the soil is moderately protected (Table - Basic Cover). Erosion is inevitable due to the steepness of the slope, but it does not appear to be excessive. The soil erosion condition was classified as moderate in 2004 and 2009 due to severe pedestalling, and soil and litter movement down slope.

Trend Assessments

Browse:

- **1988 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 a slight increase in the decadence and poor vigor of the primary browse species, mountain big sagebrush, but both are still good.
- **1994 to 1999 - stable (0):** The density of mountain big sagebrush increased by 15% from 1,520 plants/acre to 1,760 plants/acre, but the density of the preferred browse species, curlleaf mountain mahogany, decreased by nearly half from 260 plants/acre to 140 plants/acre. Cover of sagebrush increased from 4% to 9%, but no there was no measurable cover from mahogany. The recruitment of young sagebrush plants increased from 8% to 13% of the population.
- **1999 to 2004 - down (-2):** The density of sagebrush decreased by 28% from to 1,260 plants/acre, and mahogany continued to decrease in density. Cover of sagebrush decreased to 5% and recruitment of young sagebrush plants was poor at only 3%.

- **2004 to 2009 - up (+2):** The density of sagebrush increased 34% to 1,700 plants/acre, though cover remained similar. Recruitment of young sagebrush plants decreased to only 1%.

Grass:

- **1988 to 1994 - slightly down (-1):** There was a 17% decrease in the sum of nested frequency of perennial grasses. It appears there were identification problems between Salina wildrye and bluebunch wheatgrass.
- **1994 to 1999 - stable (0):** There was a slight increase in the sum of nested frequency of perennial grasses and cover increased from 14% to 22%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 18%, though cover remained similar. There was a significant decrease in the nested frequency of Salina wildrye.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 15% and cover increased from 23% to 29%.

Forb:

- **1988 to 1994 - up (+2):** There was more than a two-fold increase in the sum of nested frequency of perennial forbs due primarily to a significant increase in the nested frequency of aster (*Aster sp.*).
- **1994 to 1999 - stable (0):** There was a 9% increase in the sum of nested frequency of perennial forbs and cover increased from 2% to 4%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 44% and cover decreased to less than 1%.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover increased to over 1%.

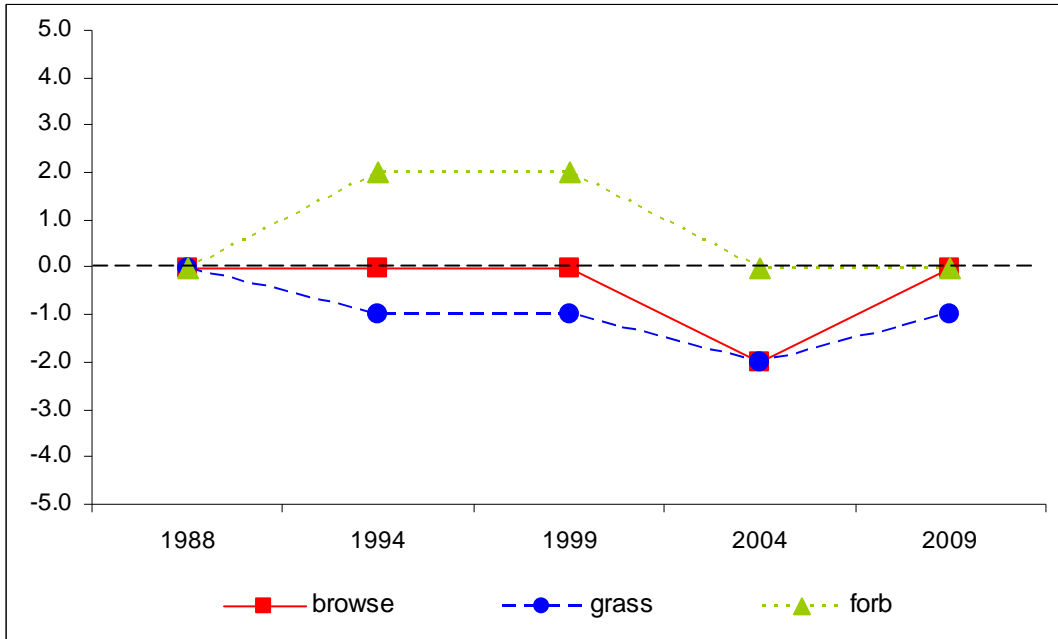
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 13

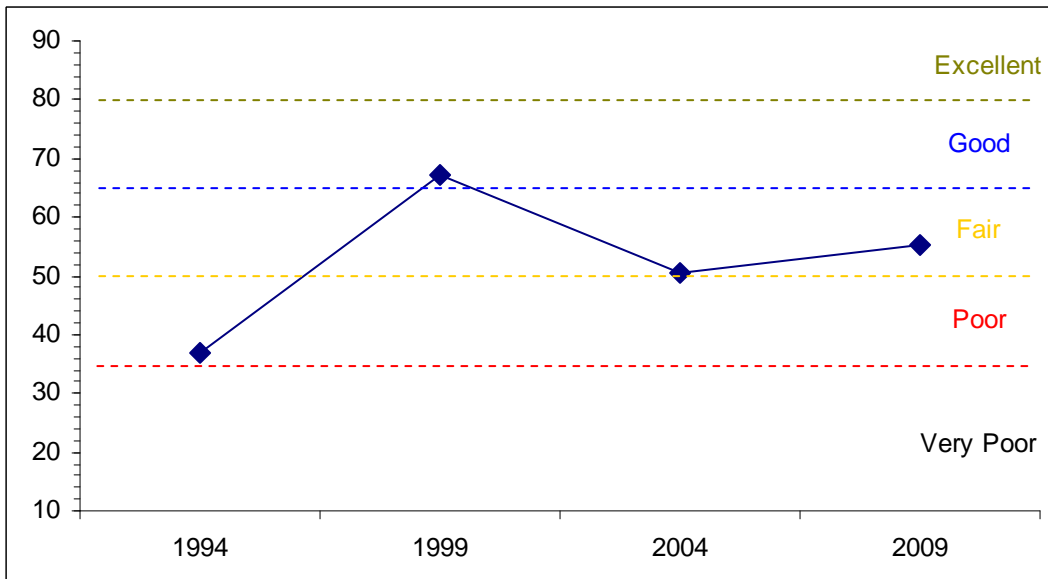
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	5.5	0.0	0.0	28.0	0.0	3.5	0.0	37.0	Poor
99	10.7	12.3	6.5	30.0	0.0	7.7	0.0	67.2	Good
04	6.6	10.3	1.8	30.0	0.0	1.7	0.0	50.4	Poor-Fair
09	7.7	10.7	4.0	30.0	0.0	3.0	0.0	55.3	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 13



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 16C, Study no: 13



HERBACEOUS TRENDS--

Management unit 16C, Study no: 13

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron spicatum	ab40	c194	b68	a15	ab49	10.87	2.84	.34	2.87
G	Bromus tectorum (a)	-	-	-	3	-	-	-	.00	-
G	Carex sp.	b15	a5	a5	a4	ab14	.03	.06	.03	.13
G	Elymus salina	c279	a80	b229	bc232	b225	3.08	19.46	22.56	25.56
G	Koeleria cristata	-	-	2	-	-	-	.00	-	-
G	Poa pratensis	-	-	1	-	1	-	.06	-	.03
Total for Annual Grasses		0	0	0	3	0	0	0	0.00	0
Total for Perennial Grasses		334	279	305	251	289	13.98	22.43	22.93	28.60
Total for Grasses		334	279	305	254	289	13.98	22.43	22.93	28.60
F	Achillea millefolium	a-	a2	b9	a2	ab3	.03	.23	.03	.03
F	Alyssum alyssoides (a)	-	-	-	2	-	-	-	.00	-
F	Antennaria microphylla	-	3	-	-	-	.03	-	-	-
F	Artemisia ludoviciana	-	3	6	3	5	.15	.07	.04	.06
F	Aster sp.	ab39	c76	c73	a45	ab12	1.02	2.49	.68	.22
F	Astragalus convallarius	a2	ab12	b19	a2	ab8	.07	.88	.03	.21
F	Astragalus sp.	-	4	-	-	-	.18	-	-	-
F	Chaenactis douglasii	-	4	-	-	-	.01	-	-	-
F	Chenopodium album (a)	-	2	-	9	-	.00	-	.05	-
F	Cirsium sp.	-	1	-	-	-	.03	.00	-	-
F	Comandra pallida	a-	a-	a-	a-	b31	-	-	-	.77
F	Descurainia pinnata (a)	-	a-	a-	b59	a2	-	-	.15	.00
F	Hymenoxys richardsonii	1	-	-	-	2	-	-	-	.15
F	Ipomopsis aggregata	-	-	1	-	-	-	.00	-	-
F	Lappula occidentalis (a)	-	a-	a-	b30	a-	-	-	.17	-
F	Machaeranthera canescens	4	5	11	1	3	.22	.13	.01	.03
F	Phlox longifolia	a-	ab6	b11	b15	a-	.01	.02	.05	-
F	Sanguisorba minor	-	-	-	-	-	-	.00	-	-
F	Schoenocrambe linifolia	-	3	-	5	4	.00	-	.01	.01
F	Taraxacum officinale	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	2	0	100	2	0.00	0	0.38	0.00
Total for Perennial Forbs		47	119	130	73	68	1.77	3.86	0.87	1.48
Total for Forbs		47	121	130	173	70	1.78	3.86	1.25	1.49

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

BROWSE TRENDS--

Management unit 16C, Study no: 13

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata vaseyana	44	49	39	40	4.25	8.53	5.19	5.34
B	Cercocarpus ledifolius	7	5	4	3	.15	.00	.06	.03
B	Chrysothamnus nauseosus	0	0	1	0	-	-	.03	-
B	Chrysothamnus viscidiflorus viscidiflorus	1	4	2	6	.00	.30	.15	.18
B	Gutierrezia sarothrae	0	2	2	3	-	.03	.03	.00
B	Juniperus osteosperma	0	0	1	1	.63	-	.41	.38
B	Mahonia repens	65	60	69	70	2.47	3.85	1.87	3.01
B	Pachistima myrsinites	1	2	2	4	.00	.09	.03	.03
B	Rosa woodsii	0	0	0	1	-	-	-	.00
B	Sambucus cerulea	0	2	1	2	-	.00	.00	.63
B	Symphoricarpos oreophilus	6	5	3	6	.06	.53	.18	.53
Total for Browse		124	129	124	136	7.58	13.34	7.98	10.14

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 13

Species	Percent Cover	
	'04	'09
Artemisia tridentata vaseyana	7.36	7.76
Gutierrezia sarothrae	.03	-
Juniperus osteosperma	.15	-
Mahonia repens	1.96	3.45
Sambucus cerulea	.16	.61

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 13

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.2	1.2
Cercocarpus ledifolius	5.4	2.6

BASIC COVER--

Management unit 16C, Study no: 13

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	10.25	24.57	40.22	32.04	42.73
Rock	10.00	9.04	10.68	10.93	7.03
Pavement	1.25	1.21	5.88	6.56	5.14
Litter	53.00	32.40	33.01	25.82	31.55
Cryptogams	0	.04	.00	.00	.00
Bare Ground	25.50	30.77	25.76	40.09	25.17

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 13, Study Name: West Huntington Canyon

Effective rooting depth (in)	pH	clay			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.3	7.4	23.3	32.2	44.6	3.2	5.5	99.2	0.7

PELLET GROUP DATA--

Management unit 16C, Study no: 13

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	13	7	-	4	-	-	-
Elk	47	54	39	31	96 (237)	131 (322)	40 (98)
Deer	4	6	3	7	10 (25)	27 (66)	3 (7)

BROWSE CHARACTERISTICS--

Management unit 16C, 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)	
<i>Artemisia tridentata vaseyana</i>										
88	3464	58	37	6	1599	2	0	4	13/21	
94	1520	8	79	13	-	18	1	9	20/32	
99	1760	13	78	9	40	39	8	1	16/24	
04	1260	3	81	16	300	30	13	10	12/22	
09	1700	1	82	16	-	12	13	9	14/30	
<i>Ceratoides lanata</i>										
88	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	15/17	
<i>Cercocarpus ledifolius</i>										
88	66	100	0	-	-	100	0	0	-/-	
94	260	69	31	-	-	0	0	0	27/18	
99	140	43	57	-	-	43	43	0	15/14	
04	100	60	40	-	-	20	80	0	17/17	
09	80	0	100	-	-	100	0	0	13/15	
<i>Chrysothamnus nauseosus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	0	0	0	0	-	0	0	0	11/15	
99	0	0	0	0	-	0	0	0	29/53	
04	20	0	0	100	-	0	0	0	19/53	
09	0	0	0	0	-	0	0	0	27/27	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
88	132	50	50	0	-	0	0	0	10/10	
94	20	0	100	0	-	0	0	0	10/15	
99	120	0	100	0	-	0	0	0	9/14	
04	40	0	100	0	-	0	0	0	7/18	
09	200	0	60	40	-	0	0	50	11/16	
<i>Gutierrezia sarothrae</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	80	0	100	-	-	0	0	0	8/12	
04	60	0	100	-	-	0	0	0	7/8	
09	80	0	100	-	-	0	0	0	10/12	
<i>Juniperus osteosperma</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	20	100	0	-	-	0	0	0	-/-	
09	20	100	0	-	-	0	0	0	-/-	
<i>Mahonia repens</i>										
88	43466	22	78	-	12666	0	0	0	5/4	
94	16740	7	93	-	-	0	0	0	9/12	
99	19420	31	69	-	260	.20	0	0	4/5	
04	20400	1	99	-	-	0	0	0	3/5	
09	29960	6	94	-	-	0	0	.06	3/5	
<i>Pachistima myrsinites</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	20	0	100	-	-	0	0	0	3/2	
99	60	100	0	-	-	0	0	0	9/9	
04	40	0	100	-	20	0	0	0	6/7	
09	120	0	100	-	-	0	0	0	3/6	
<i>Rosa woodsii</i>										
88	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	5/7	
<i>Sambucus cerulea</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	40/52	
99	240	67	33	-	-	0	0	0	57/68	
04	20	0	100	-	-	0	100	0	47/45	
09	60	67	33	-	-	0	0	0	13/33	

		Age class distribution			Utilization				
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus									
88	199	100	0	0	-	0	0	0	-/-
94	160	0	100	0	-	0	0	0	11/26
99	100	0	100	0	-	0	0	0	14/26
04	80	0	75	25	-	0	0	25	11/26
09	160	25	75	0	-	0	0	0	10/20

RED POINT - TREND STUDY NO. 16C-14-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Summer

NRCS Ecological Site Description: Semidesert Bouldery Loam (Shadscale), R034XY202UT

Land Ownership: SITLA

Elevation: 6,400 ft (1,951 m)

Aspect: Northeast

Slope: 6%-8%

Transect bearing: 170 degrees magnetic.

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

Directions:

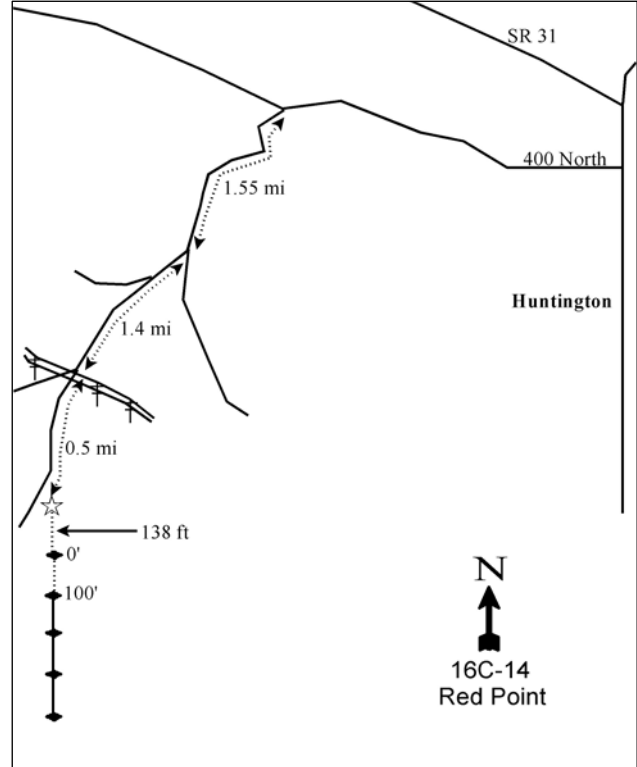
From Main Street in Huntington, go west on 400 North. Pass the old mill on the edge of town, cross the canal and continue 0.75 miles. Turn left off the old Huntington River road at a major fork. Proceed 1.55 miles, turn right, and go through a gate. Continue straight 0.2 miles to another fork and stay left for 1 mile. From here, stay straight, passing a trough, for an additional 0.2 miles to a two-way fork. Turn left and go 0.5 miles to a witness post on the left side of the road in the chaining. The frequency baseline start 138 feet south of the witness post. The 18" tall fencepost marking the 0-foot baseline has browse tag #9012 attached.

Map Name: Red Point



Township: 17S, Range: 8E, Section: 20

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 495833 E 4354008 N

RED POINT - TREND STUDY NO. 16C-14

Site Information

Site Description: This study is located in a chaining at the base of East Mountain, below the prominent Red Point. The 300 acre bench was chained and seeded in 1973. Overall declining trends and poor range condition observed in the West Huntington allotment led the BLM to recommend changes in grazing, eventually resulting in a 50% reduction in spring AUMs and closure of one pasture. As part of the Huntington Canyon winter range, deer and elk utilize the area in winter. Pellet group data has indicated moderate use by deer since 1999. The estimated elk use has steadily decreased from heavy use in 1999 to light use in 2009. Estimated cattle use has been minimal since 1999 (Table - Pellet Group Data). Twelve deer were observed near the site in 1999.

Browse: An even-aged stand of surviving pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) has reestablished on the chained bench. Pinyon and juniper trees are dense on the site, though point-quarter density estimates have remained similar since 1994 (Table - Point-Quarter Tree Data). The pinyon and juniper populations do appear to be in-filling, however, as canopy cover of both species has steadily increased since 1999 (Table - Canopy Cover).

Green ephedra (*Ephedra verididis*), true mountain mahogany (*Cercocarpus montanus*), and Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*) provide the bulk of the winter forage on this site, although none of these species are very abundant. Green ephedra provides the most preferred browse canopy cover on the site (Table -Canopy Cover). The ephedra population is mostly mature with low decadence, good vigor, and good recruitment. Utilization of ephedra has been mostly light with a few years of moderate use. The true mountain mahogany population is vibrant with a high proportion of young plants. Utilization of mahogany has been mostly moderate to heavy. Cliffrose was sampled for the first time in 2004 at low density and has displayed heavy use since). Other preferred browse species sampled on the site include slenderbush eriogonum (*Eriogonum microthecum*) and antelope bitterbrush (*Purshia tridentata*). Harriman yucca (*Yucca harrimaniae*) is the most abundant shrub on the site. The yuccas stiff, sharp leaves also protect the closely associated grasses from use (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is poor with a steady decrease in the sum of nested frequency and cover of perennial grasses since 1999. The predominant grass is crested wheatgrass (*Agropyron cristatum*) which provides almost all of the grass cover on the site. A few other perennial grass species are present, but occur rarely. Forbs are uncommon and provide very little cover or forage (Table - Herbaceous Trends).

Soil: The soil is a loam with a slightly alkaline pH. Phosphorus has limited availability for plant growth and development at 4.1 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). There are large numbers of boulders, smaller rocks, and pavement on the surface that provide good protective ground cover. Bare ground cover has been moderately low due to the rock and pavement cover, as well as moderately good litter cover from large chaining debris (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 due to pedestaling, litter movement, flow patterns and gullies, but was stable in 2009.

Trend Assessments

Browse:

- **1988 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 any of the preferred browse species populations.

- **1994 to 1999 - stable (0):** There was little change in the density of true mountain mahogany or green ephedra. Both species populations remained healthy. There was a large decrease in the density of slenderbush eriogonum, and decadence and poor vigor both increased from 0% to 44%.
- **1999 to 2004 - stable (0):** There was a 32% increase in the density of green ephedra and density of slenderbush eriogonum nearly doubled. The decadence and vigor improved in the slenderbush eriogonum population. Stansbury cliffrose was sampled for the first time in 2004 at low density, though antelope bitterbrush was not sampled. Pinyon and juniper canopy cover increased substantially from 4% to 11%.
- **2004 to 2009 - stable (0):** The density of true mountain mahogany doubled from 120 plants/acre to 260 plant/acre, though slenderbush eriogonum decreased by 85% from 800 plants/acre to 120 plants/acre. Pinyon and juniper canopy cover continued to increase to 13%.

Grass:

- **1988 to 1994 - down (-2):** There was a 21% decrease in the sum of nested frequency of perennial grasses with a significant decrease in the nested frequency of intermediate wheatgrass (*Agropyron intermedium*) 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 from 10% to 12%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 62% and cover decreased to 2%. There was a significant decrease in the nested frequency of the dominant grass, crested wheatgrass.
- **2004 to 2009 - down (-2):** There was a 21% decrease in the sum of nested frequency of perennial grasses, though cover remained similar. Only two grass species, crested wheatgrass and Indian ricegrass (*Oryzopsis hymenoides*), were sampled on the site in 2004.

Forb:

- **1988 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased by 57% with significant decreases in the nested frequency of the most common perennial forbs.
- **1994 to 1999 - down (-2):** There was a 50% decrease in the sum of nested frequency of perennial forbs and cover decreased to less than 1%. Forbs have become very rare on the site.
- **1999 to 2004 - stable (0):** Though there was an increase in the sum of nested frequency of perennial forbs, forbs are still very rare on the site and provide little cover.
- **2004 to 2009 - stable (0):** There was a substantial decrease in the sum of nested frequency of perennial forbs and they remain extremely rare on the site.

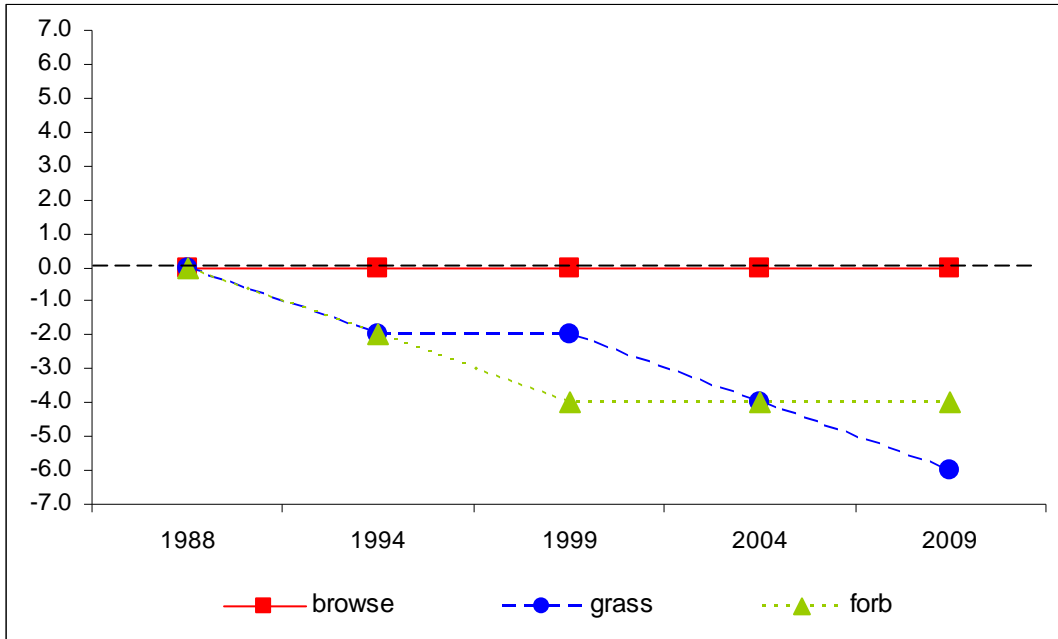
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 14

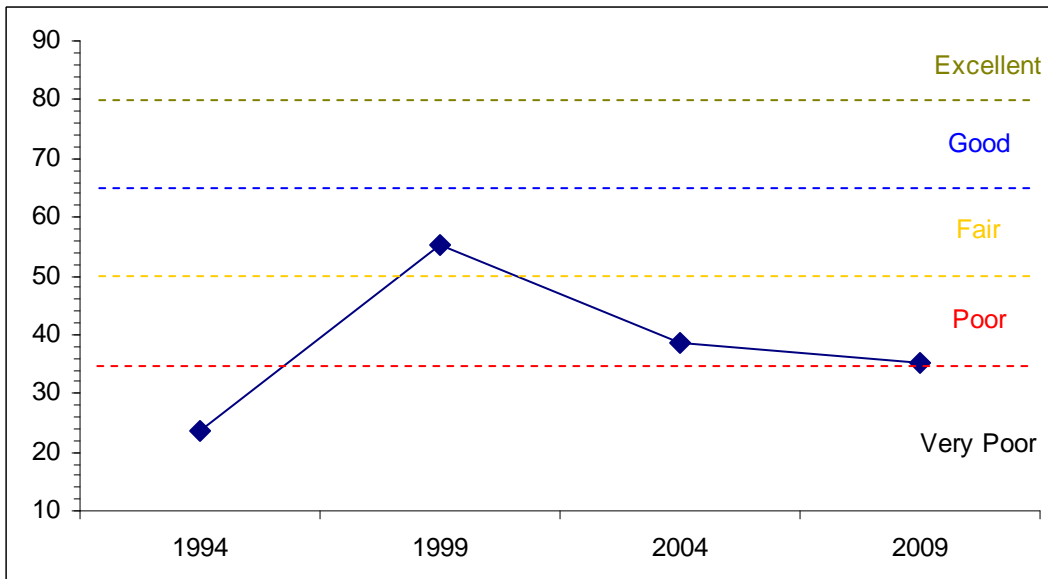
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	2.3	0.0	0.0	19.1	0.0	2.3	0.0	23.8	Very Poor
99	7.6	14.9	8.0	23.8	0.0	1.0	0.0	55.3	Fair
04	9.7	13.5	9.3	4.6	0.0	1.4	0.0	38.5	Poor
09	8.7	13.2	9.1	3.8	0.0	0.4	0.0	35.3	Very Poor-Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 14



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 16C, Study no: 14



HERBACEOUS TRENDS--

Management unit 16C, Study no: 14

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	b ₂₇₀	b ₂₆₅	b ₂₈₄	a ₈₉	a ₈₉	8.66	11.28	1.90	1.88
G	Agropyron intermedium	b ₅₀	a ₁	a ⁻	a ⁻	a ⁻	.00	-	-	-
G	Elymus junceus	a ₂	b ₁₆	ab ₉	ab ₁₁	a ⁻	.35	.25	.15	-
G	Oryzopsis hymenoides	b ₂₄	b ₂₅	ab ₂₀	ab ₂₀	ab ₆	.52	.37	.25	.03
G	Sitanion hystrix	45	a ₁	a ⁻	a ⁻	a ⁻	.00	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		391	308	313	120	95	9.54	11.91	2.31	1.92
Total for Grasses		391	308	313	120	95	9.54	11.91	2.31	1.92
F	Arabis perennans	-	2	5	-	-	.00	.01	-	-
F	Caulanthus crassicaulis	-	1	-	-	-	.00	-	-	-
F	Chenopodium album (a)	-	1	-	-	-	.01	-	-	-
F	Chenopodium fremontii (a)	-	-	-	7	-	-	-	.02	-
F	Chenopodium leptophyllum(a)	-	-	-	4	-	-	-	.00	-
F	Cryptantha sp.	c ₇₄	b ₄₅	a ₁₇	a ₃	a ₆	.65	.35	.00	.01
F	Descurainia pinnata (a)	-	a ₁₀	a ₃	b ₂₁	a ₁	.02	.00	.21	.00
F	Erigeron sp.	4	-	-	-	-	-	-	-	-
F	Eriogonum alatum	-	-	-	-	-	.00	-	-	-
F	Eriogonum sp.	-	4	2	-	-	.03	.01	-	-
F	Euphorbia sp.	c ₁₃₇	b ₄₁	ab ₂₀	ab ₂₈	a ₁₃	.17	.04	.46	.06
F	Gilia sp. (a)	a ₄	a ⁻	a ⁻	b ₁₇	a ₁	-	-	.23	.00
F	Lappula occidentalis (a)	-	-	3	3	-	-	.00	.01	-
F	Lepidium montanum	2	-	-	-	1	-	-	-	.00
F	Leucelene ericoides	-	3	3	-	-	.15	.03	-	-
F	Machaeranthera canescens	-	-	-	3	-	-	-	.03	-
F	Machaeranthera grindelioides	-	1	-	-	-	.00	-	-	-
F	Malcolmia africana	-	-	-	1	-	-	-	.00	-
F	Medicago sativa	5	-	-	-	-	.00	-	-	-
F	Penstemon cyananthus	b ₃₂	a ₂	a ₂	a ₁₅	a ₁	.03	.00	.03	.01
F	Salsola iberica (a)	-	5	-	-	1	.01	-	-	.00
F	Schoenrambe linifolia	10	4	4	8	12	.02	.04	.04	.08
F	Taraxacum officinale	-	-	-	3	-	-	-	.00	-
F	Thelesperma subnudum	b ₁₅	b ₁₆	ab ₅	ab ₆	a ⁻	.08	.01	.04	-
F	Townsendia incana	6	6	5	16	6	.01	.01	.08	.01
F	Unknown forb-perennial	3	-	-	-	-	-	-	-	-
Total for Annual Forbs		4	16	6	52	3	0.03	0.00	0.48	0.01
Total for Perennial Forbs		288	125	63	83	39	1.17	0.51	0.71	0.18
Total for Forbs		292	141	69	135	42	1.21	0.52	1.19	0.20

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

BROWSE TRENDS--

Management unit 16C, Study no: 14

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Cercocarpus montanus	6	6	6	9	.63	1.28	1.29	1.08
B	Chrysothamnus nauseosus hololeucus	0	1	0	2	-	.00	-	.00
B	Cowania mexicana stansburiana	0	0	2	3	-	-	.00	.76
B	Ephedra viridis	15	15	20	15	1.08	4.49	6.15	4.77
B	Eriogonum microthecum	11	4	8	3	.00	.03	.03	.00
B	Juniperus osteosperma	0	6	7	3	.93	3.20	3.41	4.78
B	Opuntia sp.	1	0	0	0	.00	-	-	-
B	Pinus edulis	0	13	10	8	3.31	4.06	6.72	8.10
B	Purshia tridentata	1	3	0	0	.03	.00	-	-
B	Yucca harrimaniae	28	33	31	30	2.63	4.41	3.81	1.99
Total for Browse		62	81	84	73	8.63	17.49	21.44	21.49

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 14

Species	Percent Cover		
	'99	'04	'09
Cercocarpus montanus	-	3.00	2.76
Cowania mexicana stansburiana	-	.11	.41
Ephedra viridis	-	7.11	5.66
Juniperus osteosperma	2.00	3.25	4.06
Pinus edulis	2.20	7.71	9.23
Yucca harrimaniae	-	3.70	2.86

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 14

Species	Average leader growth (in)	
	'04	'09
Cercocarpus montanus	3.9	1.6
Cowania mexicana stansburiana	2.1	0.5

POINT-QUARTER TREE DATA--

Management unit 16C, Study no: 14

Species	Trees per Acre				Average diameter (in)		
	'94	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	89	99	90	116	2.6	1.8	2.7
Pinus edulis	109	141	149	166	2.5	3.3	2.9

BASIC COVER--

Management unit 16C, Study no: 14

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	3.50	19.52	27.82	25.25	25.00
Rock	14.25	13.35	18.65	15.71	17.00
Pavement	7.00	4.23	8.49	9.98	15.58
Litter	37.25	41.90	34.64	38.46	43.42
Cryptogams	0	.02	1.52	0	1.16
Bare Ground	38.00	17.68	17.72	27.79	17.35

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 14, Study Name: Red Point

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.1	7.6	46.7	29.4	23.8	3.4	4.1	102.4	0.9

PELLET GROUP DATA--

Management unit 16C, Study no: 14

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	30	56	38	26	-	-	-
Elk	35	40	25	7	55 (136)	38 (94)	11 (28)
Deer	19	33	16	11	25 (62)	31 (76)	29 (73)
Cattle	-	4	-	-	4 (11)	4 (11)	-

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 14

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Ceratoides lanata									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	13/11
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
Cercocarpus montanus									
88	399	0	100	-	-	33	50	0	50/41
94	120	33	67	-	-	50	33	0	46/69
99	140	29	71	-	20	29	29	0	54/58
04	120	50	50	-	-	17	83	0	60/58
09	260	31	69	-	40	15	46	0	69/72

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Chrysothamnus nauseosus hololeucus</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	9/10	
99	20	0	100	-	-	0	100	0	-/-	
04	0	0	0	-	-	0	0	0	13/8	
09	40	0	100	-	-	50	0	0	9/7	
<i>Cowania mexicana stansburiana</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	0	0	0	0	-	0	0	0	-/-	
99	0	0	0	0	-	0	0	0	-/-	
04	40	0	50	50	-	0	100	50	28/34	
09	60	33	33	33	-	33	67	33	29/35	
<i>Ephedra viridis</i>										
88	865	54	46	0	-	85	8	0	24/30	
94	520	15	85	0	-	0	0	0	38/56	
99	500	12	88	0	-	52	4	0	37/54	
04	660	12	82	6	-	6	3	3	37/62	
09	620	13	84	3	-	0	0	3	39/61	
<i>Eriogonum microthecum</i>										
88	532	37	63	0	-	0	0	0	2/2	
94	1280	45	55	0	-	0	0	0	3/4	
99	320	44	13	44	20	0	38	44	2/3	
04	800	0	83	18	-	0	100	15	3/5	
09	120	33	67	0	-	0	0	0	1/2	
<i>Juniperus osteosperma</i>										
88	199	100	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	120	83	17	-	-	0	0	0	-/-	
04	140	71	29	-	-	14	0	0	-/-	
09	60	33	67	-	-	0	0	0	69/71	
<i>Opuntia sp.</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	40	0	50	50	-	0	0	50	8/11	
99	0	0	0	0	-	0	0	0	-/-	
04	0	0	0	0	-	0	0	0	-/-	
09	0	0	0	0	-	0	0	0	-/-	
<i>Pinus edulis</i>										
88	399	100	0	0	-	0	0	0	-/-	
94	0	0	0	0	-	0	0	0	-/-	
99	260	38	62	0	-	0	0	8	23/26	
04	260	15	69	15	-	0	0	8	-/-	
09	160	13	75	13	-	0	0	13	70/73	

		Age class distribution			Utilization				
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
<i>Purshia tridentata</i>									
88	66	100	0	0	-	0	0	0	-/-
94	20	0	100	0	-	0	0	0	19/20
99	160	13	75	13	-	0	25	0	22/29
04	0	0	0	0	-	0	0	0	14/28
09	0	0	0	0	-	0	0	0	-/-
<i>Yucca harrimaniae</i>									
88	2132	25	75	0	-	0	0	0	17/15
94	1680	0	100	0	-	0	0	2	14/21
99	2100	6	92	2	-	0	0	.95	14/18
04	2320	13	87	0	-	0	0	0	13/17
09	1480	8	84	8	-	0	0	9	13/18

HOWARD FS CHAINING -TREND STUDY NO. 16C-15-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Semidesert Bouldery Loam (Shadscale), R034XY202UT

Land Ownership: Private

Elevation: 6,650 ft (2,027 m)

Aspect: North

Slope: 5%-8%

Transect bearing: 165 degrees magnetic.

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

Directions:

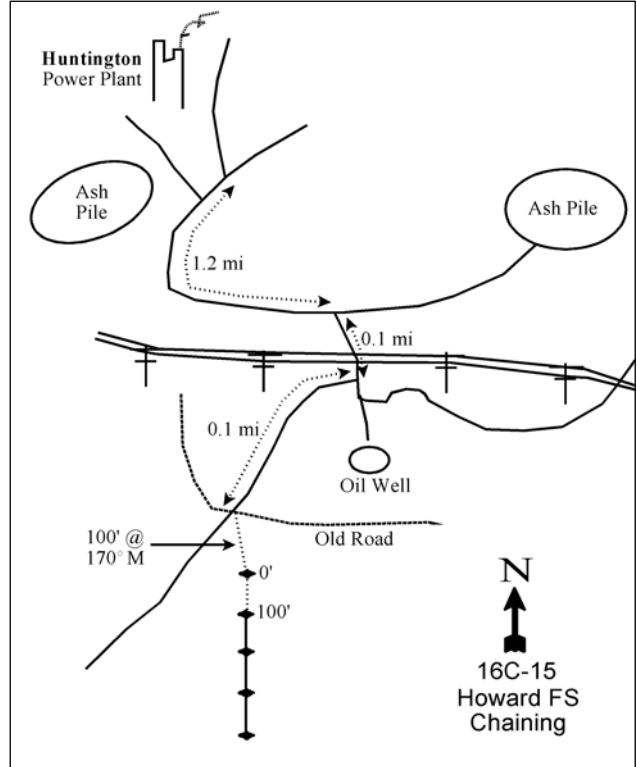
The shortest route to reach this study area is through the Huntington Power Plant. From the main building, go through the plant to the SE gate. Continue on the paved road 0.85 miles to a fork. The plant's ash pile is on the right. Bear left to a bridge or continue around the head of a small draw, following the road southeast towards the powerline. About 0.15 miles from the bridge there is an old fence. Go 0.1 miles to another fence. Continue up through the chaining, past the powerlines, for 0.25 miles to the witness post. The 0 foot stake is approximately 35 paces from the witness post at a bearing of 185°M. The 0 foot stake is marked with browse tag #7881.

Map Name: Red Point



Township: 17S, Range: 8E, Section: 7

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 493392 E 4356873 N

HOWARD FS CHAINING - TREND STUDY NO. 16C-15

Site Information

Site Description: The study is located on the BLM side of the fence on Racehorse Flat by an area known as the Howard-Forest Service Chaining. This study samples a pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and black sagebrush (*Artemisia nova*) community that was chained and seeded in the early 1970's. A variety of browse were seeded in connection with the chaining, including a palatable ecotype of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*). The study is in the West Huntington Cattle Allotment where reductions were made in spring cattle grazing. The Huntington Power Plant is visible to the north of the site and several newer natural gas wells were located near the site in 2009. Pellet group data has estimated heavy deer and light elk and cattle use since 1999 (Table - Pellet Group Data). Some old sheep sign was noted in 1999.

Browse: Pinyon and juniper trees dominate the site. The estimated density of pinyon and juniper trees has fluctuated somewhat over the sample years, but has been very high since 1999 (Table - Point-Quarter Tree Data). Most of the trees are smaller with the majority of sampled trees being less than 8 feet tall in 2009. The population appears to be infilling as canopy cover has steadily increased since 1999 (Table - Canopy Cover).

The key browse species on the site consist of a mixture of basin big sagebrush, black sagebrush, and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). There is some hybridization occurring between the Wyoming big sagebrush and the lower growing black sagebrush. All sagebrush species show evidence of mostly moderate use, with some heavy use. The mature basin big sagebrush has increased in decadence since 1988 and all of the plants were decadent in 2009 with high amounts of poor vigor. The black sagebrush population is mostly healthy with low decadence and good vigor, but contains few seedling or young plants. Wyoming big sagebrush is the most common shrub on the site, though it was identified as basin big sagebrush in 1988. The Wyoming big sagebrush population has high decadence and poor vigor with marginal recruitment of young plants (Table - Browse Characteristics). Because of possible identification problems, basin big and Wyoming big sagebrush were analyzed together. Other, less abundant, preferred browse found on the site include fourwing saltbush (*Atriplex canescens*) and true mountain mahogany (*Cercocarpus montanus*).

Herbaceous Understory: Grasses are dominated by the introduced species crested wheatgrass (*Agropyron cristatum*), which has moderate cover. Several other grass species have been sampled in the past, but only crested wheatgrass was sampled in 2009. Perennial forbs are rare and have steadily decreased in nested frequency and cover since 1988 (Table - Herbaceous Trends).

Soil: The soil is a sandy clay loam with a slightly alkaline pH (Table - Soil Analysis Data). Herbaceous cover is very low, but the residual chaining litter provides moderate amounts of cover on the site (Table - Basic Cover). The soil erosion condition was classified as moderate in 2004 and 2009 due to surface litter movement, soil pedestalling, rills, and gullies on the site.

Trend Assessments

Browse:

- **1988 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 and poor vigor increased in the big sagebrush species populations. Recruitment of young big sagebrush plants decreased substantially and is now poor.
- **1994 to 1999 - stable (0):** There were increases in density of the big sagebrush species, but the density of black sagebrush decreased markedly. Decadence of basin big sagebrush increased from 10% to

32% and decadence of Wyoming big sagebrush remained high. There was little change in the cover of the sagebrush species.

- **1999 to 2004 - down (-2):** There was a large decrease in the density of big sagebrush and decadence increased substantially in both species. Recruitment of big sagebrush decreased and was very low. There was little change in the black sagebrush population.
- **2004 to 2009 - up (+2):** The density of black sagebrush doubled and the density of big sagebrush remained the same. Cover of black sagebrush increased from less than 1% to 3%. Decadence and poor vigor of big sagebrush remained very high.

Grass:

- **1988 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 38% with a significant decrease in the nested frequency of crested wheatgrass, Russian wildrye (*Elymus junceus*), and bottlebrush squirreltail (*Sitanion hystrix*). Grasses other than crested wheatgrass are now rare on the site.
- **1994 to 1999 - up (+2):** There was a 22% increase in the sum of nested frequency of perennial grasses due to a significant increase in the nested frequency of crested wheatgrass. There was little change in the cover of perennial grasses, however.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased 53% and cover decreased from 5% to 4%. 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 of perennial grasses, though diversity has decreased with crested wheatgrass being the only grass sampled in 2009.

Forb:

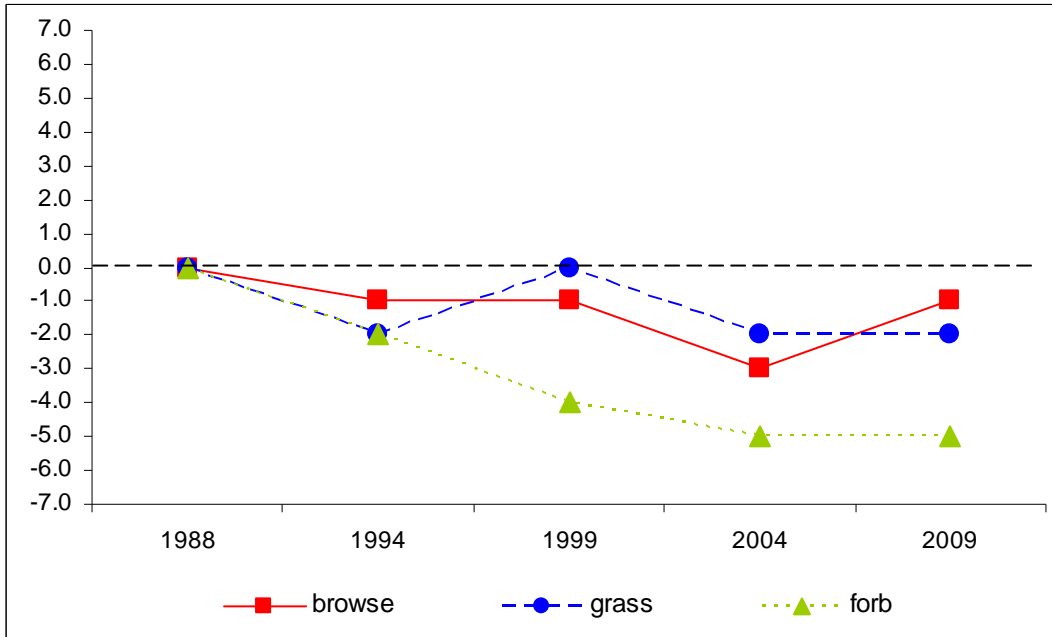
- **1988 to 1994 - down (-2):** There was a 37% decrease in the sum of nested frequency of perennial forbs.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 42% and cover decreased slightly. The most common forb, a cryptantha (*Cryptantha sp.*), has decreased significantly in nested frequency since 1988. Forbs are now very rare on the site.
- **1999 to 2004 - slightly down (-1):** Perennial forb sum of nested frequency continued to decrease, though cover remained similar. There was a significant decrease in the nested frequency of the cryptantha. Forbs are in very poor condition.
- **2004 to 2009 - stable (0):** The sum of nested frequency of perennial forbs continued to decrease, but forbs are so rare that even a large decrease would be of much note. Cover of perennial forbs also decreased.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 16C, study no: 15

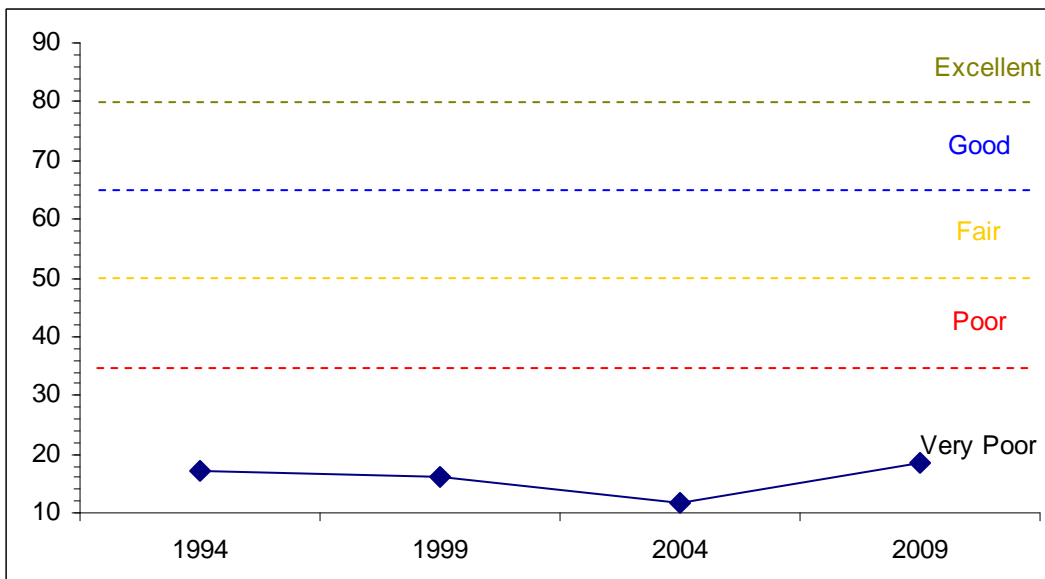
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	4.9	0.0	0.0	10.8	0.0	1.4	0.0	17.1	Very Poor
99	4.4	0.0	0.0	10.8	0.0	0.9	0.0	16.1	Very Poor
04	4.9	0.0	0.0	5.9	0.0	1.1	0.0	11.8	Very Poor
09	6.3	3.4	1.3	7.2	0.0	0.3	0.0	18.6	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 15



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 16C, Study no: 15



HERBACEOUS TRENDS--

Management unit 16C, Study no: 15

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	c246	b186	c233	a99	a124	5.15	4.95	2.51	3.58
G	Agropyron intermedium	6	2	-	-	-	.00	-	-	-
G	Bromus inermis	4	-	-	-	-	-	-	-	-
G	Elymus junceus	b35	a9	ab11	ab14	a-	.18	.42	.41	-
G	Oryzopsis hymenoides	7	5	3	-	-	.04	.01	.00	-
G	Poa fendleriana	-	1	-	-	-	.00	-	-	-
G	Sitanion hystrix	b28	a-	a-	a2	a-	-	-	.00	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		326	203	247	115	124	5.39	5.39	2.93	3.58
Total for Grasses		326	203	247	115	124	5.39	5.39	2.93	3.58
F	Arabis sp.	b15	ab4	ab1	a-	a-	.01	.00	-	-
F	Chenopodium fremontii (a)	-	7	-	2	-	.01	-	.01	-
F	Chenopodium leptophyllum(a)	-	-	-	4	10	-	-	.01	.05
F	Cirsium sp.	1	-	-	-	-	-	-	-	-
F	Cryptantha sp.	d100	cd67	bc36	a11	ab13	.58	.32	.20	.07
F	Descurainia pinnata (a)	-	b21	a-	b27	a-	.05	-	.11	-
F	Draba sp. (a)	-	1	-	-	-	.00	-	-	-
F	Eriogonum umbellatum	16	18	8	8	5	.04	.04	.22	.01
F	Gilia sp. (a)	-	-	-	11	-	-	-	.02	-
F	Halogeton glomeratus (a)	-	-	-	-	2	-	-	-	.00
F	Ipomopsis aggregata	-	-	-	3	-	-	-	.00	-
F	Lactuca serriola	-	-	-	3	-	-	-	.00	-
F	Lappula occidentalis (a)	-	-	-	3	-	-	-	.01	-
F	Lepidium densiflorum (a)	-	-	-	1	-	-	-	.00	-
F	Medicago sativa	3	-	-	-	-	-	-	-	-
F	Pedicularis centranthera	-	-	-	1	3	-	-	.03	.00
F	Penstemon carnosus	18	9	12	11	8	.03	.05	.07	.05
F	Ranunculus testiculatus (a)	-	-	1	-	-	-	.00	-	-
F	Salsola iberica (a)	-	b23	a-	a-	a-	.09	-	-	-
F	Schoenrambe linifolia	b16	ab13	a5	a-	a-	.05	.01	.00	.03
F	Streptanthus cordatus	-	-	2	-	-	-	.00	-	-
F	Taraxacum officinale	2	-	-	-	-	-	-	-	-
F	Townsendia incana	2	-	-	-	-	-	-	-	-
F	Unknown forb-perennial	4	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	52	1	48	12	0.16	0.00	0.16	0.05
Total for Perennial Forbs		177	111	64	37	29	0.72	0.44	0.53	0.16
Total for Forbs		177	163	65	85	41	0.89	0.44	0.70	0.21

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

BROWSE TRENDS--

Management unit 16C, Study no: 15

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia nova	16	10	13	26	.45	.18	.48	2.75
B	Artemisia tridentata tridentata	10	16	17	5	.85	.75	2.67	.76
B	Artemisia tridentata wyomingensis	39	34	16	22	2.58	2.59	.78	1.55
B	Atriplex canescens	1	0	1	0	.00	-	.00	-
B	Cercocarpus montanus	2	2	1	0	.00	.00	.00	-
B	Chrysothamnus nauseosus hololeucus	37	28	18	17	1.36	1.86	.81	.85
B	Juniperus osteosperma	0	24	26	19	2.03	3.29	4.39	7.90
B	Opuntia sp.	2	0	0	1	.00	-	-	.00
B	Pinus edulis	0	8	10	7	3.84	5.18	9.03	12.11
Total for Browse		107	122	102	97	11.14	13.88	18.18	25.93

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 15

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	1.60	3.96
Artemisia tridentata tridentata	-	1.48	.05
Artemisia tridentata wyomingensis	-	1.29	1.11
Chrysothamnus nauseosus hololeucus	-	1.16	.95
Juniperus osteosperma	2.40	8.28	10.91
Pinus edulis	4.59	11.69	16.29

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 15

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	3.6	0.6
Artemisia tridentata tridentata	1.6	1.3

POINT-QUARTER TREE DATA--

Management unit 16C, Study no: 15

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	321	381	312	2.1	1.9	1.9
Pinus edulis	90	144	111	5.0	3.7	4.3

BASIC COVER--

Management unit 16C, Study no: 15

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	3.25	17.63	18.36	20.39	28.93
Rock	12.25	10.96	8.97	10.26	9.49
Pavement	4.00	2.89	7.18	8.02	10.19
Litter	52.50	29.82	36.51	37.95	44.48
Cryptogams	0	.03	.81	.69	.97
Bare Ground	28.00	29.45	30.02	36.27	26.57

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 15, Study Name: Howard FS Chaining

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13	7.6	54.7	23.4	21.8	5.1	6.3	80	0.8

PELLET GROUP DATA--

Management unit 16C, Study no: 15

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Sheep	-	3	-	-	12 (30)	-	-
Rabbit	11	53	3	32	-	-	-
Elk	4	5	-	6	1 (2)	12 (30)	2 (5)
Deer	62	51	43	39	42 (104)	98 (243)	50 (122)
Cattle	1	5	2	1	158 (37)	16 (39)	4 (11)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 15

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Artemisia nova									
88	66	0	100	0	-	0	0	0	6/14
94	1020	0	80	20	-	47	16	4	8/20
99	540	7	78	15	-	63	26	0	6/16
04	700	0	89	11	-	11	9	9	8/18
09	1520	1	89	9	20	11	0	5	7/20
Artemisia tridentata tridentata									
88	5131	87	9	4	1866	19	4	5	30/28
94	200	20	70	10	-	20	0	0	41/46
99	440	23	45	32	-	27	5	27	31/34
04	580	0	41	59	-	52	34	17	33/36
09	100	0	0	100	-	0	20	80	27/27

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Artemisia tridentata wyomingensis</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	1300	2	75	23	20	25	3	22	21/25	
99	1720	10	69	21	20	44	19	10	17/24	
04	400	20	20	60	-	35	20	50	21/22	
09	880	7	32	61	100	27	0	30	22/25	
<i>Atriplex canescens</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	20	0	100	0	-	0	0	0	30/29	
99	0	0	0	0	-	0	0	0	25/18	
04	20	0	0	100	-	0	100	100	30/22	
09	0	0	0	0	-	0	0	0	41/35	
<i>Cercocarpus montanus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	40	0	0	100	-	50	50	50	18/19	
99	40	0	0	100	-	100	0	100	-/-	
04	20	0	0	100	-	0	100	0	22/21	
09	0	0	0	0	-	0	0	0	20/18	
<i>Chrysothamnus nauseosus hololeucus</i>										
88	1998	90	3	7	466	37	7	7	29/21	
94	1100	22	67	11	-	5	5	2	23/25	
99	700	9	37	54	-	40	40	34	37/36	
04	480	8	33	58	20	33	17	38	22/25	
09	460	0	26	74	-	43	4	48	29/29	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
88	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	36/40	
<i>Gutierrezia sarothrae</i>										
88	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	9/13	
09	0	0	0	-	-	0	0	0	-/-	
<i>Juniperus osteosperma</i>										
88	933	100	0	-	-	0	0	21	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	540	78	22	-	-	0	0	11	-/-	
04	680	47	53	-	-	0	0	0	-/-	
09	400	40	60	-	40	0	0	0	72/35	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Opuntia</i> sp.									
88	0	0	0	-	-	0	0	0	-/-
94	80	0	100	-	-	0	0	0	3/12
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	6/12
09	20	0	100	-	-	0	0	0	5/13
<i>Pinus edulis</i>									
88	199	100	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	160	13	88	-	20	0	0	0	-/-
04	220	9	91	-	-	0	0	0	-/-
09	160	25	75	-	-	0	0	0	-/-
<i>Pinus edulis</i> chained									
88	66	0	0	100	-	0	0	0	-/-
94	0	0	0	0	-	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	-/-
<i>Purshia tridentata</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	16/32
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	9/35
09	0	0	0	-	-	0	0	0	17/42

MIDDLE MOUNTAIN - TREND STUDY NO. 16C-17-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,000 ft (2,438 m)

Aspect: Southwest

Slope: 4%

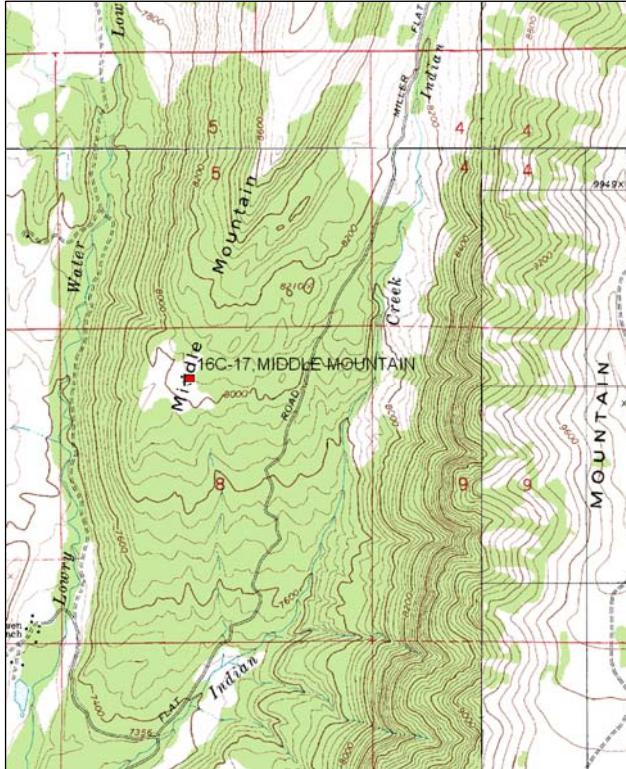
Transect bearing: 345 degrees magnetic.

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

Directions:

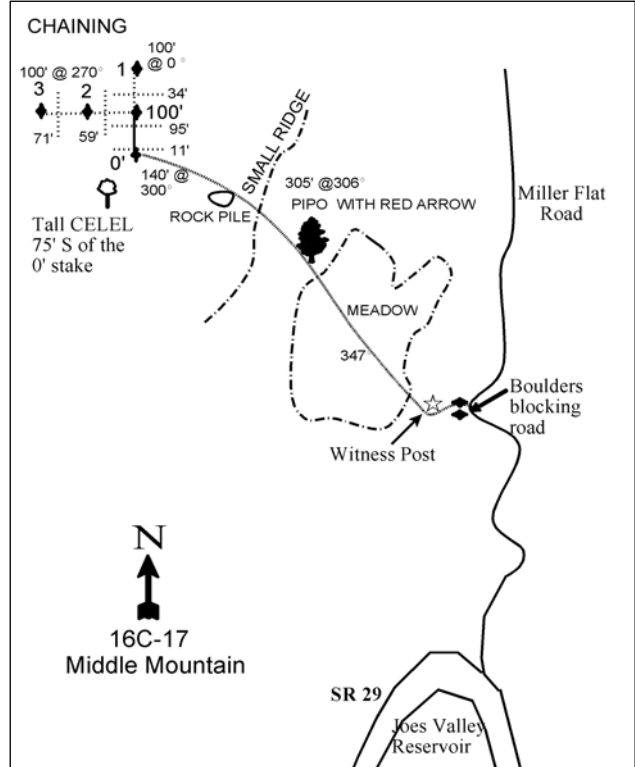
From the paved highway at the north end of Joes Valley Reservoir, proceed north on the Upper Joes Valley road (Millers Flat road) for 1.2 miles. Stay right at the fork and continue 1.2 miles to another fork. Stay right (on the Indian Creek side) and go 1.1 miles to a faint turnoff to the left. Park by the witness post which is about 75 yards off the main road. From the witness post, walk NNW to the upper end of the meadow to the lighting-scarred Ponderosa with a red arrow painted on it. From the pine tree walk NW 100 yards to a pile of rocks painted red. From the rock pile, walk NW (300°) for 140 feet to the 0-foot baseline stake. The 1st stake has a red browse tag #9018 attached.

Map Name: Joes Valley Reservoir



Township: 17S, Range: 6E, Section: 8

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 476889 E 4357214 N

MIDDLE MOUNTAIN - TREND STUDY NO. 16C-17

Site Information

Site Description: The study site is a diverse, productive area of high elevation range used by both deer and elk as winter-spring range. The study is located at the upper end of a small (approximately 200 acre) chaining on a slope where the pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees were never very dense. It is more of a mixed mountain brush site. The area was retreated by a bullhog treatment as part of the Middle Mountain Forest Service project and occurred just before the study was sampled in 2009. The methods of the treatment were similar to the Joes Valley PJ Retreatment ([WRI project # 1159](#)) done in the area, but was not conducted as part of the Watershed Restoration Initiative. The slope is open, but nearby stands of ponderosa pine (*Pinus ponderosa*), aspen (*Populus tremuloides*), and mature curlleaf mountain mahogany (*Cercocarpus ledifolius*) on the ridge provide excellent cover and additional foraging opportunities. Pellet group data estimated moderate use by elk in 1999 and 2004, but decreased to fairly light use in 2009. Estimated deer use has been light since 1999. Sheep sign has also been encountered, but is minimal (Table - Pellet Group Data).

Browse: The site supports a variety of desirable browse species at moderate abundances including mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), black sagebrush (*Artemisia nova*), Utah serviceberry (*Amelanchier utahensis*), dwarf rabbitbrush (*Chrysothamnus depressus*), and true mountain mahogany (*Cercocarpus montanus*). All of these browse species have had fairly healthy populations with low decadence and good vigor, though serviceberry had a large increase in decadence and poor vigor in 2009 following the bullhog treatment. All the preferred browse species on the site has had mostly moderate use with some years of heavy use (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is diverse and abundant. Salina wildrye (*Elymus salina*) is the dominant grass species providing over 70% of grass cover since 1994. Other common grasses include bluebunch wheatgrass (*Agropyron spicatum*), prairie junegrass (*Koeleria cristata*) and mutton bluegrass (*Poa fendleriana*). Forbs are also diverse and abundant. Common species include rose pussy toes (*Antennaria rosea*), aster (*Aster* sp.), bastard toadflax (*Comandra pallida*), thistle (*Cirsium* sp.), and desert phlox (*Phlox austromontana*).

Soil: The soil is a clay to sandy clay loam with a neutral pH. Phosphorus has very limited availability for plant growth and development at just 2 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover has been moderately high over the study. The bullhog treatment increased the amount of litter cover in 2009 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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 decadence or vigor of the preferred browse species. There was a large decrease in the recruitment of young serviceberry, dwarf rabbitbrush, and true mountain mahogany plants.
- **1994 to 1999 - slightly up (+1):** Density and cover increased in serviceberry, black sagebrush, and true mountain mahogany. Recruitment of young plants also increased in the serviceberry and true mountain mahogany populations. Density of mountain big sagebrush decreased by 29%, however, cover increased, and decadence and poor vigor both decreased substantially. Recruitment of young mountain big sagebrush plants increased.
- **1999 to 2004 - slightly up (+1):** The density of mountain big sagebrush and black sagebrush both increased substantially and cover increased slightly. However, density of serviceberry and true mountain mahogany decreased substantially, though cover of both species increased.

- **2004 to 2009 - slightly up (+1):** There was a large increase in the density of black sagebrush due to an increase in the recruitment of young plants. Mountain big sagebrush also had a 17% increase in density. Serviceberry density remained similar, but decadence increased from 5% to 22% and poor vigor increased from 0% to 56%.

Grass:

- **1988 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though there was a significant increase in the nested frequency of mutton bluegrass.
- **1994 to 1999 - stable (0):** Perennial grass sum of nested frequency increased slightly, but cover remained similar. Prairie junegrass increased significantly in nested frequency and mutton bluegrass decreased significantly.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 18% though cover remained similar. There was a significant decrease in the nested frequency of prairie junegrass.
- **2004 to 2009 - stable (0):** Perennial grass sum of nested frequency changed little, though cover decreased from 15% to 12%. Prairie junegrass decreased significantly in nested frequency and is now rare. Sandberg bluegrass (*Poa secunda*) increased significantly in nested frequency.

Forb:

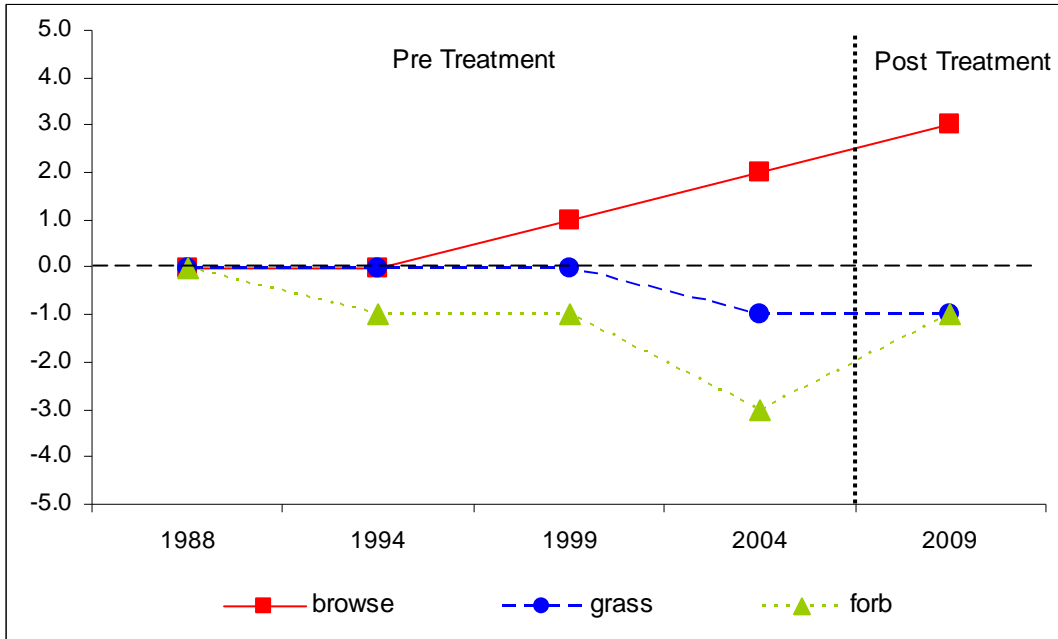
- **1988 to 1994 - slightly down (-1):** There was an 18% decrease in the sum of nested frequency of perennial forbs with significant decreases in many of the perennial forb species.
- **1994 to 1999 - stable (0):** The sum of nested frequency of perennial forbs decreased by 7%, but cover increased from 4% to 11%. Much of the increase cover came from a large increase in cover of bastard toadflax and thistle.
- **1999 to 2004 - down (-2):** There was a 30% decrease in the sum of nested frequency of perennial forbs and cover decreased to 7%. There was a significant decrease in the nested frequency of pussy toes and thistle.
- **2004 to 2009 - up (+2):** Perennial forb sum of nested frequency increased by 28%, though cover remained similar. Pussy toes increased significantly in nested frequency.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 16C, study no: 17

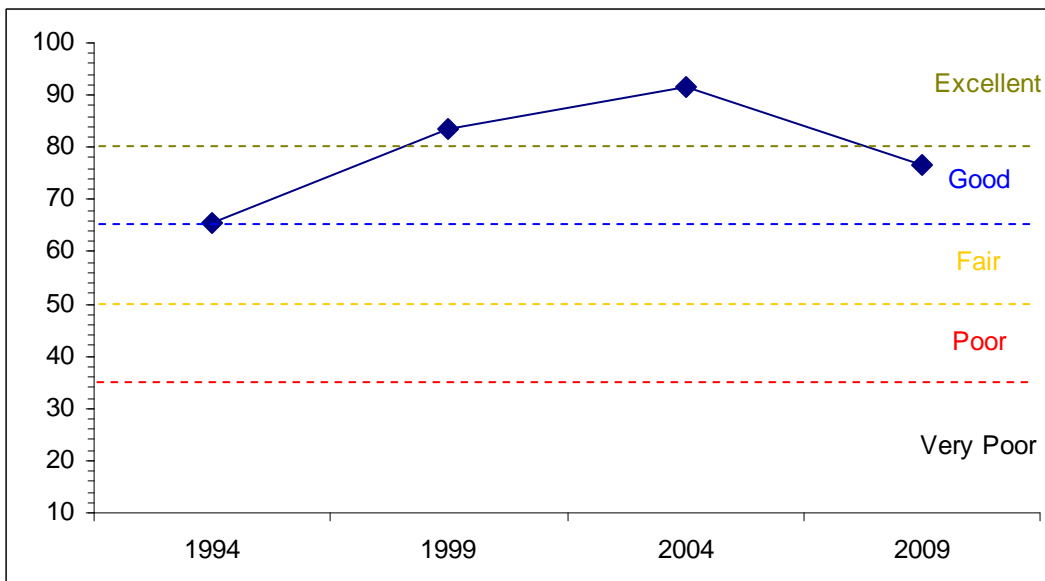
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	12.1	10.3	6.2	28.9	0.0	8.2	0.0	65.6	Fair-Good
99	23.2	12.6	8.3	29.6	0.0	10.0	0.0	83.7	Excellent
04	30.0	12.6	8.9	29.8	0.0	10.0	0.0	91.4	Excellent
09	21.9	11.8	8.9	23.9	0.0	10.0	0.0	76.5	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 17



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 16C, Study no: 17



HERBACEOUS TRENDS--

Management unit 16C, Study no: 17

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron spicatum	44	50	33	39	40	1.40	.54	.79	.88
G	Carex sp.	9	-	-	-	-	-	-	-	-
G	Elymus salina	ab244	b258	b264	ab237	a207	11.48	11.38	11.82	8.34
G	Koeleria cristata	bc52	ab27	d110	c77	a9	.26	2.42	1.95	.04
G	Poa fendleriana	bc56	d76	ab24	a10	cd68	.86	.26	.10	1.53
G	Poa secunda	a-	ab12	ab22	a7	b46	.24	.14	.18	.22
G	Sitanion hystrix	-	-	2	-	-	-	.03	-	-
G	Stipa lettermani	a-	a7	a-	a5	b25	.21	-	.06	.93
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		405	430	455	375	395	14.47	14.80	14.92	11.95
Total for Grasses		405	430	455	375	395	14.47	14.80	14.92	11.95
F	Achillea millefolium	-	-	-	-	3	-	-	-	.00
F	Allium sp.	b54	a-	a-	a-	a1	-	-	-	.01
F	Androsace septentrionalis (a)	-	a-	b13	ab6	a2	-	.13	.04	.00
F	Antennaria rosea	18	23	92	17	50	.35	1.83	.33	.43
F	Arabis sp.	-	3	-	-	-	.00	-	-	-
F	Aster sp.	a54	c102	a38	bc83	ab53	.56	.28	.92	.88
F	Astragalus convallarius	-	2	-	1	3	.00	-	.00	.03
F	Astragalus sp.	2	5	7	-	6	.02	.19	-	.21
F	Calochortus nuttallii	-	-	3	1	-	-	.00	.00	-
F	Castilleja linariaefolia	5	-	4	-	9	-	.01	-	.13
F	Chaenactis douglasii	-	-	-	1	-	-	-	.00	-
F	Cirsium sp.	b105	b94	b98	a53	a49	.68	4.07	1.85	1.36
F	Collinsia parviflora (a)	-	a-	a-	a3	b32	-	-	.00	.08
F	Comandra pallida	b60	a35	c108	bc70	bc73	.13	2.89	1.23	1.03
F	Crepis acuminata	5	1	-	-	-	.00	-	-	-
F	Cryptantha sp.	2	4	-	-	-	.01	-	-	-
F	Cymopterus sp.	a-	ab5	a-	a1	b13	.01	-	.00	.08
F	Erigeron eatonii	c159	b79	b54	a3	a8	.42	.30	.09	.01
F	Erigeron flagellaris	-	-	-	4	9	-	-	.03	.02
F	Eriogonum racemosum	a-	a-	a-	a-	b16	-	-	-	.37
F	Eriogonum umbellatum	2	7	-	-	2	.03	-	-	.03
F	Gayophytum ramosissimum(a)	-	-	-	2	-	-	-	.00	-
F	Hymenopappus filifolius	a6	ab20	b24	ab17	a-	.30	.52	.38	-
F	Hymenoxys acaulis	-	-	-	-	3	-	-	-	.18
F	Lesquerella sp.	-	-	2	-	8	-	.03	-	.06
F	Lomatium grayi	b38	a2	a-	a-	a3	.00	-	-	.00
F	Machaeranthera canescens	a-	a-	a-	a4	b18	-	-	.04	.23
F	Microsteris gracilis (a)	-	a-	a-	a1	b7	-	-	.00	.01
F	Orthocarpus sp. (a)	-	a-	b21	c136	b25	-	.18	4.03	.45
F	Penstemon caespitosus	d76	cd66	a-	b25	bc40	.66	-	.46	.46
F	Penstemon lentus	4	-	-	5	4	-	-	.09	.06
F	Phlox austromontana	a14	ab34	ab28	ab35	b43	.77	.82	.99	.92

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
F	Phlox longifolia	-	-	-	1	3	-	-	.00	.03
F	Polygonum douglasii (a)	-	a ³	a ⁻	b ³⁶	ab ¹⁷	.00	-	.10	.04
F	Ranunculus testiculatus (a)	-	-	-	-	4	-	-	-	.01
F	Senecio multilobatus	3	-	-	-	-	-	-	-	-
F	Sphaeralcea coccinea	10	24	20	13	12	.10	.11	.11	.10
F	Taraxacum officinale	b ⁸	a ⁻	a ⁻	a ⁻	a ⁻	-	.03	-	-
Total for Annual Forbs		0	3	34	184	87	0.00	0.31	4.19	0.60
Total for Perennial Forbs		625	506	478	334	429	4.08	11.12	6.57	6.68
Total for Forbs		625	509	512	518	516	4.09	11.43	10.77	7.29

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

BROWSE TRENDS--

Management unit 16C, Study no: 17

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	20	14	17	13	.64	.86	1.28	1.12
B	Artemisia nova	41	61	55	51	2.90	4.92	5.35	4.53
B	Artemisia tridentata vaseyana	50	47	50	54	1.99	4.48	6.42	4.51
B	Cercocarpus ledifolius	2	1	2	2	.00	.00	.00	.00
B	Cercocarpus montanus	16	25	21	18	1.57	3.73	4.58	2.73
B	Chrysothamnus depressus	68	72	76	58	2.13	3.63	5.44	3.85
B	Chrysothamnus viscidiflorus viscidiflorus	5	4	25	25	.18	.03	.46	.69
B	Gutierrezia sarothrae	53	26	41	55	1.48	.39	.93	1.57
B	Opuntia sp.	3	5	4	2	.01	.00	.03	.03
B	Pinus edulis	0	3	1	0	-	.38	1.03	-
B	Purshia tridentata	2	2	2	2	.00	.00	.00	.00
B	Symphoricarpos oreophilus	13	10	16	19	.84	.82	1.32	.52
Total for Browse		273	270	310	299	11.76	19.25	26.88	19.57

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 17

Species	Percent Cover	
	'04	'09
Amelanchier utahensis	1.73	.85
Artemisia nova	7.36	5.30
Artemisia tridentata vaseyana	5.48	5.01
Cercocarpus ledifolius	.51	.13
Cercocarpus montanus	3.53	4.53
Chrysothamnus depressus	4.03	3.56
Chrysothamnus viscidiflorus viscidiflorus	.60	.26
Gutierrezia sarothrae	2.06	1.81
Opuntia sp.	.03	-
Pinus edulis	2.51	-
Purshia tridentata	.13	.11
Symphoricarpos oreophilus	1.41	1.25

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 17

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	3.6	2.5
Artemisia nova	1.1	0.8
Artemisia tridentata vaseyana	2.4	1.3
Cercocarpus montanus	4.2	3.7

BASIC COVER--

Management unit 16C, Study no: 17

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	5.75	29.73	39.15	43.42	38.47
Rock	6.50	2.62	2.79	2.26	1.16
Pavement	0	.03	.09	.09	.03
Litter	74.25	19.81	27.38	24.07	37.84
Cryptogams	0	.60	.55	2.79	.05
Bare Ground	13.50	44.09	38.95	44.63	35.55

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 17, Study Name: Middle Mountain

Effective rooting depth (in)	pH	clay			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.2	7.2	44.4	13.8	41.8	1.4	2	76.8	0.6

PELLET GROUP DATA--

Management unit 16C, Study no: 17

Type	Quadrat Frequency			
	'94	'99	'04	'09
Sheep	-	2	-	-
Rabbit	9	30	30	29
Elk	43	21	23	18
Deer	18	9	20	12
Cattle	1	-	-	-

Days use per acre (ha)		
'99	'04	'09
-	-	2 (5)
-	-	-
35 (87)	39 (96)	19 (46)
26 (64)	16 (40)	13 (33)
-	-	-

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 17

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Amelanchier utahensis									
88	1199	100	0	0	33	3	67	11	-/-
94	440	9	82	9	-	27	32	5	11/15
99	620	74	26	0	-	26	6	0	35/30
04	380	32	63	5	-	32	26	0	14/20
09	360	11	67	22	-	28	22	56	15/19
Artemisia nova									
88	599	56	22	22	-	28	6	6	7/8
94	1880	29	56	15	-	11	1	5	8/19
99	2480	11	77	12	120	37	21	4	11/20
04	3000	19	65	16	9820	28	14	7	8/18
09	5480	27	63	9	1380	9	9	3	8/19
Artemisia tridentata vaseyana									
88	1931	21	41	38	633	28	45	7	17/23
94	2180	5	62	33	40	28	5	13	14/25
99	1540	17	68	16	40	29	18	6	19/30
04	2720	33	54	13	9440	22	21	6	14/27
09	3120	29	47	24	3140	6	29	24	14/23
Cercocarpus ledifolius									
88	0	0	0	-	-	0	0	0	-/-
94	40	0	100	-	-	50	0	0	14/18
99	20	0	100	-	-	0	0	0	38/32
04	40	0	100	-	-	0	100	0	35/34
09	40	0	100	-	-	0	50	0	38/38
Cercocarpus montanus									
88	365	82	18	0	-	9	82	0	28/37
94	580	3	86	10	-	21	66	10	19/37
99	760	16	84	0	20	50	26	0	28/36
04	580	10	90	0	760	3	90	0	23/32
09	520	4	96	0	180	46	50	8	32/43

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Chrysothamnus depressus										
88	3198	57	41	2	-	26	18	1	4/10	
94	5240	5	88	7	-	3	0	3	3/8	
99	4760	11	86	3	60	17	6	.42	4/11	
04	7020	2	97	1	280	16	13	0	4/10	
09	7120	6	92	2	-	9	.56	9	4/9	
Chrysothamnus nauseosus										
88	33	0	100	-	-	0	0	100	20/19	
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	-/-	
Chrysothamnus viscidiflorus viscidiflorus										
88	365	36	45	18	-	18	9	0	9/12	
94	100	0	80	20	-	0	0	20	7/8	
99	120	0	100	0	-	0	0	0	11/17	
04	1360	0	100	0	60	0	0	0	9/13	
09	2880	17	81	2	20	0	0	.69	7/11	
Gutierrezia sarothrae										
88	898	22	74	4	-	4	0	4	5/4	
94	3220	6	94	0	-	0	0	0	6/7	
99	1500	19	81	0	120	0	0	0	6/7	
04	3640	9	91	0	-	0	0	0	7/10	
09	7820	0	97	3	-	0	0	3	6/6	
Mahonia repens										
88	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	3/4	
Opuntia sp.										
88	33	0	0	100	-	0	0	100	-/-	
94	80	50	50	0	-	0	0	0	2/12	
99	100	40	40	20	-	0	0	20	2/8	
04	140	14	86	0	-	0	0	0	3/3	
09	60	33	67	0	-	0	0	0	-/-	
Pinus edulis										
88	33	100	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	60	33	67	-	-	0	0	0	-/-	
04	20	0	100	-	60	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Purshia tridentata</i>									
88	0	0	0	0	-	0	0	0	-/-
94	140	14	57	29	-	71	14	29	13/30
99	60	0	100	0	-	0	100	0	18/76
04	40	0	50	50	-	50	50	0	13/47
09	60	0	100	0	-	0	100	0	14/40
<i>Quercus gambelii</i>									
88	33	100	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	32/37
<i>Symphoricarpos oreophilus</i>									
88	698	71	19	9	66	24	57	0	11/19
94	440	5	95	0	-	59	0	0	8/16
99	240	17	83	0	-	17	0	0	12/25
04	520	12	85	4	-	0	0	0	11/22
09	1240	10	87	3	-	0	0	3	8/14
<i>Tetradymia canescens</i>									
88	33	0	100	-	-	100	0	0	9/10
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	-/-

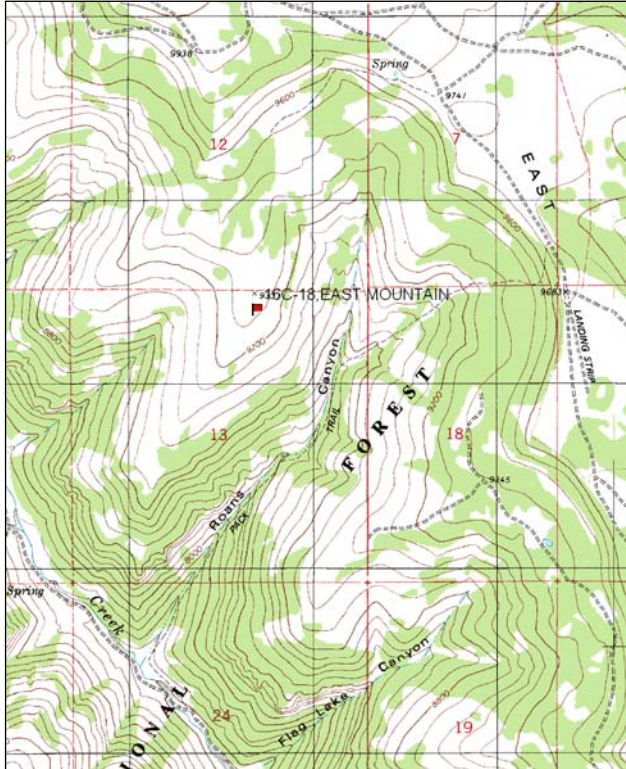
EAST MOUNTAIN - TREND STUDY NO. 16C-18-09

Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 9,200 ft (2,804 m)
Aspect: South
Slope: 6%-8%
Transect bearing: 180 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

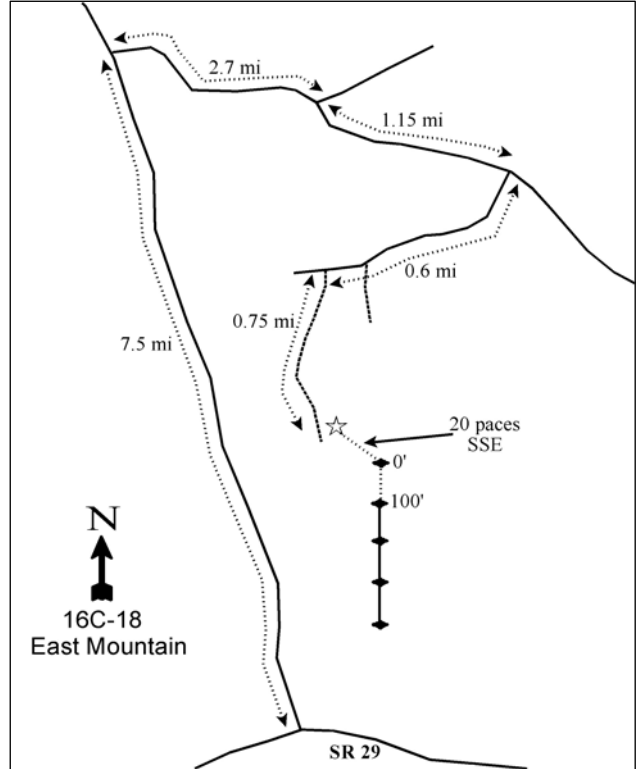
From Orangeville, go up Straight Canyon to a major fork at Cottonwood Creek. Bear right up Cottonwood Creek approximately 7.5 miles to Mill Canyon. Turn right and go up Mill Canyon 2.7 miles to a fork at the top of East Mountain. Bear right on the main road 0.6 miles to a fork to Pine Springs - Snow Lake. Continue on the main road 0.55 miles. Turn right here down off the main road. Go 0.15 miles to a spring. Continue 0.15 miles to the creek at the bottom of the dugway. Go 0.3 miles to a fork past the first patch of aspen clones to the second patch (2nd faint road), bear left on the 2nd faint road. Wind down through the trees and out onto the sage/grass ridge for 0.75 miles. There is a witness post on the left side of the road. From the witness post, walk 20 paces SSE to a 18" fencepost marked by a red browse tag, #7162. This is the 0-foot baseline stake.

Map Name: Mahogany Point



Township: 17S, Range: 6E, Section: 13

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 483613 E 4355578 N

EAST MOUNTAIN - TREND STUDY NO. 16C-18

Site Information

Site Description: The study is located on a low point on the west side of the plateau above Roans Canyon and Cottonwood Creek. The area is managed by the Forest Service as part of the East Mountain allotment. Much of the area was treated with herbicide to kill sagebrush in the late 1960's. The site is located on a slope where the majority of the mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was not affected. The lower end of the study baseline was affected more by the treatment and has shown a lower density of mountain big sagebrush than the beginning of the study baseline. Elk winter on the points and windswept south-facing slopes. Deer sign was only occasionally observed. Pellet group data has estimated heavy elk use and light deer use since 1999. Estimated cattle use was light in 2009, but was not sampled in the previous sample years (Table - Pellet Group Data).

Browse: The dominant browse species is mountain big sagebrush which provides the majority of the browse cover on the site (Table - Browse Trends). The mountain big sagebrush population is comprised of mostly small statured plants with a high amount of decadence. The proportion of mountain big sagebrush plants displaying poor vigor has steadily increased since 1988, but is still moderately low. Utilization of mountain big sagebrush has been mostly moderate with some heavy use in a few sample years. Additional browse species that occur in limited abundance are low rabbitbrush (*Chrysothamnus viscidiflorus*), snowberry (*Symphoricarpos oreophilus*), and gray horsebrush (*Tetradymia canescens*) (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is abundant and diverse. Large bunches of Salina wildrye (*Elymus salina*) dominate the grass component. Associated grass species are mutton and Sandberg bluegrass (*Poa fendleriana* and *P. secunda*), western wheatgrass (*Agropyron smithii*), and a sedge (*Carex* sp.). Perennial forbs are also diverse and prevalent. Desert phlox (*Phlox austromontana*), looseflower milkvetch (*Astragalus tenellus*), silvery lupine (*Lupinus sericeus*), Wyoming painted-cup (*Castilleja linariaefolia*), and a penstemon (*Penstemon* sp.) are common species (Table - Herbaceous Trends).

Soil: The loose surface soil has a clay loam texture and neutral pH. Phosphorus has a limited availability for plant growth and development at 3.8 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Scattered small gullies, which begin on the upper portions of the slope, converge and deepen on the steeper side hills. There has been a moderately high amount of bare ground cover over the sample years with most of the protective ground cover provided by herbaceous vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 due to soil movement and pedestaling around plants, but was classified as stable in 2009.

Trend Assessments

Browse:

- **1988 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 poor vigor of mountain big sagebrush, though recruitment of young plants decreased.
- **1994 to 1999 - stable (0):** The density and cover of mountain big sagebrush increased slightly, though decadence increased from 23% to 30%.
- **1999 to 2004 - stable (0):** Density of mountain big sagebrush increased by 17% from 3,140 plants/acre to 3,700 plants/acre, but decadence also increased to 43%. Cover of big sagebrush decreased from 15% to 14% and poor vigor increased from 10% to 14%. Recruitment of young big sagebrush plants did increase slightly from 7% of the population to 11%.
- **2004 to 2009 - stable (0):** There was little change in the density of mountain big sagebrush, though cover decreased to 11%. Decadence remained high at 38% and poor vigor increased to 17%. Recruitment of young big sagebrush plants increased to 13% of the population.

Grass:

- **1988 to 1994 - down (-2):** Perennial grass sum of nested frequency decreased by 22% with a significant decrease in nested frequency of western wheatgrass and Sandberg bluegrass. Salina wildrye increased significantly in nested frequency.
- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial grasses though cover increased slightly. There was a significant increase in the nested frequency of western wheatgrass and a significant decrease in Salina wildrye.
- **1999 to 2004 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 10% and cover increased from 10% to 12%.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 11% and cover decreased to 8%.

Forb:

- **1988 to 1994 - down (-2):** Perennial forb sum of nested frequency decreased by 27%.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 16% and cover increased from 7% to 17%. The large increase in cover is primarily due to increases in Wyoming painted-cup, looseflower milkvetch, and silvery lupine.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 31% and cover decreased to 9%.
- **2004 to 2009 - up (+2):** Perennial forb sum of nested frequency increased by 27% and cover increased to 11%.

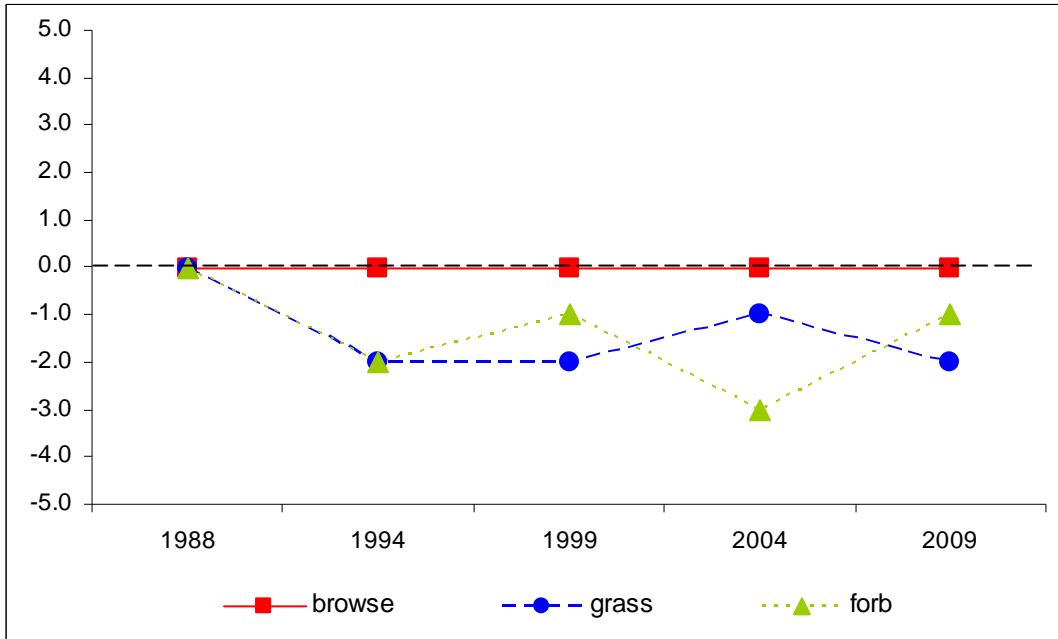
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 18

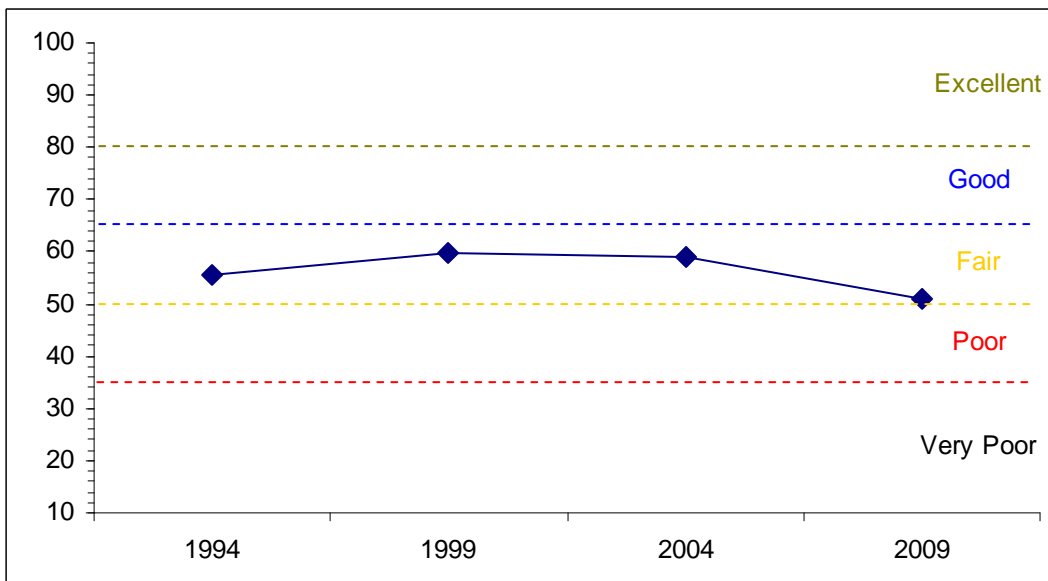
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	16.5	8.1	2.5	18.3	0.0	10.0	0.0	55.4	Fair
99	19.3	6.2	3.7	20.6	0.0	10.0	0.0	59.8	Fair
04	18.0	2.6	5.4	23.3	0.0	10.0	0.0	59.2	Fair
09	14.3	4.0	6.7	16.1	0.0	10.0	0.0	51.1	Poor-Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 18



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 16C, Study no: 18



HERBACEOUS TRENDS--

Management unit 16C, Study no: 18

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	c69	a13	bc44	ab34	ab33	.02	.55	.61	.21
G	Agropyron spicatum	-	-	-	5	6	-	-	.06	.06
G	Bromus anomalus	ab12	a-	ab7	b12	a1	-	.09	.24	.03
G	Bromus japonicus (a)	-	-	-	-	-	-	.00	-	-
G	Carex sp.	24	18	37	22	36	.38	1.39	1.61	1.61
G	Elymus salina	a115	b167	a115	a125	a122	7.71	5.26	5.10	4.43
G	Oryzopsis hymenoides	-	-	2	-	-	-	.00	-	-
G	Poa fendleriana	68	80	63	97	58	.89	2.28	2.46	1.19
G	Poa pratensis	-	-	-	7	7	-	-	.53	.06
G	Poa secunda	c92	b24	ab13	a4	ab5	.06	.02	.03	.02
G	Sitanion hystrix	-	-	-	1	1	-	-	.00	.00
G	Stipa lettermani	15	7	14	17	20	.07	.69	.96	.43
Total for Annual Grasses		0	0	0	0	0	0	0.00	0	0
Total for Perennial Grasses		395	309	295	324	289	9.14	10.31	11.63	8.07
Total for Grasses		395	309	295	324	289	9.14	10.31	11.63	8.07
F	Androsace septentrionalis (a)	-	ab9	b14	a3	a-	.30	.05	.03	-
F	Antennaria rosea	-	-	-	4	-	-	-	.01	-
F	Arabis sp.	b7	a-	ab3	a-	a-	-	.01	-	-
F	Aster sp.	-	-	2	-	-	-	.00	-	-
F	Astragalus convallarius	a-	a3	ab5	ab4	b15	.00	.01	.03	.13
F	Astragalus megacarpus	b9	a1	ab4	a-	a-	.00	.03	.03	-
F	Astragalus tenellus	ab26	a13	b48	ab26	b39	.72	3.22	1.52	1.29
F	Castilleja linariaefolia	b88	ab59	b79	a27	b84	.45	3.53	.76	2.74
F	Caulanthus crassicaulis	5	-	-	-	-	-	-	-	-
F	Chaenactis douglasii	b17	ab4	ab13	a3	ab6	.01	.08	.00	.19
F	Comandra pallida	a3	a2	a14	a9	b24	.01	.12	.12	.52
F	Crepis acuminata	1	-	-	-	-	-	-	-	-
F	Erigeron pumilus	12	6	3	5	-	.01	.00	.06	-
F	Eriogonum alatum	-	11	10	7	12	.08	.24	.13	.15
F	Eriogonum racemosum	-	-	2	-	-	-	.03	-	-
F	Eriogonum sp.	-	-	1	-	-	-	.00	-	-
F	Eriogonum umbellatum	14	17	16	20	21	.07	.40	.35	.64
F	Hymenopappus filifolius	-	-	-	7	2	-	-	.33	.01
F	Hymenoxys richardsonii	a39	b94	a36	a44	a40	1.32	.61	.76	.45
F	Ipomopsis aggregata	9	-	1	2	2	-	.00	.00	.30
F	Lesquerella alpina	a11	ab20	b35	a13	ab16	.10	.22	.03	.06
F	Linum lewisii	ab5	ab10	b12	ab6	a-	.02	.08	.22	-
F	Lupinus sericeus	d71	bc32	c42	ab5	a5	1.83	3.08	.42	.21
F	Machaeranthera canescens	-	5	5	-	1	.01	.06	-	.03
F	Machaeranthera grindelioides	11	4	3	3	8	.04	.03	.18	.10
F	Penstemon comarrhenus	ab23	a10	b38	b39	b35	.06	1.39	.60	.95
F	Penstemon watsonii	13	14	-	7	5	.16	-	.31	.09
F	Phlox austromontana	b160	a108	a108	a87	ab118	2.11	3.28	3.23	3.22

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
F	Phlox longifolia	_b 42	_{ab} 10	_a -	_{ab} 18	_a 2	.02	-	.06	.03
F	Salsola iberica (a)	-	-	-	-	1	-	-	-	.00
F	Senecio multilobatus	11	1	8	5	1	.00	.02	.02	.00
F	Taraxacum officinale	8	2	7	2	1	.00	.07	.01	.03
F	Tragopogon dubius	1	2	-	-	-	.00	-	-	-
Total for Annual Forbs		0	9	14	3	1	0.30	0.05	0.03	0.00
Total for Perennial Forbs		586	428	495	343	437	7.10	16.60	9.24	11.16
Total for Forbs		586	437	509	346	438	7.41	16.65	9.27	11.17

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

BROWSE TRENDS--

Management unit 16C, Study no: 18

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia frigida	19	16	15	14	.08	.43	.55	.39
B	Artemisia tridentata vaseyana	68	71	76	79	13.11	15.06	13.92	11.10
B	Chrysothamnus viscidiflorus	53	38	49	52	.65	.34	1.47	.96
B	Gutierrezia sarothrae	28	23	31	15	.37	.43	.39	.19
B	Rosa woodsii	0	1	1	1	-	.00	.00	.00
B	Symphoricarpos oreophilus	21	22	30	29	1.24	.52	.60	.47
B	Tetradymia canescens	25	30	34	31	1.64	1.42	1.44	.97
Total for Browse		214	201	236	221	17.10	18.23	18.37	14.09

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 18

Species	Percent Cover	
	'04	'09
Artemisia frigida	.28	.11
Artemisia tridentata vaseyana	13.19	16.26
Chrysothamnus viscidiflorus	1.53	1.96
Gutierrezia sarothrae	.55	.15
Symphoricarpos oreophilus	1.01	1.08
Tetradymia canescens	1.63	1.11

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 18

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.1	1.2

BASIC COVER--

Management unit 16C, Study no: 18

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	10.75	31.36	37.50	34.54	32.37
Rock	2.50	5.98	8.07	6.71	6.90
Pavement	0	1.34	1.92	1.00	1.15
Litter	45.25	34.56	29.52	28.28	35.93
Cryptogams	0	.43	.09	.03	.03
Bare Ground	41.50	43.59	35.87	44.90	35.90

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 18, Study Name: East Mountain

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.4	7.3	40	27.4	32.6	2.8	3.8	99.2	0.6

PELLET GROUP DATA--

Management unit 16C, Study no: 18

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	20	10	8	4	-	-	-
Elk	36	24	45	36	55 (136)	56 (137)	76 (187)
Deer	2	4	4	2	17 (42)	21 (53)	2 (5)
Cattle	-	-	1	1	-	-	15 (38)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 18

		Age class distribution					Utilization		
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia frigida									
88	265	0	75	25	-	25	25	25	4/2
94	560	11	89	0	-	0	0	0	5/4
99	660	21	79	0	40	0	0	0	5/7
04	520	4	96	0	-	12	4	0	6/7
09	420	24	76	0	-	24	0	0	6/8
Artemisia tridentata vaseyana									
88	4265	30	48	22	133	38	5	2	13/31
94	3060	5	72	23	40	41	1	7	15/32
99	3140	7	63	30	140	61	10	10	16/33
04	3700	11	45	43	700	42	15	14	14/31
09	3680	13	50	38	480	47	21	17	11/26

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Chrysothamnus nauseosus									
88	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	16/28
09	0	0	0	-	-	0	0	0	-/-
Chrysothamnus viscidiflorus									
88	2465	38	41	22	333	22	14	0	5/5
94	2420	2	98	0	-	0	0	0	7/9
99	1460	19	75	5	20	0	1	1	7/11
04	2060	3	83	14	20	8	2	4	7/11
09	2860	1	97	2	20	0	0	1	6/7
Gutierrezia sarothrae									
88	0	0	0	0	-	0	0	0	-/-
94	1480	3	89	8	-	0	0	0	6/6
99	1240	10	90	0	-	0	0	0	7/8
04	1240	2	98	0	-	0	0	0	7/9
09	500	0	100	0	-	0	0	0	6/7
Rosa woodsii									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	10/18
99	60	0	100	-	-	0	0	0	9/12
04	80	100	0	-	-	0	0	0	5/4
09	140	29	71	-	-	0	0	0	6/8
Symphoricarpos oreophilus									
88	864	69	23	8	199	23	0	0	13/21
94	1240	42	56	2	60	15	0	0	10/20
99	1060	28	58	13	120	34	0	0	11/26
04	1520	13	70	17	-	18	13	1	9/16
09	1400	6	91	3	40	9	6	0	10/18
Tetradymia canescens									
88	0	0	0	0	66	0	0	0	-/-
94	1440	4	92	4	-	0	0	1	7/11
99	1120	16	80	4	100	18	0	4	8/11
04	1680	8	83	8	-	37	13	2	7/10
09	1420	23	62	15	60	24	4	7	7/12

TRAIL MOUNTAIN EXCLOSURE - TREND STUDY NO. 16C-19-09

Vegetation Type: Mixed Mountain Brush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,350 ft (2,545 m)

Aspect: Southwest

Slope: 6%-8%

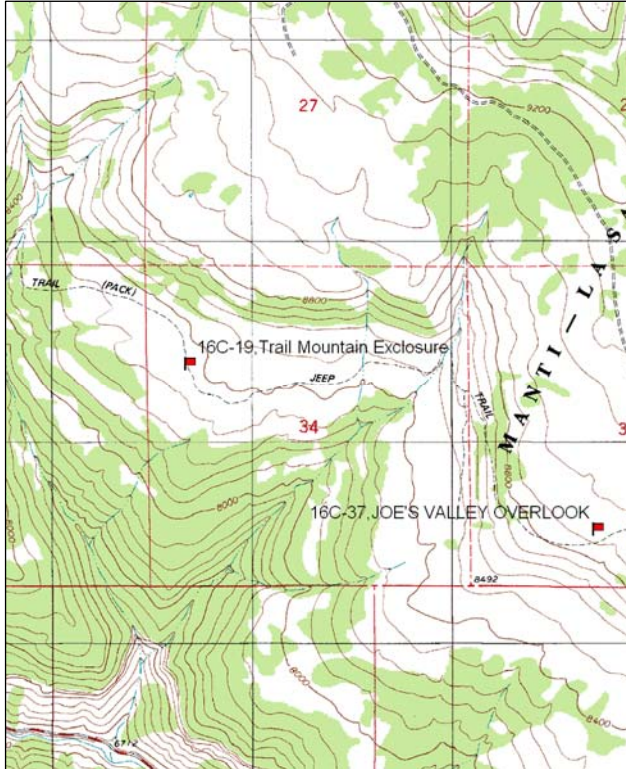
Transect bearing: 239 degrees magnetic.

Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), belt 4 rebar @ 4'

Directions:

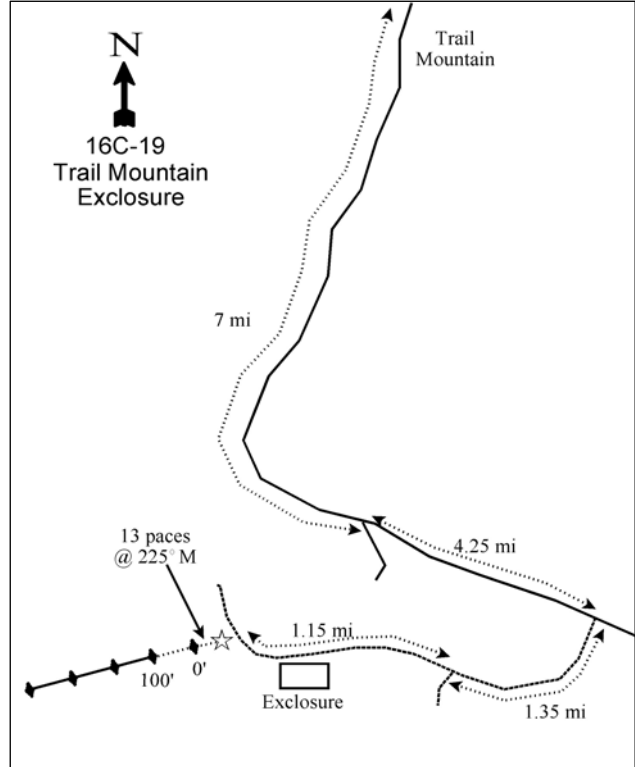
From the pass between Upper Joes Valley and the head of Cottonwood Creek (T16S, R6E, sec 27), take the road south onto Trail Mountain. Go 7.0 miles on this road to a fork. Take the left fork, towards Miles Point. Go 4.25 miles to a fork. Bear right down the side of the mountain for 1.35 miles. Bear right at another fork and continue 1.0 miles to the enclosure. Continue past the enclosure for 0.15 miles to just past where the road crosses a gully at a sharp bend in the terraces to a witness post. The 0 ft stake is located 13 paces away at 225°M, and is marked with a browse tag. There is rebar next to the 0 ft stake.

Map Name: Mahogany Point



Township: 17S, Range: 6E, Section: 34

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 479609 E 4350569 N

TRAIL MOUNTAIN ENCLOSURE - TREND STUDY NO. 16C-19

Site Information

Site Description: The Trail Mountain Big Game Enclosure was constructed on the southwest end of Trail Mountain in the 1960's. Considerable watershed work, contour trenching and seeding was done on this Forest Service land at that time. The area has since been closed to livestock grazing, although there is trespass use by cattle. This side of the mountain is occupied primarily by a mixed mountain brush communities. The trend study is on the same location as the 1980 line-intercept study #35-3. The bench itself has a gentle slope, but drops off steeply to the west and south. Pellet group data has estimated moderately heavy elk use since 1999. Estimated deer use was light in 1999, but was minimal in 2004 with no deer sign sampled in 2009. Trespass cattle use has steadily increased on the site and was moderately high in 2009 (Table - Pellet Group Data).

Browse: The mixed brush community on this site is composed largely of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with significant populations of Utah serviceberry (*Amelanchier utahensis*) and true mountain mahogany (*Cercocarpus montanus*). Utilization of mountain big sagebrush has been mostly moderate, with heavier use noted on serviceberry and true mountain mahogany. Mountain big sagebrush displays moderate decadence, but has mostly good vigor and good recruitment of young plants. The serviceberry and true mountain mahogany populations are healthy with low decadence, good vigor, and excellent recruitment of young plants. In 1999, some of the large serviceberry plants in the vicinity appeared to have been knocked down in what appeared to be a mechanical treatment to promote more available growth. Other common species include black sagebrush (*Artemisia nova*), dwarf rabbitbrush (*Chrysothamnus depressus*), snowberry (*Symphoricarpos oreophilus*), curleaf mountain mahogany (*Cercocarpus ledifolius*), and a few antelope bitterbrush (*Purshia tridentata*). Many of the curleaf mountain mahogany are large highlined trees that have experience heavy use (Table - Browse Characteristics).

Herbaceous Understory: Grasses on the site are diverse and abundant. Salina wildrye (*Elymus salina*) is the dominant grass species with other native perennial species such as mutton bluegrass (*Poa fendleriana*), pinewoods needlegrass (*Stipa pinetorum*), and bluebunch wheatgrass (*Agropyron spicatum*) being common. Introduced species such as smooth brome (*Bromus inermis*) occur primarily on the terraced areas of the bench. Forbs are also diverse and abundant; however, most species provide little forage due to their low growing growth form. Some of the most common forbs include mat penstemon (*Penstemon caespitosus*), sulfur eriogonum (*Eriogonum umbellatum*), and desert phlox (*Phlox austromontana*) (Table - Herbaceous Trends).

Soil: The soil is a moderately deep, clay loam with a slightly alkaline pH. Phosphorus has limited availability for plant growth and development at 2.9 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). A large gully by the site is vegetated and stable. Bare ground cover is moderately low due to good litter and vegetation cover (Table - Basic Cover). The contour trenches also remain effective in slowing erosion. The soil erosion condition was classified as stable in 2009.

Trend Assessments

Browse:

- **1988 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 a decrease in the decadence of mountain big sagebrush and serviceberry, but other measurements have remained similar.
- **1994 to 1999 - stable (0):** Serviceberry density decreased by 21% and mountain big sagebrush density decreased by 10%, though the density of true mountain mahogany increased by 78%. Cover of true mountain mahogany also increased from 1% to 3%. The populations of all three species remain healthy with low decadence, good vigor, and good recruitment of young plants.

- **1999 to 2004 – slightly up (0):** Density of mountain big sagebrush increased by 27%, but the density of serviceberry decreased by 24%. Cover of mountain big sagebrush decreased from 10% to 7% and decadence increased from 16% to 22%.
- **2004 to 2009 - up (+2):** There was a large increase in the density and cover of black sagebrush, as well as a substantial increase in the density of serviceberry and mountain big sagebrush. All preferred browse populations show good signs of health, though decadence of mountain big sagebrush has moderate decadence at 25%.

Grass:

- **1988 to 1994 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial grasses with a mutton bluegrass decreasing significantly in nested frequency.
- **1994 to 1999 - stable (0):** The sum of nested frequency and cover of perennial grasses increased slightly, but not substantially. Mutton bluegrass decreased significantly in nested frequency again.
- **1999 to 2004 - slightly down (-1):** Perennial grass sum of nested frequency decreased by 16%, but cover remained similar. Western wheatgrass (*Agropyron smithii*) was sampled for the first time in 2004, but mutton bluegrass decreased significantly in nested frequency again.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 18%, though cover decreased to 9%. Mutton bluegrass increased significantly in nested frequency.

Forb:

- **1988 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased by 37% with a significant decrease in the nested frequency of lupine (*Lupinus sp.*), looseflower milkvetch (*Astragalus tenellus*), and Eaton fleabane (*Erigeron eatonii*).
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased 14% and cover increased to 10%. Hoary aster (*Machaeranthera canescens*) increased significantly in nested frequency, but looseflower milkvetch decreased significantly and is no longer sampled.
- **1999 to 2004 - down (-2):** Perennial forb sum of nested frequency decreased by 29% and cover decreased to 6%.
- **2004 to 2009 - up (+2):** There was a 28% increase in the sum of nested frequency of perennial forbs and cover increased to 7%.

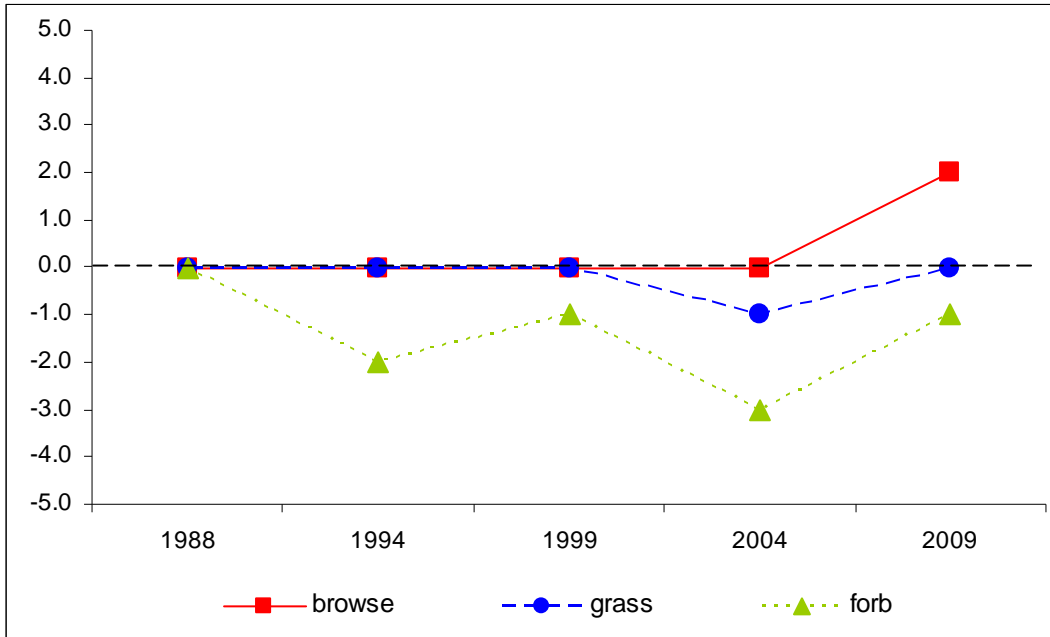
DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --

Management unit 16C, study no: 19

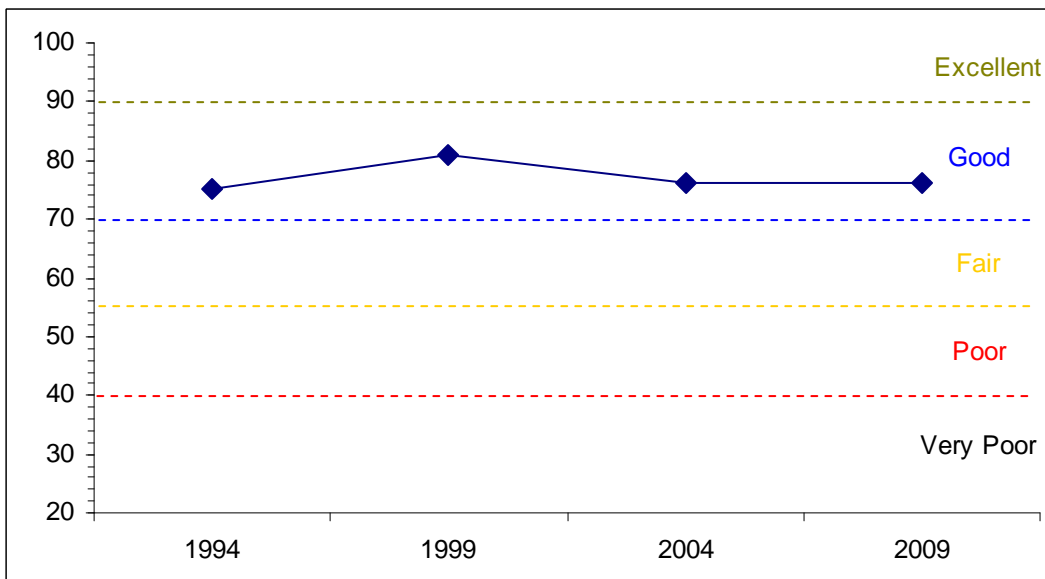
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	25.1	9.7	11.1	19.3	0.0	10.0	0.0	75.1	Good
99	23.7	11.7	15.0	20.5	0.0	10.0	0.0	80.8	Good
04	20.1	11.1	15.0	20.0	0.0	10.0	0.0	76.1	Good
09	22.9	11.2	15.0	17.1	0.0	10.0	0.0	76.1	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 19



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL
Management unit 16C, Study no: 19



HERBACEOUS TRENDS--

Management unit 16C, Study no: 19

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	-	-	2	-	-	-	.15	-	-
G	Agropyron intermedium	7	1	4	-	5	.00	.01	.00	.04
G	Agropyron smithii	a-	a1	a-	b37	b35	.03	-	.43	.20
G	Agropyron spicatum	61	60	84	70	51	1.59	1.99	2.61	.95
G	Bromus inermis	32	26	38	35	43	.46	.91	.79	.97
G	Carex sp.	-	1	2	1	-	.00	.03	.00	-
G	Elymus salina	a79	ab78	bc127	abc93	c129	1.92	3.73	3.65	4.42
G	Oryzopsis hymenoides	-	13	2	5	1	.59	.38	.18	.03
G	Poa fendleriana	d173	c134	b77	a31	b76	4.10	2.00	.86	1.21
G	Sitanion hystrix	-	5	7	-	-	.01	.06	-	-
G	Stipa comata	-	-	4	8	2	-	.03	.12	.00
G	Stipa pinetorum	a60	b63	b53	b55	ab53	.89	.92	1.34	.70
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		412	382	400	335	395	9.63	10.23	10.01	8.55
Total for Grasses		412	382	400	335	395	9.63	10.23	10.01	8.55
F	Androsace septentrionalis (a)	-	a-	a3	b15	a-	-	.00	.54	-
F	Antennaria parvifolia	b25	b12	b10	a-	b32	.29	.36	-	.50
F	Arabis sp.	b12	a-	a-	a-	a-	-	-	-	-
F	Arenaria sp.	-	-	-	1	-	-	-	.00	-
F	Aster sp.	b43	ab23	ab26	a-	a6	.09	.31	-	.03
F	Astragalus calycosus	-	1	6	-	-	.00	.22	-	-
F	Astragalus convallarius	-	6	-	3	5	.01	-	.01	.06
F	Astragalus miser	-	-	-	8	3	-	-	.42	.03
F	Astragalus tenellus	c25	b12	a-	a-	-	.22	-	-	-
F	Calochortus nuttallii	7	-	-	-	1	-	-	-	.00
F	Castilleja linariaefolia	ab11	ab7	b17	ab5	a1	.16	.35	.02	.00
F	Cirsium sp.	6	3	2	-	-	.03	.15	-	-
F	Comandra pallida	34	28	41	20	23	.13	.44	.15	.16
F	Crepis acuminata	4	-	-	2	-	-	-	.03	-
F	Erigeron eatonii	b52	a2	a8	a-	a3	.00	.01	-	.00
F	Erigeron pumilus	-	-	-	-	3	-	-	-	.00
F	Eriogonum alatum	-	1	2	3	7	.01	.03	.03	.22
F	Eriogonum racemosum	-	-	-	-	1	-	-	-	.00
F	Eriogonum umbellatum	a17	ab41	ab43	ab24	b45	.77	1.75	.60	1.37
F	Hedysarum boreale	3	-	6	-	-	-	.09	-	-
F	Hymenoxys acaulis	10	5	4	1	8	.06	.06	.00	.09
F	Ipomopsis aggregata	-	-	6	-	-	-	.04	-	-
F	Lesquerella sp.	ab7	a2	a4	b12	a-	.01	.03	.26	-
F	Lupinus sp.	b50	a-	a-	a-	a-	-	-	-	-
F	Machaeranthera canescens	ab10	a7	c40	abc24	bc33	.06	.83	.54	.17
F	Machaeranthera grindelioides	-	4	-	12	17	.06	-	.27	.28
F	Orthocarpus sp. (a)	-	-	2	-	-	-	.15	-	-
F	Pedicularis centranthera	a-	a-	b12	c24	a-	-	.15	.21	-

T y P e	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
F	Penstemon caespitosus	131	143	126	91	98	3.50	4.37	1.35	2.20
F	Penstemon sp.	b41	a6	a-	a-	a-	.06	-	-	-
F	Penstemon watsonii	ab4	a-	ab7	b13	b19	-	.03	.25	.26
F	Phlox austromontana	b116	a80	a63	a63	ab86	1.06	.97	1.24	1.27
F	Potentilla gracilis	a-	b16	b26	b12	b19	.06	.16	.06	.13
F	Schoenrambe linifolia	-	-	-	-	1	-	-	-	.00
F	Senecio multilobatus	b15	a1	ab6	ab4	a2	.00	.07	.03	.00
F	Taraxacum officinale	4	-	-	-	-	-	-	-	-
F	Unknown forb-perennial	b7	a-	a-	a-	a-	-	-	-	-
F	Zigadenus paniculatus	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	5	15	0	0	0.15	0.54	0
Total for Perennial Forbs		635	400	455	322	413	6.63	10.46	5.52	6.84
Total for Forbs		635	400	460	337	413	6.63	10.61	6.06	6.84

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

BROWSE TRENDS--

Management unit 16C, Study no: 19

T y P e	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	27	22	22	25	3.47	2.79	3.03	3.08
B	Artemisia nova	12	8	5	16	.51	.94	.03	1.45
B	Artemisia tridentata vaseyana	76	65	71	71	10.94	9.55	7.03	7.08
B	Cercocarpus ledifolius	7	8	10	9	1.38	.03	.33	.68
B	Cercocarpus montanus	14	16	16	16	1.13	3.36	2.85	3.34
B	Chrysothamnus depressus	26	27	41	49	1.24	.66	1.54	1.18
B	Chrysothamnus nauseosus	14	1	0	9	.13	.00	-	.03
B	Chrysothamnus viscidiflorus	10	16	3	5	.69	.55	.03	.01
B	Eriogonum microthecum	0	0	0	1	-	.03	-	.00
B	Gutierrezia sarothrae	6	22	44	23	.06	1.13	1.85	.50
B	Juniperus osteosperma	0	0	0	2	-	-	-	.15
B	Opuntia sp.	0	0	2	0	.03	-	.00	-
B	Pinus edulis	0	1	2	1	.03	.15	.41	.38
B	Purshia tridentata	1	3	1	3	.15	.30	.00	.06
B	Sambucus cerulea	0	0	0	0	-	-	.03	-
B	Symphoricarpos oreophilus	20	30	27	30	1.39	5.60	3.23	2.92
B	Tetradymia canescens	15	10	11	14	.09	.01	.03	.03
Total for Browse		228	229	255	274	21.28	25.14	20.44	20.93

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 19

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	5.33	3.20
Artemisia nova	-	.31	.93
Artemisia tridentata vaseyana	-	8.39	8.76
Cercocarpus ledifolius	1.60	.56	.45
Cercocarpus montanus	-	2.66	3.53
Chrysothamnus depressus	-	1.53	1.01
Chrysothamnus nauseosus	-	-	.40
Gutierrezia sarothrae	-	1.51	.25
Pinus edulis	-	.26	.10
Purshia tridentata	-	.18	.21
Symphoricarpos oreophilus	-	4.81	3.91
Tetradymia canescens	-	.15	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 19

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	5.0	3.2
Artemisia tridentata vaseyana	2.3	1.1
Cercocarpus ledifolius	6.8	3.2
Cercocarpus montanus	8.3	3.2
Purshia tridentata	6.8	-

BASIC COVER--

Management unit 16C, Study no: 19

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	9.00	34.87	40.61	35.56	36.46
Rock	0	3.90	6.11	5.07	3.29
Pavement	2.25	1.14	3.62	2.82	4.72
Litter	59.00	38.39	37.47	38.21	39.77
Cryptogams	1.00	.27	.31	.48	.04
Bare Ground	28.75	28.70	23.38	38.52	27.11

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 19, Study Name: Trial Mountain Enclosure

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.9	7.6	38.7	27.4	33.8	3	2.9	131.2	0.5

PELLET GROUP DATA--

Management unit 16C, Study no: 19

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	16	10	9	29
Elk	12	20	30	48
Deer	17	7	6	4
Cattle	1	1	4	10

Days use per acre (ha)		
'99	'04	'09
-	-	-
44 (109)	53 (131)	54 (134)
15 (37)	2 (5)	-
8 (20)	12 (29)	49 (120)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 19

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
88	399	83	0	17	133	67	0	17	-/-
94	960	48	48	4	20	10	4	4	27/29
99	760	24	66	11	20	42	21	11	38/44
04	580	21	72	7	-	31	59	0	27/32
09	820	41	56	2	140	46	32	12	33/37
<i>Artemisia nova</i>									
88	0	0	0	0	-	0	0	0	-/-
94	540	0	44	56	-	19	4	22	11/20
99	420	10	81	10	-	57	0	10	9/19
04	340	29	71	0	-	0	0	0	10/38
09	1680	33	62	5	-	30	0	4	9/16
<i>Artemisia tridentata vaseyana</i>									
88	4531	10	40	50	733	43	4	0	22/28
94	3380	13	61	26	-	3	1	7	19/26
99	3040	27	57	16	440	24	9	7	22/27
04	3880	29	49	22	380	52	19	9	16/25
09	4260	23	53	25	820	32	25	13	16/25
<i>Ceratoides lanata</i>									
88	265	25	25	50	-	0	0	0	3/3
94	0	0	0	0	-	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	-/-
<i>Cercocarpus ledifolius</i>									
88	0	0	0	0	-	0	0	0	-/-
94	140	29	71	0	-	43	0	0	20/21
99	180	78	22	0	-	56	0	0	26/27
04	200	40	60	0	-	20	60	0	17/16
09	180	22	56	22	-	22	56	11	44/52

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Cercocarpus montanus										
88	0	0	0	0	-	0	0	0	-/-	
94	380	26	68	5	-	21	37	5	24/29	
99	680	12	88	0	-	41	59	0	22/32	
04	620	13	81	6	-	3	97	3	30/30	
09	720	33	67	0	-	6	94	0	25/34	
Chrysothamnus depressus										
88	3598	6	85	9	-	30	2	0	4/9	
94	2120	3	96	1	-	25	0	.94	3/7	
99	1360	0	99	1	60	19	68	1	2/7	
04	4400	0	99	1	-	23	63	.45	5/9	
09	4120	2	88	9	20	1	.48	16	3/8	
Chrysothamnus nauseosus										
88	0	0	0	0	-	0	0	0	-/-	
94	460	4	87	9	-	4	0	9	6/9	
99	40	100	0	0	-	0	0	0	10/15	
04	0	0	0	0	-	0	0	0	8/11	
09	500	8	84	8	-	48	20	0	5/8	
Chrysothamnus viscidiflorus										
88	533	0	100	0	-	0	0	0	6/7	
94	300	0	87	13	-	0	13	13	5/9	
99	940	9	91	0	20	2	0	0	6/7	
04	80	0	100	0	-	0	0	0	6/9	
09	160	13	88	0	-	13	0	0	6/8	
Cowania mexicana stansburiana										
88	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	32/40	
09	0	0	0	-	-	0	0	0	-/-	
Eriogonum microthecum										
88	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	100	0	-	-	0	0	0	-/-	
Gutierrezia sarothrae										
88	0	0	0	0	-	0	0	0	-/-	
94	160	0	100	0	-	0	0	0	5/6	
99	1240	11	89	0	20	0	0	0	6/8	
04	5280	28	72	0	20	0	0	0	7/8	
09	1580	1	96	3	-	0	0	4	6/6	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Juniperus osteosperma										
88	66	0	100	-	-	0	0	0	69/72	
94	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	60	100	0	-	-	0	0	0	-/-	
Leptodactylon pungens										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	5/4	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
Mahonia repens										
88	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	0/9	
Opuntia sp.										
88	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	4/12	
09	0	0	0	-	-	0	0	0	-/-	
Pinus edulis										
88	0	0	0	-	66	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	20	100	0	-	60	0	0	0	-/-	
04	40	100	0	-	-	0	0	0	-/-	
09	20	100	0	-	-	0	0	0	-/-	
Purshia tridentata										
88	0	0	0	-	-	0	0	0	-/-	
94	20	0	100	-	-	0	0	0	9/32	
99	80	25	75	-	-	0	75	0	7/15	
04	80	0	100	-	-	0	0	0	14/44	
09	160	25	75	-	-	63	0	0	12/35	
Sambucus cerulea										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	24/33	
99	0	0	0	-	-	0	0	0	32/31	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	34/33	

		Age class distribution					Utilization		
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
<i>Symphoricarpos oreophilus</i>									
88	0	0	0	0	66	0	0	0	-/-
94	760	34	66	0	-	3	0	0	13/25
99	1220	25	72	3	60	7	0	0	14/28
04	920	9	89	2	-	20	0	0	10/22
09	2440	11	87	2	20	38	18	.81	13/23
<i>Tetradymia canescens</i>									
88	199	33	67	0	-	33	0	0	12/7
94	440	14	68	18	-	23	14	0	5/8
99	360	0	72	28	-	56	0	11	6/9
04	320	13	81	6	-	13	6	6	9/10
09	380	16	42	42	380	16	26	26	6/7

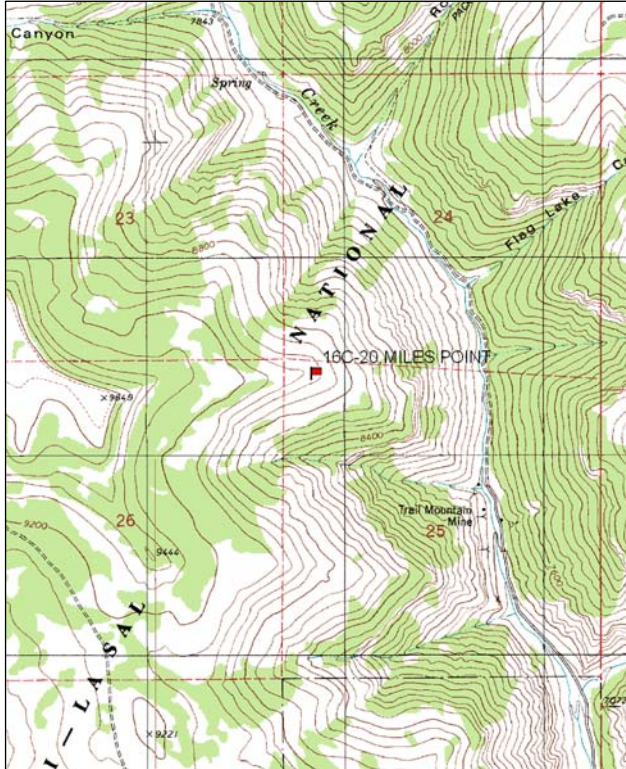
MILES POINT - TREND STUDY NO. 16C-20-09

Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,800 ft (2,682 m)
Aspect: Southeast
Slope: 30%-35%
Transect bearing: 112 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

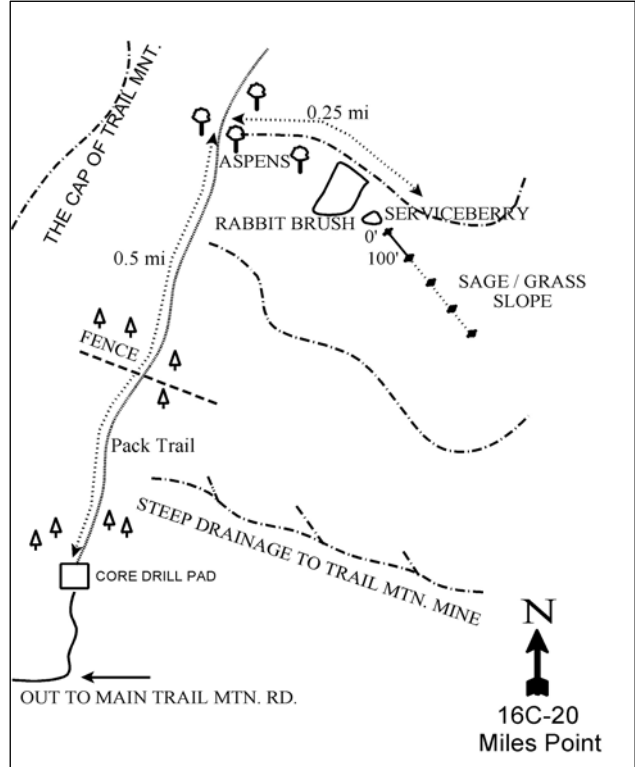
From the pass at the top of the Cottonwood Canyon Road (10.15 miles from Straight Canyon), take the Trail Mountain road southeast for approximately 9.5 miles to the south end of the Cap of Trail Mountain. The study site is to the NE, on the other side of this high cap. A new road takes off to the east from the main road just past the southern point of the cap. Follow this road for 0.65 miles and stop before you enter the thick timber. From here, a pack trail takes off to the north along the edge of Trail Mountain. Follow this trail for about 1/2 miles to an open ridge. Turn east and hike down this ridge to the SE for 1/4 mile. The study is located on a sage-grass slope on the SE side of the ridge. The 0-foot baseline stake, marked by browse tag #9030, is adjacent to a large clump of serviceberry. The area has a view of lower Cottonwood Canyon and the fields in Straight Canyon.

Map Name: Mahogany Point



Township: 17S, Range: 6E, Section: 25

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 482771 E 4352588 N

MILES POINT - TREND STUDY NO. 16C-20

Site Information

Site Description: This study is not actually situated on Miles Point, but on a similar sagebrush/grass point above the Trail Mountain mine in Cottonwood Canyon. The study samples a typical high elevation elk winter range, which mule deer use in the summer. The study is on a moderately steep slope (35%) with a southeast aspect. Nearby aspen (*Populus tremuloides*), curlleaf mountain mahogany (*Cercocarpus ledifolius*), and conifer stands show evidence of elk winter use. The study site is in the Trail Mountain summer cattle allotment, but actually receives little use by cattle. Pellet group data has indicated moderate to heavy use by elk and minimal use by deer since 1999. The estimated cattle use was light in 1999 and 2004, but was more moderate in 2009 (Table - Pellet Group Data).

Browse: The dominant browse on site is mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) which provides the majority of the browse cover (Table - Browse Trends). Sagebrush cover along the baseline is higher near the zero foot stake and decreases as you go downhill towards the 400 foot stake. The mountain big sagebrush population has shifted from predominantly young plants in 1988 to a more mature stand with moderate to high decadence in the other sample years. Decadence was very high at 57% in 2004 which is attributed severe drought conditions prior to the 2004 sample year. Utilization has been mostly moderate over the study. Other common shrubs include dwarf rabbitbrush (*Chrysothamnus depressus*), stickyleaf low rabbitbrush (*C. viscidiflorus* ssp. *viscidiflorus*), and snowberry (*Symphoricarpos oreophilus*). Dwarf rabbitbrush displayed consistent moderate to heavy use from 1988 to 2004, but was lighter in 2009. There are a few scattered Utah serviceberry (*Amelanchier utahensis*) plants that have shown heavy use, but good vigor, since 2004 (Table - Browse Characteristics).

Herbaceous Understory: Grasses are abundant, but not very diverse on the site. Bluebunch wheatgrass (*Agropyron spicatum*) and Salina wildrye (*Elymus salina*) provide nearly all of the herbaceous understory cover. Other grass species are rare. Forbs are rare and produce little cover. Timber poisonvetch (*Astragalus convallarius*) is the most common species (Table - Herbaceous Trends).

Soil: The soil texture is a clay loam with a slightly alkaline pH (Table - Soil Analysis Data). Soil parent material is limestone with rocks common within the profile. The slope of the site is high, but bare ground cover is low due to good herbaceous vegetation, litter, rock, and pavement cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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 mountain big sagebrush population appears to be maturing with a large increase in decadence and a decrease in the recruitment of young plants.
- **1994 to 1999 - slightly up (+1):** There was a 6% increase in the density of sagebrush from 3,600 plants/acre to 3,840 plants/acre and cover increased from 13% to 16%. Decadence of sagebrush decreased from 21% to 14% and recruitment of young sagebrush plants increased from 6% to 9%. The density of dwarf rabbitbrush increased 60% from 920 plants/acre to 1,480 plants/acre.
- **1999 to 2004 - down (-2):** Density of mountain big sagebrush decreased by 45% to 2,120 plants/acre and cover decreased to 9%. Decadence of sagebrush increased to 57% and poor vigor increased from 8% to 25%. Recruitment of young sagebrush plants decreased to 4%.
- **2004 to 2009 - up (+2):** The density of mountain big sagebrush increased 28% to 2,720 plants/acre and cover increased to 12%. Decadence and poor vigor of sagebrush decreased, but remained fairly high at 29% and 20%, respectively. Recruitment of young sagebrush increased to 6%.

Grass:

- **1988 to 1994 - up (+2):** The sum of nested frequency of perennial grasses increased by 26% with a significant increase in the nested frequency of Salina wildrye.
- **1994 to 1999 - stable (0):** There was no change in the sum of nested frequency of perennial grasses, but composition changed with a significant increase in the nested frequency of bluebunch wheatgrass and a significant decrease in Salina wildrye.
- **1999 to 2004 - slightly down (-1):** Perennial grass sum of nested frequency decreased by 12% and cover decreased from 24% to 19%. Bluebunch wheatgrass decreased significantly in nested frequency.
- **2004 to 2009 - stable (0):** There was a 9% increase in the sum of nested frequency of perennial grasses and cover increased to 24%. Salina wildrye increased significantly in nested frequency.

Forb:

- **1988 to 1994 - down (-2):** There was an 88% decrease in the sum of nested frequency of perennial forbs with a significant decrease in the nested frequency of looseflower milkvetch. Forbs are now very rare on the site.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs doubled, but forbs remain rare. Cover of perennial forbs increased to over 1%.
- **1999 to 2004 - slightly down (-1):** Perennial forb sum of nested frequency decreased by 31% and cover decreased to less than 1%. Forbs remain very rare.
- **2004 to 2009 - stable (0):** There was little change in forb sum of nested frequency or cover.

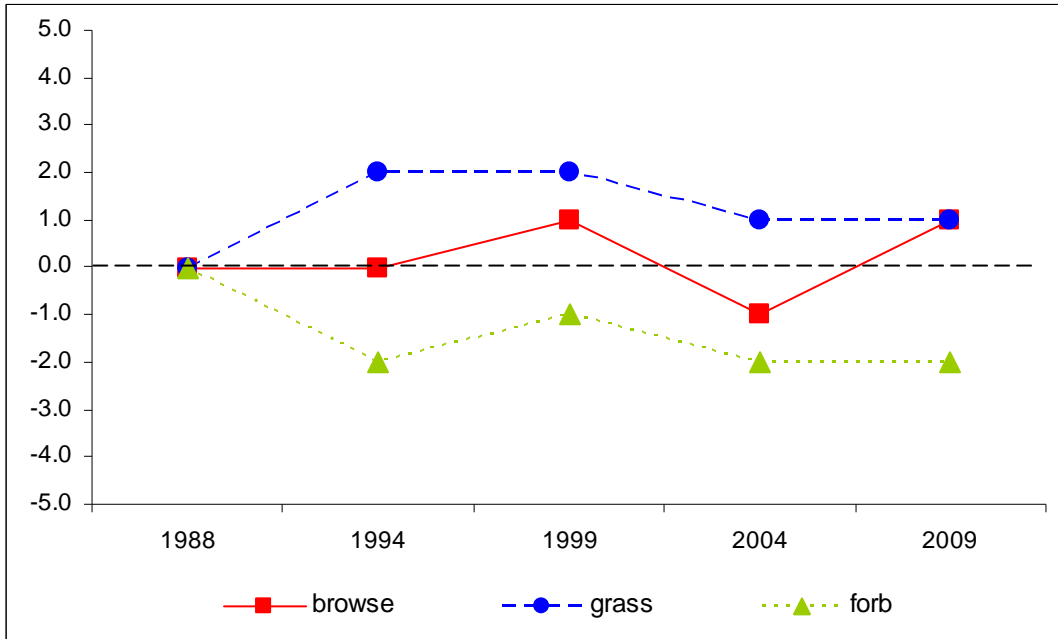
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 20

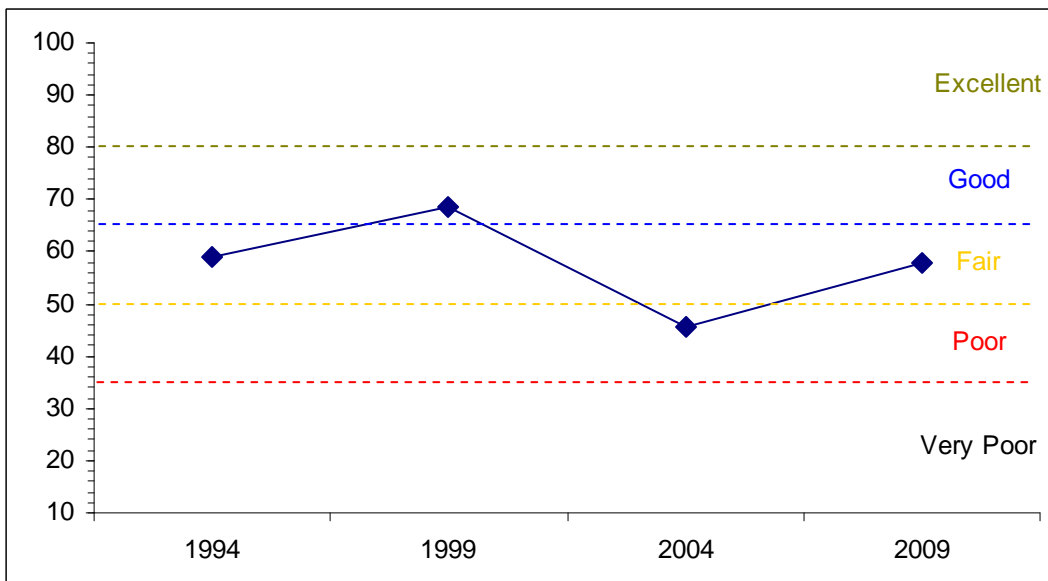
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	17.1	9.0	2.8	30.0	0.0	0.1	0.0	59.0	Fair
99	21.0	10.9	4.3	30.0	0.0	2.3	0.0	68.5	Good
04	12.8	-0.5	2.5	30.0	0.0	0.8	0.0	45.6	Poor
09	17.4	7.0	2.8	30.0	0.0	0.6	0.0	57.7	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 20



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 16C, Study no: 20



HERBACEOUS TRENDS--
Management unit 16C, Study no: 20

T y p e	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron spicatum	a ₂ 12	ab ₂ 34	c ₃ 13	b ₂ 71	b ₂ 49	14.05	19.32	15.14	16.00
G	Elymus salina	ab ₆ 4	c ₁ 23	a ₅ 9	a ₄ 7	bc ₁ 07	8.85	3.98	3.20	7.50
G	Poa fendleriana	7	12	6	9	7	.03	.09	.04	.34
G	Stipa lettermani	21	15	6	13	7	.13	.18	.62	.07
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		304	384	384	340	370	23.06	23.57	19.01	23.91
Total for Grasses		304	384	384	340	370	23.06	23.57	19.01	23.91
F	Androsace septentrionalis (a)	-	-	3	-	-	-	.00	-	-
F	Aster sp.	2	2	-	2	3	.00	-	.01	.01
F	Astragalus convallarius	b ₁ 47	a ₁ 4	a ₂ 9	a ₂ 2	a ₁ 7	.04	.77	.33	.13
F	Astragalus sp.	-	-	3	-	-	-	.03	-	-
F	Calochortus nuttallii	1	2	1	-	-	.00	.01	-	-
F	Castilleja linariaefolia	b ₁ 3	a ₁ -	a ₁ -	a ₁ -	a ₁ -	-	-	-	-
F	Chaenactis douglasii	-	-	5	3	-	-	.03	.00	-
F	Cirsium neomexicanum	4	-	2	-	-	-	.03	-	-
F	Crepis acuminata	7	-	-	-	-	-	-	-	-
F	Cymopterus sp.	-	-	-	3	3	-	-	.00	.00
F	Hedysarum boreale	-	-	2	-	2	-	.15	-	.03
F	Hymenoxys richardsonii	-	-	-	-	2	.00	.00	-	.03
F	Machaeranthera canescens	b ₁ 9	a ₂	ab ₄	ab ₅	ab ₃	.00	.06	.04	.03
F	Penstemon caespitosus	-	-	5	1	3	-	.06	.00	.03
F	Penstemon sp.	-	-	-	-	1	-	-	-	.00
F	Phlox longifolia	3	-	1	-	-	-	.00	-	-
F	Polygonum douglasii (a)	-	-	-	2	-	-	-	.00	-
F	Schoenocrambe linifolia	-	-	-	-	1	-	-	-	.00
F	Tragopogon dubius	4	-	-	-	-	-	-	-	-
F	Unknown forb-perennial	4	3	-	-	-	.00	-	-	-
Total for Annual Forbs		0	0	3	2	0	0	0.00	0.00	0
Total for Perennial Forbs		194	23	52	36	35	0.06	1.15	0.39	0.29
Total for Forbs		194	23	55	38	35	0.06	1.15	0.39	0.29

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

BROWSE TRENDS--

Management unit 16C, Study no: 20

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	2	0	1	3	.00	-	.00	.03
B	Artemisia tridentata vaseyana	86	85	64	70	12.65	15.80	9.22	12.48
B	Ceratoides lanata	0	0	0	0	-	-	-	.63
B	Chrysothamnus depressus	12	20	20	22	.84	.79	.84	.70
B	Chrysothamnus nauseosus	0	0	1	3	-	-	.00	.00
B	Chrysothamnus viscidiflorus viscidiflorus	70	67	62	67	2.86	1.28	3.64	3.01
B	Sambucus cerulea	0	1	1	1	.15	.15	.15	.03
B	Symphoricarpos oreophilus	39	39	30	33	2.54	1.69	1.97	1.44
B	Tetradymia canescens	7	8	10	9	.00	.00	.24	.06
Total for Browse		216	220	189	208	19.06	19.73	16.08	18.40

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 20

Species	Percent Cover	
	'04	'09
Artemisia tridentata vaseyana	8.89	14.41
Chrysothamnus depressus	1.45	.83
Chrysothamnus viscidiflorus viscidiflorus	5.23	4.19
Symphoricarpos oreophilus	1.76	2.78
Tetradymia canescens	.50	.26

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 20

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.9	1.2

BASIC COVER--

Management unit 16C, Study no: 20

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	13.50	44.13	44.77	36.15	42.62
Rock	3.75	7.74	6.75	9.15	2.42
Pavement	3.50	1.18	6.38	5.17	7.67
Litter	58.75	42.52	43.77	33.15	30.37
Cryptogams	0	.03	.18	.96	.15
Bare Ground	20.50	18.95	16.36	34.59	23.18

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 20, Study Name: Miles Point

Effective rooting depth (in)	pH	clay			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.9	7.5	24.7	29.4	45.8	3.1	6	128	0.5

PELLET GROUP DATA--

Management unit 16C, Study no: 20

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	11	10	29	7
Moose	-	-	1	-
Elk	31	24	36	16
Deer	9	2	4	1
Cattle	-	2	1	4

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	-	-
70 (173)	56 (139)	31 (76)
3 (7)	5 (13)	2 (5)
2 (5)	8 (20)	25 (61)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 20

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
88	0	0	0	-	-	0	0	0	-/-
94	40	0	100	-	-	0	0	0	33/40
99	0	0	0	-	-	0	0	0	36/20
04	20	0	100	-	-	0	100	0	31/36
09	80	50	50	-	-	25	50	0	29/36
<i>Artemisia tridentata vaseyana</i>									
88	2798	67	26	7	66	33	7	0	22/32
94	3600	6	73	21	-	19	.55	7	21/33
99	3840	9	77	14	100	32	1	8	22/32
04	2120	4	40	57	60	55	25	25	17/27
09	2720	6	65	29	60	35	12	20	17/29
<i>Chrysothamnus depressus</i>									
88	4731	6	80	14	-	42	17	3	3/7
94	920	0	91	9	20	20	22	0	4/8
99	1480	3	91	7	-	18	34	4	4/7
04	2000	0	96	4	-	34	43	0	4/10
09	1460	1	88	11	-	11	4	19	4/9
<i>Chrysothamnus nauseosus</i>									
88	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	19/19
09	60	0	100	-	-	0	0	0	20/25
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
88	5665	26	74	0	-	0	0	0	10/12
94	4780	1	97	2	-	.83	0	.83	10/16
99	4100	9	83	8	100	15	0	2	12/15
04	4040	0	98	2	-	7	5	1	9/14
09	4580	5	81	14	20	2	0	40	7/14

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Sambucus cerulea										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	26/30	
99	20	0	100	-	-	0	0	0	22/24	
04	20	100	0	-	-	0	0	0	31/22	
09	20	0	100	-	-	0	0	0	22/15	
Symphoricarpos oreophilus										
88	1798	67	33	0	199	41	30	4	13/33	
94	1600	4	93	4	-	0	8	1	11/32	
99	1720	16	79	5	20	26	0	2	11/23	
04	1320	3	97	0	-	2	2	0	10/23	
09	2160	22	76	2	60	2	14	19	10/24	
Tetradymia canescens										
88	332	20	80	0	-	40	20	0	7/10	
94	180	0	89	11	-	0	0	0	9/9	
99	320	6	94	0	-	31	0	0	8/9	
04	320	0	94	6	-	63	0	0	9/13	
09	380	5	42	53	-	5	37	11	6/12	

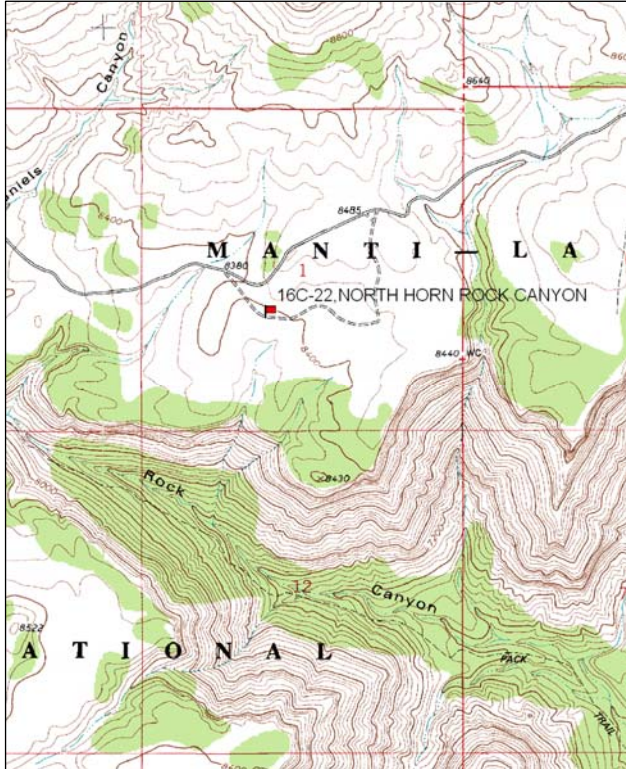
NORTH HORN-ROCK CANYON - TREND STUDY NO. 16C-22-09

Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,400 ft (2,560 m)
Aspect: Southwest
Slope: 3%-5%
Transect bearing: 173 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

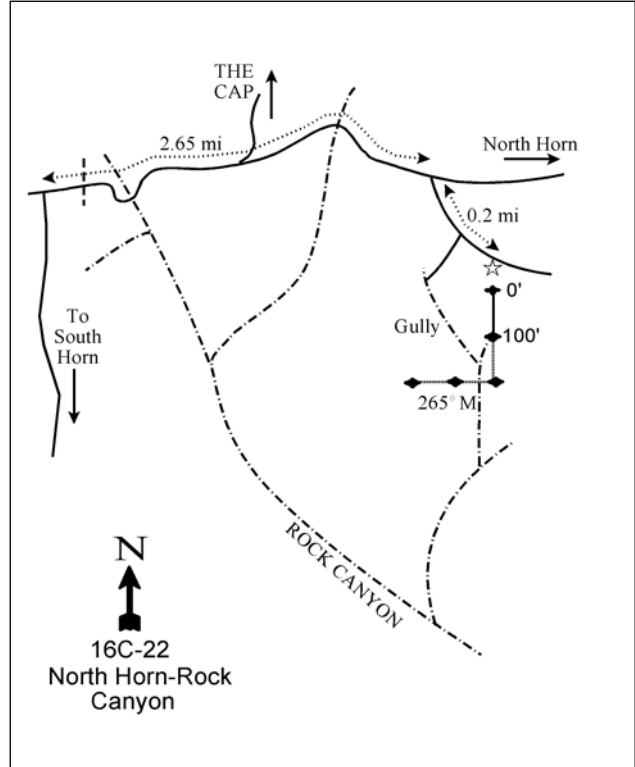
From the intersection of the North Horn and South Horn roads, continue on the graded North Horn road. Go 0.8 miles and cross the upper end of Rock Canyon. Continue on main road 1.85 miles to a small fork. Bear right onto the dirt road (#130), and proceed 0.2 miles to a witness post on the right hand side of the road. The frequency baseline starts 40 feet south of the tall witness post. The 0-foot baseline stake is marked by a red browse tag #9008.

Map Name: The Cap,



Township: 19S, Range: 6E, Section: 1

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 482765 E 4338465 N

NORTH HORN-ROCK CANYON - TREND STUDY NO. 16C-22

Site Information

Site Description: The study is located in a small basin at the head of Rock Canyon. The Rock Canyon drainage is a migration route from the high elevation range on North Horn and South Horn mountains down to the pinyon-juniper and desert shrub winter range. The study site is a sagebrush/grass community containing a mixture of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*Artemisia nova*) with scattered mountain brush on the hillsides. Ponderosa pine (*Pinus ponderosa*), pinyon pine (*P. edulis*), and Utah juniper (*Juniperus osteosperma*) trees are found in the drainages and along the canyon edge. The small basin has never been terraced or seeded. Pellet group data estimated light elk use in 1999 and moderately heavy use in 2004 and 2009. Estimated deer use has been moderate and estimated cattle use has been light since 1999 (Table - Pellet Group Data).

Browse: A mixture of mountain big sagebrush and black sagebrush provides most of the forage on this site. Some individuals were difficult to identify and are most likely hybrids. Black sagebrush is more numerous than mountain big sagebrush and provides the bulk of the browse cover on the site (Table - Browse Trends). The mountain big sagebrush plants are typically smaller in stature and are not much larger than the black sagebrush plants on average. Both sagebrush species have moderately high decadence, though mountain big sagebrush typically displays higher decadence than black sagebrush. There has been heavier use of mountain big sagebrush than black sagebrush, but in 2009 black sagebrush also showed a lot of heavy use. The site also supports two species of rabbitbrush, dwarf (*Chrysothamnus depressus*), and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*). All of the rabbitbrush was called dwarf rabbitbrush in 1988 and 1994, but most of the rabbitbrush is actually stickyleaf low rabbitbrush. Other palatable browse species include Utah serviceberry (*Amelanchier utahensis*) and antelope bitterbrush (*Purshia tridentata*), although these species occur infrequently (Table - Browse Characteristics).

Herbaceous Understory: Grasses are diverse and fairly abundant on the site. Western wheatgrass (*Agropyron smithii*), mutton bluegrass (*Poa fendleriana*), and blue grama (*Bouteloua gracilis*) are the dominant grass species on this site. Salina wildrye (*Elymus salina*) was sampled for the first time in 1999 and has become one of the dominant species, as well. Forbs are diverse, but most are low-growing and do not provide much forage due to their low abundance (Table - Herbaceous Trends).

Soil: The soil is a sandy clay loam with a neutral pH. Phosphorus has a limited availability for plant growth and development at 5.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is fairly abundant, especially in the shrub interspaces. Much of the protective ground cover is provided by the moderately high pavement cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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. Decadence of mountain big sagebrush increased from 32% to 46%, but decadence of black sagebrush decreased from 37% to 24%. Recruitment of young plants decreased in both sagebrush species populations.
- **1994 to 1999 - stable (0):** There was a 14% decrease in the density of mountain big sagebrush, though black sagebrush had an 8% increase in density. Cover increased slightly for both species, but decadence remained high and recruitment was low.
- **1999 to 2004 - slightly down (-1):** Density of black sagebrush decreased 13% from 5,580 plants/acre to 4,840 plants/acre, and density of mountain big sagebrush decreased 19% from 2,520 plants/acre to

2,040 plants/acre. Decadence is still high in both species and recruitment of young plants remains low.

- **2004 to 2009 - slightly up (+1):** Density of black sagebrush increased 11% to 5,420 plants/acre and density of mountain big sagebrush increased 22% to 2,500 plants/acre. Recruitment of young plants increased to 11% of the population in black sagebrush and 18% in mountain big sagebrush.

Grass:

- **1988 to 1994 - slightly down (-1):** Perennial grass sum of nested frequency decreased by 12% due to significant decrease in the nested frequency of bottlebrush squirreltail (*Sitanion hystrix*) and needle-and-thread (*Stipa comata*).
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial grasses increased 16% and cover increased from 7% to 11%. There was a significant increase in the nested frequency of bottlebrush squirreltail and Salina wildrye was sampled for the first time in 1999.
- **1999 to 2004 - slightly down (-1):** There was a 12% decrease in the sum of nested frequency, though there was little change in cover. Western wheatgrass has had a significant decrease in nested frequency since 1994.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, but cover decreased to 10%. Bottlebrush squirreltail decreased significantly in nested frequency.

Forb:

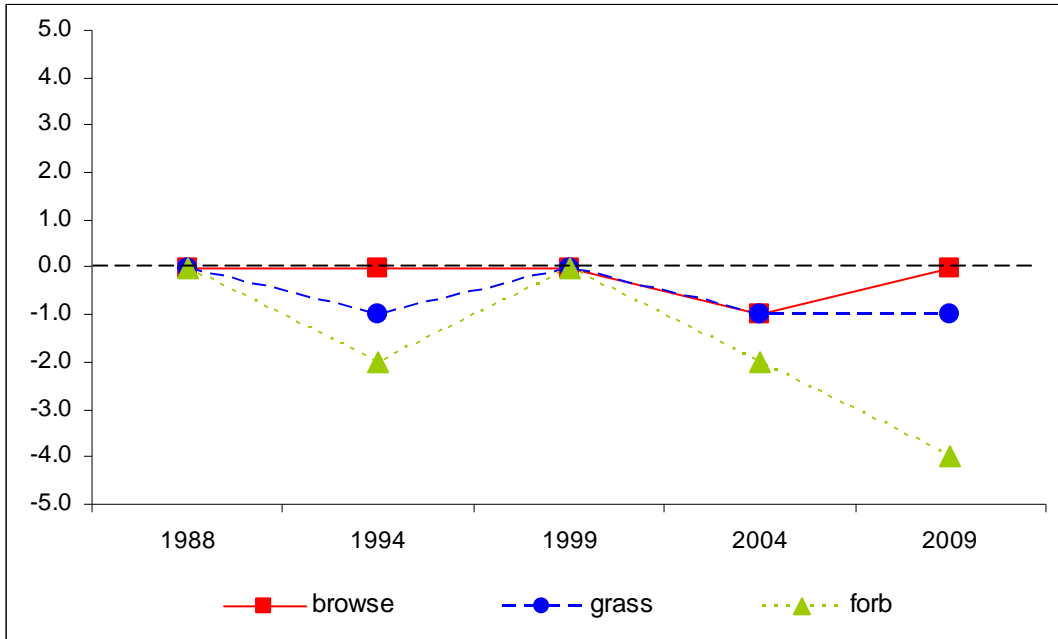
- **1988 to 1994 - down (-2):** Perennial forb sum of nested frequency decreased by 52% with a significant decrease in the nested frequency of some of the more palatable forbs including Wyoming painted-cup (*Castilleja linariaefolia*) and tapertip hawksbeard (*Crepis acuminata*).
- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial forbs doubled and returned to 1988 levels. Cover of perennial forbs increased to near 2%. There was a significant increase in the nested frequency of lobeleaf groundsel (*Senecio multilobatus*).
- **1999 to 2004 - down (-2):** Perennial forb sum of nested frequency decreased 35%, though cover remained similar.
- **2004 to 2009 - down (-2):** There was a 64% decrease in the sum of nested frequency of perennial forbs and cover decreased to less than 1%. Forbs are very rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 16C, study no: 22

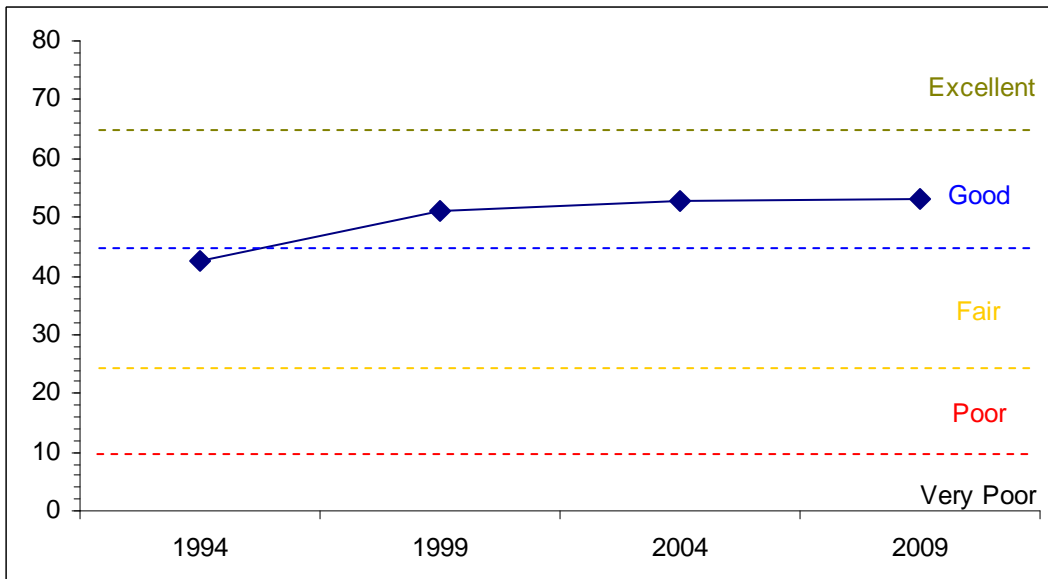
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	18.9	7.8	0.6	14.4	0.0	1.0	0.0	42.7	Fair
99	17.4	6.3	1.4	22.8	0.0	3.4	0.0	51.2	Good
04	20.8	5.1	2.1	22.1	0.0	2.8	0.0	52.9	Good
09	20.2	5.8	6.4	19.6	0.0	1.3	0.0	53.1	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 22



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 16C, Study no: 22



HERBACEOUS TRENDS--
Management unit 16C, Study no: 22

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	b206	b217	ab173	a135	a136	4.14	3.12	2.78	1.35
G	Agropyron spicatum	-	-	-	4	-	-	-	.21	-
G	Bouteloua gracilis	66	93	90	98	86	1.56	2.65	3.67	2.87
G	Elymus salina	-	-	74	52	80	-	1.41	1.04	2.61
G	Oryzopsis hymenoides	-	5	5	11	5	.07	.16	.61	.18
G	Poa fendleriana	a89	ab109	b131	ab100	ab100	1.37	3.34	2.25	1.67
G	Poa secunda	-	4	3	4	11	.03	.00	.01	.09
G	Sitanion hystrix	c85	a3	b27	b26	a-	.00	.67	.29	-
G	Stipa comata	b47	a1	a-	ab14	ab15	.00	.00	.16	1.00
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		493	432	503	444	433	7.19	11.38	11.05	9.79
Total for Grasses		493	432	503	444	433	7.19	11.38	11.05	9.79
F	Allium sp.	3	-	-	-	-	-	-	-	-
F	Androsace septentrionalis (a)	-	-	4	-	-	-	.03	-	-
F	Antennaria sp.	-	1	-	-	-	.03	-	-	-
F	Arabis sp.	1	1	-	-	-	.00	-	-	-
F	Astragalus convallarius	-	2	-	-	-	.00	-	-	-
F	Astragalus sp.	-	3	2	-	-	.00	.03	-	-
F	Castilleja linariaefolia	b36	a4	a3	a-	a-	.03	.00	-	-
F	Chaenactis douglasii	b19	a-	b18	a-	a-	-	.16	-	-
F	Chenopodium leptophyllum(a)	-	-	-	1	-	-	-	.00	-
F	Crepis acuminata	b22	a-	ab6	ab8	a3	-	.10	.13	.03
F	Cryptantha sp.	-	2	-	4	-	.00	-	.16	-
F	Erigeron eatonii	ab7	bc24	c26	a-	a2	.13	.16	.00	.00
F	Erigeron pumilus	7	4	3	4	5	.01	.01	.03	.01
F	Eriogonum alatum	-	-	1	-	2	-	.00	-	.03
F	Eriogonum racemosum	14	13	23	23	10	.04	.29	.23	.19
F	Eriogonum umbellatum	-	-	2	2	1	-	.03	.15	.15
F	Gayophytum ramosissimum(a)	-	-	-	17	-	-	-	.04	-
F	Haplopappus acaulis	a4	b12	a-	a1	a2	.18	-	.03	.03
F	Hymenoxys acaulis	-	-	-	5	-	-	-	.06	-
F	Ipomopsis aggregata	a-	a-	b12	a-	a-	-	.03	-	-
F	Lappula occidentalis (a)	-	-	-	8	-	-	-	.01	-
F	Lupinus argenteus	-	-	7	5	-	-	.06	.03	-
F	Machaeranthera canescens	b31	ab11	ab16	a3	a3	.02	.09	.03	.01
F	Penstemon sp.	-	1	-	-	-	.01	-	-	-
F	Penstemon watsonii	2	7	6	8	3	.02	.05	.09	.06
F	Phlox austromontana	b18	a3	ab11	ab11	ab10	.01	.39	.07	.10
F	Phlox longifolia	-	-	-	5	3	-	-	.01	.00
F	Polygonum douglasii (a)	-	a-	a-	b18	a-	-	-	.03	-
F	Senecio multilobatus	ab29	a6	b49	b41	a-	.01	.24	.32	-
F	Sphaeralcea coccinea	1	-	-	-	-	-	-	-	-
F	Trifolium sp.	-	-	1	3	-	-	.00	.03	-

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
F	Unknown forb-perennial	1	-	2	-	-	-	.00	-	-
	Total for Annual Forbs	0	0	4	44	0	0	0.03	0.10	0
	Total for Perennial Forbs	195	94	188	123	44	0.52	1.69	1.41	0.64
	Total for Forbs	195	94	192	167	44	0.52	1.72	1.51	0.64

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

BROWSE TRENDS--

Management unit 16C, Study no: 22

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	0	2	1	2	-	.03	.15	.15
B	Artemisia nova	74	76	73	72	7.72	8.48	9.07	8.65
B	Artemisia tridentata vaseyana	71	58	57	56	3.87	4.39	5.97	5.15
B	Chrysothamnus depressus	85	41	38	48	3.50	.64	.79	1.65
B	Chrysothamnus viscidiflorus viscidiflorus	0	81	89	85	-	5.10	5.85	4.23
B	Eriogonum microthecum	0	0	0	1	-	-	-	.00
B	Gutierrezia sarothrae	22	34	23	31	.16	.52	.22	.36
B	Pediocactus simpsonii	1	3	2	4	.03	.03	.00	.00
B	Pinus edulis	0	2	2	2	-	.00	.00	.03
B	Purshia tridentata	0	5	4	5	-	.30	.53	.41
B	Symphoricarpos oreophilus	0	1	1	0	-	.00	.00	.00
	Total for Browse	253	303	290	306	15.29	19.51	22.60	20.65

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 22

Species	Percent Cover	
	'04	'09
Artemisia nova	10.08	8.64
Artemisia tridentata vaseyana	5.78	6.28
Chrysothamnus depressus	.71	1.91
Chrysothamnus viscidiflorus viscidiflorus	6.34	3.43
Gutierrezia sarothrae	1.50	.26
Pinus edulis	.08	.21
Purshia tridentata	.95	1.08

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 22

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	1.0	0.6
Artemisia tridentata vaseyana	2.0	0.8
Purshia tridentata	3.6	1.7

BASIC COVER--

Management unit 16C, Study no: 22

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	6.25	23.82	32.56	35.23	34.97
Rock	.25	5.92	2.12	3.84	.94
Pavement	12.25	2.67	11.30	8.62	10.61
Litter	45.00	20.31	16.80	21.46	27.06
Cryptogams	1.50	2.53	4.10	2.96	1.32
Bare Ground	34.75	40.54	35.50	43.04	35.65

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 22, Study Name: North Horn - Rock Canyon

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.3	7.2	60.4	17.8	21.8	1.7	5.5	73.6	0.6

PELLET GROUP DATA--

Management unit 16C, Study no: 22

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	28	18	18	44	-	-	-
Elk	23	12	48	33	13 (32)	66 (164)	46 (114)
Deer	16	12	4	15	29 (72)	38 (94)	34 (84)
Cattle	-	3	2	6	15 (37)	9 (23)	13 (32)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 22

		Age class distribution					Utilization		
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
88	532	37	63	0	-	50	25	0	19/12
94	0	0	0	0	-	0	0	0	14/14
99	40	0	50	50	-	0	100	50	24/40
04	20	0	100	0	-	0	100	0	12/16
09	60	0	100	0	-	67	0	0	33/38
Artemisia nova									
88	11265	8	55	37	399	6	.59	12	7/11
94	5160	0	76	24	40	16	2	4	9/19
99	5580	2	76	22	20	25	11	6	7/17
04	4840	6	61	33	13340	18	.41	20	7/19
09	5420	11	56	33	5280	12	41	9	7/18

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Artemisia tridentata vaseyana</i>										
88	5131	17	51	32	466	21	12	8	10/15	
94	2940	1	52	46	20	31	2	14	9/20	
99	2520	4	48	48	20	35	21	19	11/24	
04	2040	2	58	40	5380	56	29	16	12/27	
09	2500	18	43	39	1420	24	42	15	11/26	
<i>Chrysothamnus depressus</i>										
88	6331	14	77	9	599	18	3	4	3/6	
94	6900	4	96	0	-	12	3	0	3/8	
99	1320	6	88	6	-	33	33	2	3/7	
04	1240	2	89	10	-	16	15	3	4/9	
09	3140	8	89	4	-	0	0	5	3/9	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	0	0	0	0	-	0	0	0	-/-	
99	7700	5	89	6	-	0	0	0	5/11	
04	9340	6	93	1	80	.21	0	.64	5/11	
09	7060	4	94	2	360	0	1	4	4/12	
<i>Eriogonum microthecum</i>										
88	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	120	0	100	-	-	0	0	0	-/-	
<i>Gutierrezia sarothrae</i>										
88	399	33	67	-	-	0	0	0	6/7	
94	960	10	90	-	-	0	0	0	4/23	
99	2020	3	97	-	-	0	0	0	6/8	
04	1040	4	96	-	-	0	0	0	6/8	
09	1580	0	100	-	-	0	0	0	5/6	
<i>Pediocactus simpsonii</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	20	0	100	-	-	0	0	0	2/2	
99	80	0	100	-	-	0	0	0	3/4	
04	40	0	100	-	-	0	0	0	2/4	
09	100	20	80	-	-	0	0	0	3/5	
<i>Pinus edulis</i>										
88	0	0	0	-	66	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	40	100	0	-	-	0	0	0	-/-	
04	40	100	0	-	-	0	0	0	-/-	
09	40	100	0	-	-	0	0	0	-/-	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Purshia tridentata</i>										
88	0	0	0	-	66	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	7/53	
99	200	0	100	-	-	20	80	0	10/52	
04	100	0	100	-	-	0	100	0	10/36	
09	340	6	94	-	-	41	53	0	14/34	
<i>Symphoricarpos oreophilus</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	20	100	0	-	-	0	0	0	-/-	
04	20	0	100	-	-	0	0	0	6/10	
09	0	0	0	-	-	0	0	0	-/-	

BLACK DRAGON - TREND STUDY NO. 16C-23-09

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 7,000 ft (2,134 m)

Aspect: South

Slope: 5%

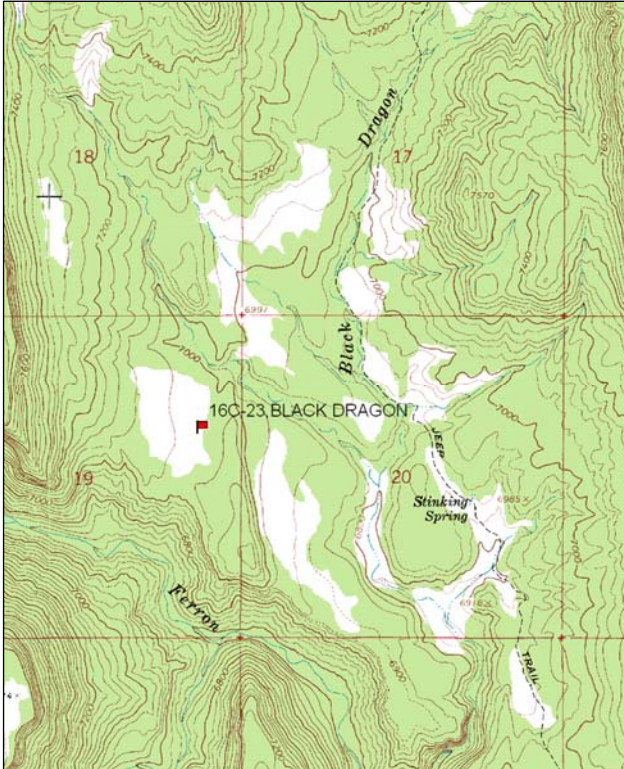
Transect bearing: 239 degrees magnetic.

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

Directions:

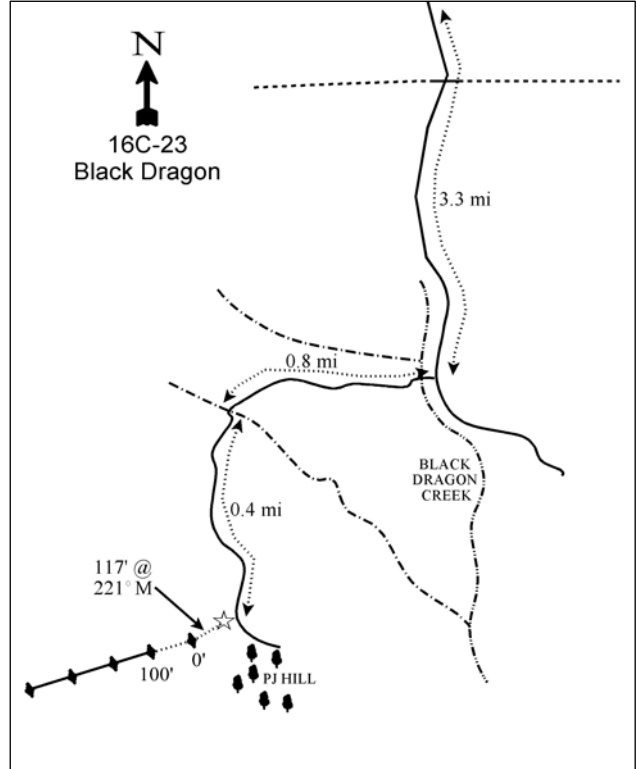
From the junction near the fence at the top of North Dragon Creek above Joes Valley, take the middle road (F.S. #170). Go down the Black Dragon trail 0.5 miles to a gate. Continue driving down the canyon 2.8 miles to a fork. Bear right across the creek. Proceed 0.8 miles through a chaining and down into a dry creek bottom. Cross and continue across a seeded sage flat for 0.4 miles to where the road turns to the left towards a P-J hill. There is a green fencepost on the right side of the road as a witness post. From the post, the 0-foot baseline stake is 117 feet bearing 221°M, and is marked by tag #484.

Map Name: Ferron Canyon



Township: 19S, Range: 6E, Section: 19

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 475481 E 4334124 N

BLACK DRAGON - TREND STUDY NO. 16C-23

Site Information

Site Description: The study is located between Joe's Valley and Ferron Canyon. The Black Dragon area is important winter range for deer and increasingly important for elk. Much of the pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) in the valley was chained and seeded a number of years ago. The study area is on a naturally open sagebrush flat that was not chained, but was contour-trenched and seeded in 1965. The site is now occupied primarily by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and seeded grasses. The area is managed as part of the Horn Mountain Allotment. Pellet group data estimated moderately heavy use by elk in 1999, but elk use was very heavy in 2009. Estimated deer use was moderate in 1999 and decreased to light use in 2004 and 2009. Estimated cattle use has been light since 1999 (Table - Pellet Group Data).

Browse: A small statured mountain big sagebrush is the key browse species, but there is likely some hybridization with black sagebrush (*Artemisia nova*). All sagebrush plants have been classified as mountain big sagebrush since 1994. The sagebrush population is dense, but healthy with low decadence, good vigor, and good recruitment of young plants in most sample years. Utilization of sagebrush has fluctuated between moderate and heavy use with the heaviest use in 1999 and 2009. Stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) co-dominates the site and has a very high density. The only other browse species that occurs in notable numbers is the palatable browse species winterfat (*Ceratoides lanata*). Winterfat has shown heavy use, but has maintained low decadence and good vigor (Table - Browse Characteristics).

Herbaceous Understory: Grasses are fairly diverse and abundant, but are dominated by the seeded species crested wheatgrass (*Agropyron cristatum*). It is especially dense within the contour furrows. The native species needle-and-thread (*Stipa comata*), bluebunch wheatgrass (*Agropyron spicatum*), bottlebrush squirreltail (*Sitanion hystrix*), and Indian ricegrass (*Oryzopsis hymenoides*) have decreased over the course of the study, and are now only rare. Forbs are not very diverse, are rare, and produce little useful forage. The most common species include longleaf phlox (*Phlox longifolia*) and scarlet globemallow (*Sphaeralcea coccinea*) (Table - Herbaceous Trends).

Soil: The soil is a fine-textured sandy clay loam with a neutral pH (Table - Soil Analysis Data). At intervals of 30 to 40 feet, there are contour-furrows which have effectively eliminated most problems from erosion. There is moderately high bare ground cover, especially on the top edges of the furrows, but herbaceous vegetation, litter, and pavement cover provide some good protective ground cover. The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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 mountain big sagebrush characteristics still show a healthy population.
- **1994 to 1999 - slightly up (+1):** The density of mountain big sagebrush increased by 12% from 9,040 plants/acre to 10,180 plants/acre, though much of the increase was due to a large increase in young plants. The density of mature sagebrush plants decreased slightly. The cover of sagebrush increased from 6% to 8%, but the undesirable species, stickyleaf low rabbitbrush also had an increase in cover from 8% to 10%.
- **1999 to 2004 - up (+2):** Mountain big sagebrush density increased by 31% to 13,380 plants/acre and cover increased to 12%. Mountain big sagebrush now provides more cover than stickyleaf low rabbitbrush. Recruitment of young sagebrush plants decreased to only 3% of the population.

- **2004 to 2009 - slightly up (+1):** Density of mountain big sagebrush increased by 12% to 15,080 plants/acre with a large increase in the recruitment of young plants. Cover of sagebrush remained similar.

Grass:

- **1988 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though there was a slight change in composition. There was a significant decrease in the nested frequency of the seeded species intermediate wheatgrass (*Agropyron intermedium*) and a significant increase in Indian ricegrass.
- **1994 to 1999 - stable (0):** Perennial grass sum of nested frequency decreased by 9% and cover decreased from 13% to 10%. There was a significant decrease in the nested frequency of Indian ricegrass and a significant increase in bottlebrush squirreltail.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 18%, though cover increased slightly. There was a significant decrease in the nested frequency of bottlebrush squirreltail and needle-and-thread has had a decreased significantly since 1999.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, but composition changed slightly. There was a significant increase in the nested frequency of crested wheatgrass and a significant decrease in needle-and-thread. Native perennial grasses are rare on the site now.

Forb:

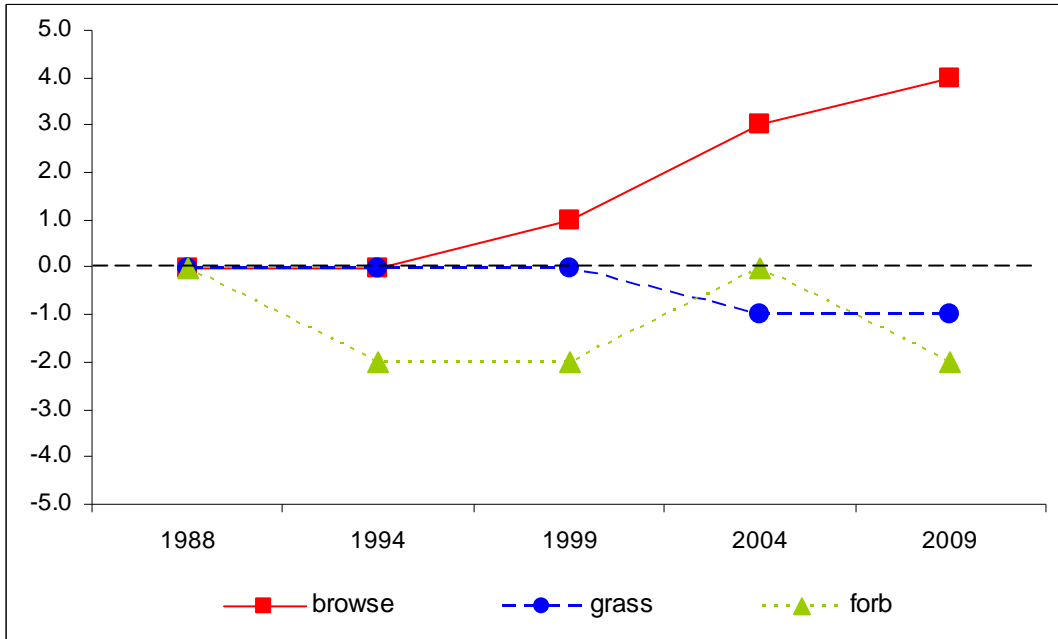
- **1988 to 1994 - down (-2):** There was a 68% decrease in the sum of nested frequency of perennial forbs with significant decreases in the nested frequency of many of the perennial forb species.
- **1994 to 1999 – stable (0):** The sum of nested frequency of perennial forbs decreased, but cover remained similar and no species changed significantly in nested frequency.
- **1999 to 2004 - up (+2):** There was a three-fold increase in the sum of nested frequency of perennial forbs and cover increased from less than 1% to near 2%. Most of the change came from a significant increase in the nested frequency of longleaf phlox and a substantial increase in cover of that species.
- **2004 to 2009 - down (-2):** Perennial forb sum of nested frequency decreased by 48% and cover decreased to less than 1%. There was a significant decrease in the nested frequency of longleaf phlox.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 16C, study no: 23

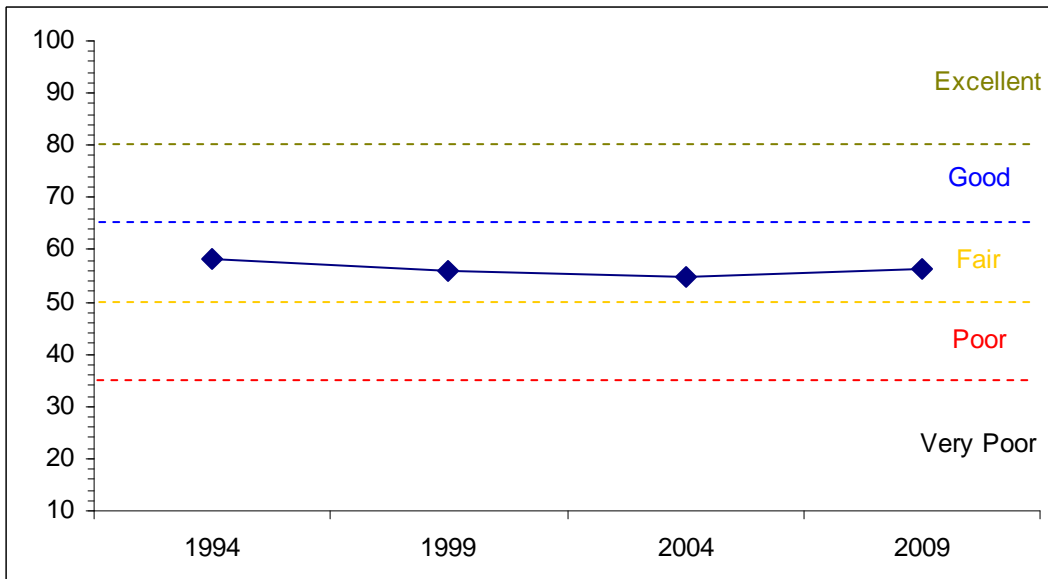
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	7.4	10.3	13.8	25.9	0.0	0.8	0.0	58.2	Fair
99	9.9	10.6	15.0	19.8	0.0	0.9	0.0	56.1	Fair
04	15.5	12.9	1.8	21.4	0.0	3.2	0.0	54.9	Fair
09	15.3	9.9	15.0	14.9	0.0	1.1	0.0	56.3	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 23



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 16C, Study no: 23



HERBACEOUS TRENDS--

Management unit 16C, Study no: 23

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	ab256	a234	ab245	a232	b280	7.96	6.82	9.41	6.78
G	Agropyron intermedium	b63	a4	a8	a8	a4	.03	.07	.10	.03
G	Agropyron spicatum	6	6	16	2	-	.16	.45	.06	-
G	Bouteloua gracilis	a-	b31	b27	b25	b26	.90	.93	.61	.57
G	Oryzopsis hymenoides	b51	c77	a20	ab29	a10	1.24	.33	.22	.04
G	Sitanion hystrix	ab17	b29	c49	ab11	a1	.30	.55	.04	.03
G	Sporobolus cryptandrus	-	1	4	1	-	.03	.01	.00	-
G	Stipa comata	bc50	c78	bc48	b33	a-	2.33	.71	.24	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		443	460	417	341	321	12.97	9.90	10.69	7.46
Total for Grasses		443	460	417	341	321	12.97	9.90	10.69	7.46
F	Arabis sp.	-	-	-	4	-	-	-	.03	-
F	Astragalus calycosus	b19	a2	ab7	b27	a-	.01	.03	.06	-
F	Calochortus nuttallii	3	-	1	-	1	-	.00	-	.00
F	Chenopodium leptophyllum(a)	-	a6	a-	b58	a-	.01	-	.18	-
F	Descurainia pinnata (a)	-	-	-	-	2	-	-	.00	.01
F	Erigeron pumilus	b21	a-	ab8	ab4	b14	-	.07	.01	.06
F	Lappula occidentalis (a)	-	a-	a-	b8	a-	-	-	.02	-
F	Machaeranthera canescens	b37	a4	a3	a7	a5	.01	.06	.02	.03
F	Microsteris gracilis (a)	-	-	3	4	8	-	.00	.01	.01
F	Phlox longifolia	c164	ab50	a17	c142	b58	.15	.06	.78	.34
F	Senecio multilobatus	1	-	-	-	-	-	-	-	-
F	Sphaeralcea coccinea	66	44	45	64	50	.24	.22	.68	.12
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	6	3	70	10	0.01	0.00	0.22	0.02
Total for Perennial Forbs		312	100	81	248	128	0.41	0.45	1.60	0.57
Total for Forbs		312	106	84	318	138	0.42	0.46	1.83	0.59

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

BROWSE TRENDS--

Management unit 16C, Study no: 23

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata vaseyana	95	96	94	99	5.84	7.78	12.13	12.18
B	Ceratoides lanata	17	16	18	19	.09	.12	.28	.09
B	Chrysothamnus depressus	0	0	0	1	-	-	-	.00
B	Chrysothamnus viscidiflorus viscidiflorus	95	92	93	88	7.64	10.25	7.76	5.94
B	Opuntia sp.	7	13	12	7	.04	.01	.01	.00
B	Pinus edulis	0	0	0	1	-	-	-	.00
B	Sclerocactus sp.	0	0	1	0	-	-	.00	-
Total for Browse		214	217	218	215	13.62	18.17	20.19	18.23

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 23

Species	Percent Cover	
	'04	'09
Artemisia tridentata vaseyana	12.58	12.55
Ceratoides lanata	.13	.08
Chrysothamnus viscidiflorus viscidiflorus	5.90	3.09
Opuntia sp.	.03	.01
Pinus edulis	.06	.03

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 23

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	1.6	0.8

BASIC COVER--

Management unit 16C, Study no: 23

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	6.75	24.96	27.18	31.84	27.52
Rock	.75	4.69	.76	1.27	.25
Pavement	10.00	.74	7.55	7.59	8.38
Litter	37.25	19.30	17.26	23.89	24.76
Cryptogams	1.00	.08	.11	1.31	.74
Bare Ground	44.25	37.02	40.47	45.37	42.27

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 23, Study Name: Black Dragon

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.4	7.1	57.4	16.7	25.8	1.7	6.9	60.8	0.7

PELLET GROUP DATA--

Management unit 16C, Study no: 23

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	36	14	31	38	-	-	-
Elk	29	44	41	43	53 (131)	50 (124)	92 (227)
Deer	38	22	23	7	40 (99)	17 (43)	3 (8)
Cattle	4	2	2	3	10 (25)	11 (27)	7 (16)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 23

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
88	199	33	67	-	-	0	0	33	6/15
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	-/-
<i>Artemisia tridentata vaseyana</i>									
88	49798	90	5	6	4333	3	6	1	8/12
94	9040	28	56	16	-	19	.66	7	9/18
99	10180	54	31	15	320	18	74	4	11/22
04	13380	3	90	7	22560	46	12	4	12/19
09	15080	35	48	17	11040	15	49	13	9/18
<i>Ceratoides lanata</i>									
88	1465	14	86	0	-	36	59	0	4/3
94	520	8	92	0	-	19	0	0	3/4
99	620	3	97	0	-	74	13	0	7/7
04	580	10	90	0	200	7	83	0	6/7
09	580	7	86	7	-	24	41	7	4/5
<i>Chrysothamnus depressus</i>									
88	0	0	0	0	-	0	0	0	-/-
94	0	0	0	0	-	0	0	0	-/-
99	0	0	0	0	-	0	0	0	-/-
04	0	0	0	0	-	0	0	0	-/-
09	20	0	0	100	-	0	0	0	3/11
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
88	13932	84	16	0	1933	1	0	0	5/8
94	18780	12	88	0	-	0	0	0	4/9
99	19680	7	93	0	80	7	.20	0	6/12
04	13300	1	97	2	1320	.30	0	2	5/9
09	14420	18	69	13	280	0	0	13	3/10

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Gutierrezia sarothrae</i>										
88	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	6/7	
<i>Opuntia sp.</i>										
88	998	53	40	7	133	0	0	27	3/7	
94	140	0	100	0	-	0	0	0	3/6	
99	300	13	80	7	-	0	0	7	3/14	
04	280	21	71	7	20	0	0	7	2/9	
09	300	27	60	13	-	0	0	20	2/8	
<i>Pinus edulis</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	20	0	0	0	-/-	
09	20	100	0	-	-	0	0	100	-/-	
<i>Sclerocactus sp.</i>										
88	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	-/-	

SOUTH HORN ENCLOSURE - TREND STUDY NO. 16C-24-09

Vegetation Type: Mixed Mountain Brush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,500 ft (2,591 m)
Aspect: Northwest
Slope: 5%
Transect bearing: 206 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

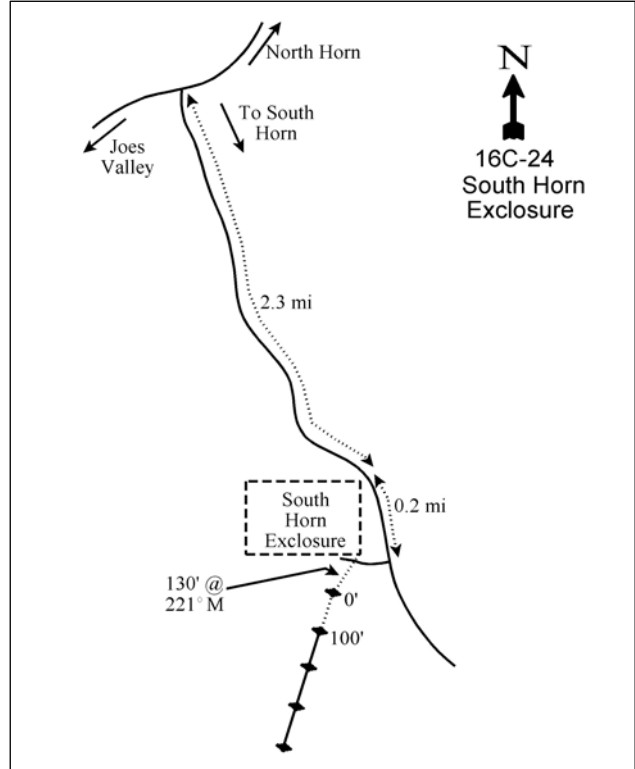
Directions:
From the intersection of the North Horn and South Horn roads, turn right (south) onto the South Horn road (#21). Proceed 2.3 miles to the NE corner of an enclosure. Continue 0.2 miles past the enclosure to a faint road. Turn right onto this faint road and go 0.15 miles to the SE corner of the enclosure. The 0-foot baseline stake is approximately 130 feet southwest (221°M) of the SE corner.

Map Name: The Cap



Township: 19S, Range: 6E, Section: 23

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 480700 E 4334410 N

SOUTH HORN ENCLOSURE - TREND STUDY NO. 16C-24

Site Information

Site Description: The study samples a mixed mountain brush community with scattered old pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). The study is located on the south side of the South Horn Mountain Enclosure and is representative of north slopes in the area which support a higher density of true mountain mahogany. The area is managed as part of the Horn Mountain allotment. Pellet group data has indicated moderate use by deer and elk and light use by cattle since 1999 (Table - Pellet Group Data).

Browse: The site supports a variety of browse species. The key species include true and curlleaf mountain mahogany (*Cercocarpus montanus* and *C. ledifolius*), serviceberry (*Amelanchier utahensis*), and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Mountain big sagebrush provides the majority of browse cover on the site (Table - Browse Trends), but is not as heavily utilized as the other three species. Mountain mahogany is represented by a small population of mostly mature plants which average a little over four feet in height, making some plants partly unavailable. There are also some large tree-like curlleaf mountain mahogany plants, but both mountain mahogany species are heavily utilized on the available portions of the plants. Serviceberry plants are typically large, averaging about 7 feet in height, but available parts of the plants are highly utilized. Snowberry (*Symphoricarpos oreophilus*) is common on the site, but is not heavily utilized (Table - Browse Characteristics).

Large and very old pinyon and juniper trees are scattered throughout the site. The density of pinyon and juniper trees is fairly low and appears to be stable with little change in density or average diameter since 1999 (Table - Point-Quarter Tree Data). There does appear to be some infilling of pinyon and juniper occurring as canopy cover has steadily increased for both species since 1999 (Table - Canopy Cover).

Herbaceous Understory: Grasses are diverse, but not very abundant. No one species provides a large majority of the grass cover, but the most common species include Salina wildrye (*Elymus salina*), mutton bluegrass (*Poa fendleriana*), and Indian ricegrass (*Oryzopsis hymenoides*). There are numerous other native perennial species sampled on the site, but none provide much cover. Forbs are very diverse, but no one species is very abundant and forbs provide little forage on the site (Table - Herbaceous Trends).

Soil: The soil texture is a sandy loam with a neutral pH. Phosphorus and potassium have limited availability for plant growth and development at just 4.2 ppm and 32 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is fairly low on the site due to a high amount of litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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 has increased and recruitment of young plants decreased for most of the preferred browse on the site.
- **1994 to 1999 - up (+2):** Density of serviceberry, mountain big sagebrush, and true mountain mahogany all increased substantially. The cover of mountain big sagebrush more than doubled from 5% to 11%. Decadence decreased in serviceberry and mountain big sagebrush, but increased in true mountain mahogany.
- **1999 to 2004 - slightly down (-1):** There was a 34% decrease in the density of mountain big sagebrush and cover decreased to 7%. Decadence of sagebrush increased from 6% to 27% and poor vigor increased from 5% to 19%. However, the density of serviceberry and true mountain mahogany each increased slightly, and decadence and poor vigor decreased.

- **2004 to 2009 - stable (0):** Density of mountain big sagebrush increased by 14% and cover increased to 9%, but decadence increased to 34%. The density of true mountain mahogany decreased by 18% and cover decreased from 4% to 3%.

Grass:

- **1988 to 1994 - slightly down (-1):** Perennial grass sum of nested frequency decreased by 12% with a significant decrease in the nested frequency of intermediate wheatgrass (*Agropyron intermedium*).
- **1994 to 1999 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial grasses, but cover increased slightly. Western wheatgrass (*Agropyron smithii*) increased significantly in nested frequency and Salina wheatgrass decreased significantly.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased 55% and cover decreased from 5% to 2%. There was a significant decrease in the nested frequency of western wheatgrass.
- **2004 to 2009 - up (+2):** Perennial grass sum of nested frequency increased 34% and cover increased to 5%. There was a large increase in the cover of Salina wildrye.

Forb:

- **1988 to 1994 - down (-2):** There was a 52% decrease in the sum of nested frequency of perennial forbs with a significant decrease in many of the palatable forbs.
- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial forbs increased 28% and cover increased from 2% to 3%.
- **1999 to 2004 - down (-2):** Perennial forb sum of nested frequency decreased by 25% and cover decreased to 2%. Annual forb sum of nested frequency increased four-fold and cover increased from less than 1% to near 3%.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 13% and cover decreased slightly. There was also a substantial decrease in the sum of nested frequency and cover of annual forbs.

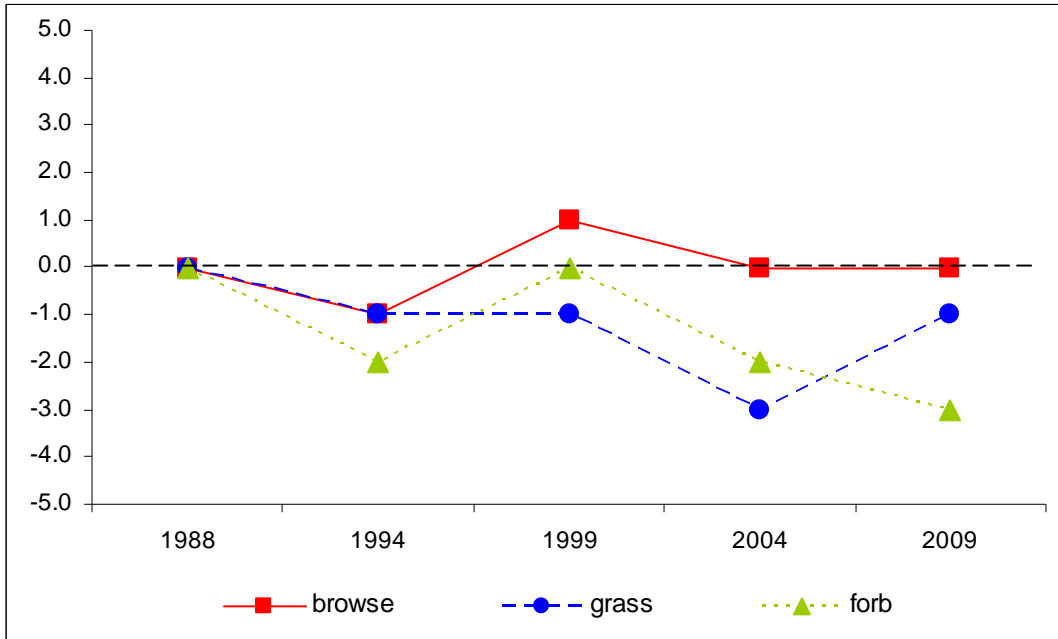
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 24

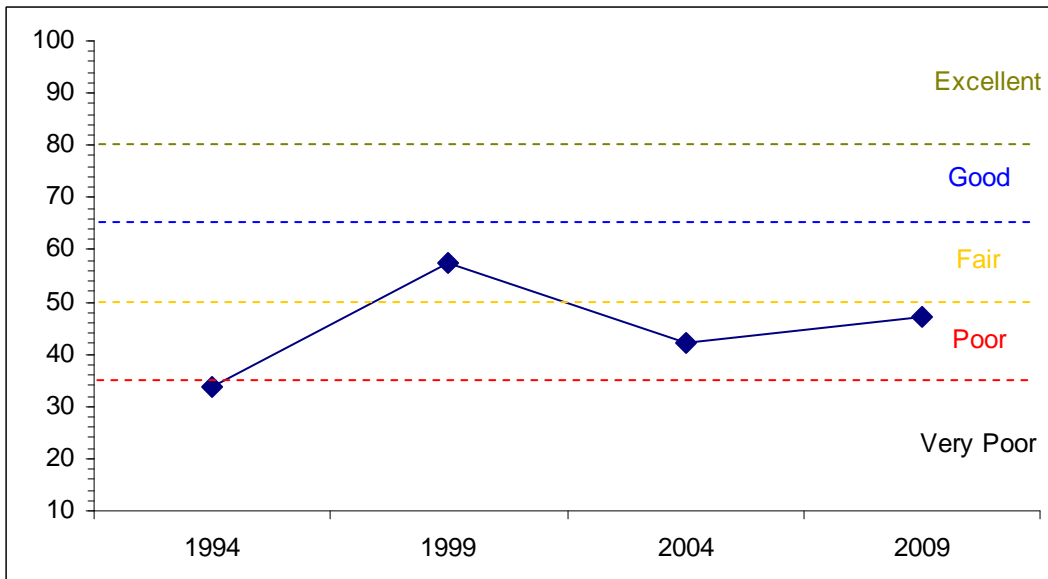
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	16.3	6.0	0.4	7.0	0.0	4.2	0.0	33.9	Very Poor-Poor
99	24.1	11.5	5.7	10.0	0.0	6.3	0.0	57.6	Fair
04	18.5	10.2	6.0	3.6	0.0	4.0	0.0	42.3	Poor
09	20.2	7.8	7.1	9.1	0.0	2.7	0.0	47.0	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 24



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 16C, Study no: 24



HERBACEOUS TRENDS--
Management unit 16C, Study no: 24

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron intermedium	b144	a7	a3	a-	a-	.01	.00	-	-
G	Agropyron smithii	a-	a2	c84	ab17	b33	.03	.50	.11	.15
G	Bromus tectorum (a)	-	-	-	-	1	-	-	-	.00
G	Carex sp.	c46	ab14	bc23	a2	a5	.11	.82	.04	.10
G	Elymus salina	a-	c70	b43	b20	b35	.71	1.59	.32	1.99
G	Festuca ovina	a-	b33	a3	a2	a-	.36	.03	.03	-
G	Koeleria cristata	a-	b37	a6	a3	a-	.33	.06	.04	-
G	Oryzopsis hymenoides	a-	b17	b21	b16	b27	.57	.79	.13	.68
G	Poa fendleriana	a-	b38	b58	b38	b35	.29	.81	.81	1.20
G	Poa secunda	b60	a30	a13	a8	a11	.52	.22	.18	.05
G	Sitanion hystrix	-	6	-	6	3	.01	-	.01	.00
G	Stipa comata	b56	a26	a5	a7	a15	.50	.04	.10	.36
G	Stipa lettermani	b11	a-	b9	ab3	a-	-	.12	.03	-
Total for Annual Grasses		0	0	0	0	1	0	0	0	0.00
Total for Perennial Grasses		317	280	268	122	164	3.48	5.02	1.82	4.55
Total for Grasses		317	280	268	122	165	3.48	5.02	1.82	4.55
F	Androsace septentrionalis (a)	-	a-	b49	a-	a-	-	.18	.00	-
F	Arabis sp.	b61	b64	ab57	ab46	a24	.29	.35	.24	.08
F	Chenopodium album (a)	-	a-	a-	b35	b17	-	-	.10	.05
F	Chenopodium fremontii (a)	-	5	-	-	3	.01	-	-	.00
F	Chenopodium leptophyllum(a)	-	-	-	-	5	-	-	-	.02
F	Collinsia parviflora (a)	-	a15	a10	c129	b63	.05	.02	1.50	.22
F	Comandra pallida	29	24	20	31	36	.52	.60	.20	.42
F	Crepis acuminata	b57	a6	a16	a1	a1	.04	.10	.03	.03
F	Cryptantha sp.	c38	ab11	ab16	bc33	a2	.16	.27	.18	.06
F	Delphinium nuttallianum	b13	a-	a-	a-	a-	-	-	-	-
F	Erigeron eatonii	c75	b48	ab42	ab22	a18	.37	.24	.13	.09
F	Erigeron pumilus	a-	a-	a-	a2	b12	-	-	.00	.05
F	Erigeron sp.	-	5	-	-	-	.01	-	-	-
F	Eriogonum alatum	b23	ab20	ab15	a4	ab15	.34	.31	.18	.10
F	Eriogonum cernuum (a)	-	5	2	-	-	.01	.03	-	-
F	Eriogonum racemosum	-	-	-	-	5	-	-	-	.01
F	Eriogonum umbellatum	b13	a1	a1	a2	a2	.00	.03	.03	.06
F	Gayophytum ramosissimum(a)	-	9	-	4	16	.06	-	.01	.10
F	Heterotheca villosa	-	-	5	6	5	-	.21	.09	.16
F	Lappula occidentalis (a)	-	a-	a5	b29	a3	-	.01	.70	.00
F	Lupinus sp.	4	-	-	-	-	-	-	-	-
F	Machaeranthera canescens	b18	a2	a-	a-	ab3	.03	.03	-	.01
F	Oenothera sp.	-	-	-	8	-	-	-	.33	-
F	Penstemon humilis	b25	a2	a5	a-	a1	.01	.03	-	.03
F	Penstemon sp.	-	-	-	7	7	-	-	.02	.04
F	Penstemon watsonii	-	-	5	-	-	-	.12	-	-
F	Phlox austromontana	b49	a9	a11	a15	a9	.21	.21	.34	.06

T y P e	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
F	<i>Polygonum douglasii</i> (a)	-	_b 85	_a 21	_c 148	_a 42	.14	.04	.38	.12
F	<i>Potentilla</i> sp.	-	3	-	1	-	.00	-	.00	-
F	<i>Schoenocrambe linifolia</i>	_a -	_b 13	_c 46	_{bc} 21	_c 38	.05	.40	.08	.12
F	<i>Senecio multilobatus</i>	_{bc} 24	_a 4	_c 31	_{ab} 10	_a 4	.01	.19	.10	.01
F	<i>Sphaeralcea coccinea</i>	-	4	9	-	-	.00	.02	-	-
F	<i>Townsendia</i> sp.	_b 24	_a 2	_a -	_a -	_a -	.03	-	-	-
Total for Annual Forbs		0	119	87	345	149	0.28	0.29	2.70	0.53
Total for Perennial Forbs		453	218	279	209	182	2.11	3.14	1.99	1.35
Total for Forbs		453	337	366	554	331	2.40	3.43	4.69	1.88

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

BROWSE TRENDS--

Management unit 16C, Study no: 24

T y P e	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	<i>Amelanchier utahensis</i>	2	6	5	5	2.32	1.83	2.03	2.26
B	<i>Artemisia tridentata vaseyana</i>	54	59	53	58	5.16	11.05	7.18	9.05
B	<i>Cercocarpus ledifolius</i>	3	4	4	2	.00	.48	.18	.56
B	<i>Cercocarpus montanus</i>	10	15	15	13	4.22	4.55	4.12	3.13
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	18	16	26	35	.28	.24	.71	.86
B	<i>Gutierrezia sarothrae</i>	7	5	6	0	.04	.21	.04	-
B	<i>Juniperus osteosperma</i>	0	0	0	0	.15	-	-	1.00
B	<i>Leptodactylon pungens</i>	11	11	10	9	.10	.54	.13	.12
B	<i>Mahonia repens</i>	0	0	1	0	-	-	.06	.03
B	<i>Opuntia</i> sp.	7	12	15	16	.07	.29	.26	.24
B	<i>Pinus edulis</i>	0	1	1	2	1.46	2.76	.84	.75
B	<i>Purshia tridentata</i>	2	2	1	2	.00	.00	.00	.00
B	<i>Symphoricarpos oreophilus</i>	13	16	14	13	.58	1.76	1.29	.42
B	<i>Tetradymia canescens</i>	1	0	2	0	.00	-	.00	-
Total for Browse		128	147	153	155	14.41	23.74	16.87	18.47

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 24

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	1.79	3.00	4.61
Artemisia tridentata vaseyana	-	8.76	9.85
Cercocarpus ledifolius	2.40	2.28	2.13
Cercocarpus montanus	2.00	7.73	5.00
Chrysothamnus viscidiflorus viscidiflorus	-	2.76	1.89
Gutierrezia sarothrae	-	.06	-
Juniperus osteosperma	2.79	3.00	4.05
Leptodactylon pungens	-	.33	.20
Opuntia sp.	-	.33	.11
Pinus edulis	15.39	17.20	20.26
Purshia tridentata	-	.33	.25
Symphoricarpos oreophilus	-	1.68	.50

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 24

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	3.2	1.8
Artemisia tridentata vaseyana	1.8	1.5
Cercocarpus montanus	5.6	2.4

POINT-QUARTER TREE DATA--

Management unit 16C, Study no: 24

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	13	<18	29	20.7	-	16.6
Pinus edulis	30	34	32	15.4	13.9	13.5

BASIC COVER--

Management unit 16C, Study no: 24

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	2.50	20.51	31.71	22.03	25.01
Rock	.75	.44	.89	.67	.74
Pavement	.75	.05	.66	.72	.56
Litter	75.00	61.38	62.79	62.39	62.25
Cryptogams	1.00	.54	.46	2.36	1.70
Bare Ground	20.00	22.79	17.32	25.20	22.79

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 24, Study Name: South Horn Exclosure

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
9.3	6.8	76.7	11.4	11.8	0.8	4.2	32	0.5

PELLET GROUP DATA--

Management unit 16C, Study no: 24

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	52	55	22	58
Elk	30	13	16	9
Deer	23	26	14	16
Cattle	1	-	-	1

Days use per acre (ha)		
'99	'04	'09
-	-	-
33 (82)	29 (73)	17 (41)
32 (79)	23 (56)	36 (88)
3 (7)	5 (13)	8 (20)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 24

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
88	332	60	40	0	199	40	0	0	42/31
94	40	0	50	50	-	0	0	0	82/103
99	120	17	67	17	480	50	17	17	93/90
04	200	50	40	10	-	0	50	10	55/54
09	220	18	82	0	80	9	45	0	88/103
<i>Artemisia nova</i>									
88	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	13/38
09	0	0	0	-	-	0	0	0	-/-
<i>Artemisia tridentata vaseyana</i>									
88	1864	11	68	21	533	14	4	4	16/22
94	1820	2	59	38	20	3	0	10	28/35
99	2540	14	80	6	160	33	0	5	21/31
04	1680	7	65	27	20	29	7	19	18/27
09	1920	19	47	34	140	28	11	19	18/31
<i>Cercocarpus ledifolius</i>									
88	0	0	0	0	-	0	0	0	-/-
94	80	75	0	25	-	50	25	0	76/53
99	100	40	60	0	-	20	20	0	15/20
04	100	60	20	20	-	0	80	0	41/41
09	40	0	50	50	-	0	100	0	40/41
<i>Cercocarpus montanus</i>									
88	1798	44	56	0	1333	48	7	0	51/58
94	220	0	91	9	-	45	0	0	55/60
99	320	0	75	25	40	50	50	6	50/54
04	340	0	100	0	-	0	71	0	52/57
09	280	0	93	7	-	7	71	7	51/59

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
88	1598	46	42	12	66	8	0	4	8/11	
94	640	0	94	6	-	6	3	16	20/28	
99	580	14	86	0	-	0	0	0	11/14	
04	1020	2	94	4	-	4	4	4	11/16	
09	1740	2	93	5	-	0	0	8	10/13	
<i>Cowania mexicana stansburiana</i>										
88	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	24/43	
09	0	0	0	-	-	0	0	0	-/-	
<i>Gutierrezia sarothrae</i>										
88	1731	42	46	11	399	4	0	15	3/4	
94	400	30	55	15	60	0	0	0	5/5	
99	380	0	100	0	-	0	0	0	7/9	
04	660	12	88	0	-	0	0	0	6/8	
09	0	0	0	0	-	0	0	0	-/-	
<i>Leptodactylon pungens</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	620	13	87	-	-	0	0	0	5/8	
99	640	0	100	-	-	0	0	0	4/5	
04	520	0	100	-	-	0	0	0	6/8	
09	760	0	100	-	-	0	0	0	5/6	
<i>Mahonia repens</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	3/5	
99	0	0	0	-	-	0	0	0	-/-	
04	160	100	0	-	-	0	0	0	2/6	
09	0	0	0	-	-	0	0	0	3/4	
<i>Opuntia sp.</i>										
88	7531	24	68	8	133	0	0	39	2/4	
94	180	22	78	0	-	0	0	0	2/5	
99	480	17	83	0	40	0	0	0	2/5	
04	780	3	97	0	-	0	0	0	3/9	
09	820	17	80	2	-	0	0	7	3/13	
<i>Pinus edulis</i>										
88	0	0	0	-	66	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	40	0	0	0	-/-	
04	20	0	100	-	20	0	0	0	-/-	
09	40	0	100	-	20	0	0	0	-/-	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Purshia tridentata										
88	0	0	0	-	-	0	0	0	-/-	
94	80	0	100	-	-	75	0	0	9/16	
99	80	25	75	-	-	0	100	0	17/25	
04	60	0	100	-	-	0	0	0	13/22	
09	80	75	25	-	-	100	0	0	20/48	
Sambucus racemosa										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	21/49	
99	0	0	0	-	-	0	0	0	33/52	
04	0	0	0	-	-	0	0	0	41/66	
09	0	0	0	-	-	0	0	0	22/54	
Sclerocactus whipplei										
88	66	0	100	-	-	0	0	0	1/3	
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	-/-	
Symphoricarpos oreophilus										
88	1665	84	16	0	266	12	8	0	15/9	
94	500	4	96	0	-	12	0	0	9/19	
99	860	70	30	0	60	0	0	0	14/22	
04	760	32	68	0	-	11	0	0	10/25	
09	980	6	86	8	-	0	8	8	12/24	
Tetradymia canescens										
88	0	0	0	-	-	0	0	0	-/-	
94	20	0	100	-	-	0	0	0	10/11	
99	0	0	0	-	-	0	0	0	7/24	
04	40	0	100	-	-	0	0	0	8/15	
09	0	0	0	-	-	0	0	0	6/7	

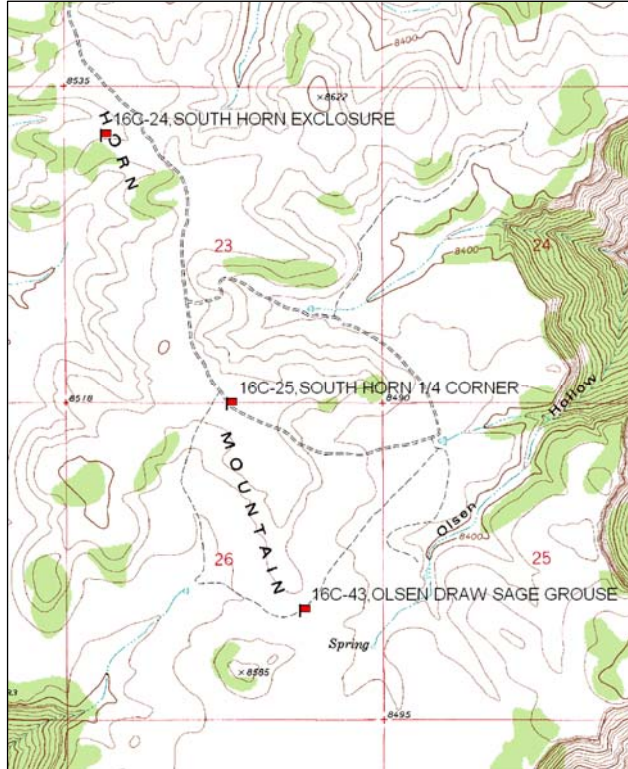
SOUTH HORN 1/4 CORNER - TREND STUDY NO. 16C-25-09

Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,550 ft (2,606 m)
Aspect: Southwest
Slope: 5%
Transect bearing: 180 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

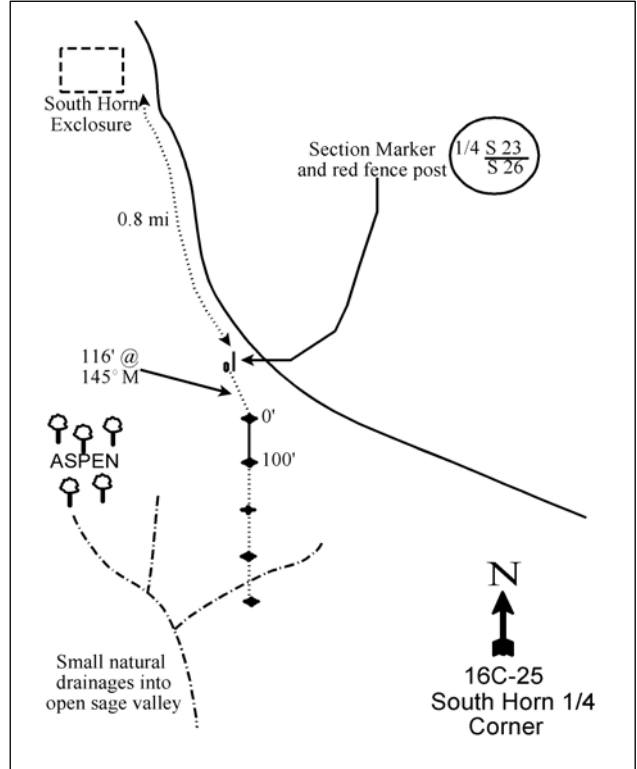
From the South Horn enclosure (by study #16C-24), continue south on the main USGS road for 0.8 miles to a USGS landline marker by a tall red fencepost on the right side of the road. This is the witness post for the transect. From the witness post walk SE (145°M) for 116 feet to the 0-foot end of the baseline. The 18" green fencepost is marked by browse tag #9011.

Map Name: The Cap



Township: 19S, Range: 6E, Section: 26

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 481335 E 4333044 N

SOUTH HORN 1/4 CORNER - TREND STUDY NO. 16C-25

Site Information

Site Description: The study samples an area of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and native perennial grass which is representative of a large expanse of open sagebrush slopes and flats on South Horn Mountain. On top of this large open plateau, the country is flat or gently rolling. Scattered clumps of pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and Utah serviceberry (*Amelanchier utahensis*) offer cover and forage on and surrounding the study area, with a stand of aspen (*Populus tremuloides*) 300 yards to the west. The Forest Service manages the area as part of the Horn Mountain allotment. On this particular site, there is little sign of cattle because of limited water availability in the summer. Pellet group data estimated very heavy elk use in 1999 and 2004, but more moderate use in 2009. Estimated deer and cattle use has been light since 1999 (Table - Pellet Group Data). Cattle were on the site during the 2004 sample.

Browse: The dominant browse species is mountain big sagebrush, which provides the majority of the browse cover on the site (Table - Browse Trends). The mountain big sagebrush population is moderately dense and has had high amounts of decadence in the past, but decadence was low in 2009. Recruitment of young mountain big sagebrush plants has been very good over the sample years and over half the population was comprised of young plants in 2009. Utilization of mountain big sagebrush has been mostly moderate with some years of heavy use. Other preferred browse species on the site that occur in lower density and cover include Utah serviceberry, black sagebrush (*Artemisia nova*), winterfat (*Ceratoides lanata*), and dwarf rabbitbrush (*Chrysothamnus depressus*). Utilization of these species has been mostly moderate with some heavy use of serviceberry. Smaller shrubs and half-shrubs like prickly phlox (*Leptodactylon pungens*), stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), and broom snakeweed (*Gutierrezia sarothrae*) are fairly common, but are in low densities and do not provide much cover or forage (Table - Browse Characteristics).

Herbaceous Understory: Grasses on the site are moderately abundant and diverse. Needle-and-thread (*Stipa comata*), and mutton and sandberg bluegrass (*Poa fendleriana* and *P. secunda*) are the most common species. These three species have provided almost all of the grass cover since 1994. Other species on the site include bottlebrush squirreltail (*Sitanion hystrix*), western wheatgrass (*Agropyron smithii*), and Indian ricegrass (*Oryzopsis hymenoides*). The forb population is very diverse and quite abundant, though no one species provides much cover. Common species on the site include tapertip hawksbeard (*Crepis acuminata*), hairy golden aster (*Heterotheca villosa*), penstemon (*Penstemon* spp.), and desert phlox (*Phlox austromontana*) (Table - Herbaceous Trends).

Soil: The soil texture is a sandy loam with a neutral pH. Phosphorus has limited availability for plant growth and development at just 2.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately high, but there is good vegetation cover provided by the herbaceous understory on the site (Table - Basic Cover). The soil erosion condition was classified as slight in 2004 due to pedestaling, flow patterns, rills, and surface litter and soil movement, but was classified as stable in 2009.

Trend Assessments

Browse:

- **1988 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. There was a slight increase in decadence of mountain big sagebrush from 45% to 54% and poor vigor increased markedly from 10% to 36%. Recruitment of young sagebrush plants decreased from 33% of the population to 7%.

- **1994 to 1999 - slightly up (+1):** The density of mountain big sagebrush increased 15% from 4,180 plants/acre to 4,840 plants/acre with a large increase in the recruitment of young plants to 21%. Decadence of mountain big sagebrush decreased to 13% and poor vigor decreased to 6%.
- **1999 to 2004 - down (-2):** Density of mountain big sagebrush decreased by 34% to 3,180 plants/acre. Decadence of mountain big sagebrush increased slightly to 25% and recruitment of young plants decreased slightly to 18%. There was also a large increase in the density and cover of the undesirable species broom snakeweed.
- **2004 to 2009 - up (+2):** The mountain big sagebrush density doubled to 6,360 plants/acre due to a substantial increase in the density of young plants. Cover of sagebrush changed little, however. Decadence of sagebrush decreased slightly, but poor vigor remained similar.

Grass:

- **1988 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 44%. There was a change in composition with a significant decrease in the nested frequency of mutton bluegrass and a significant increase in Sandberg bluegrass.
- **1994 to 1999 - up (+2):** Perennial grass sum of nested frequency increased by 47% and cover increased from 8% to 12%. There was a significant decrease in the nested frequency of prairie junegrass (*Koeleria cristata*) and needle-and-thread.
- **1999 to 2004 - stable (0):** There was little change in the nested frequency of perennial grasses, though cover decreased to 10%. There was a significant increase in needle-and-thread and western wheatgrass.
- **2004 to 2009 - slightly up (+1):** There was a 15% increase in the sum of nested frequency, but cover remained similar. There was a significant decrease in the nested frequency of bottlebrush squirreltail and prairie junegrass.

Forb:

- **1988 to 1994 - down (-2):** The perennial forb sum of nested frequency decreased by 51% with a significant decrease in the nested frequency of many of the palatable forbs.
- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover increased from 5% to 13%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 24% and cover decreased to 6%.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs.

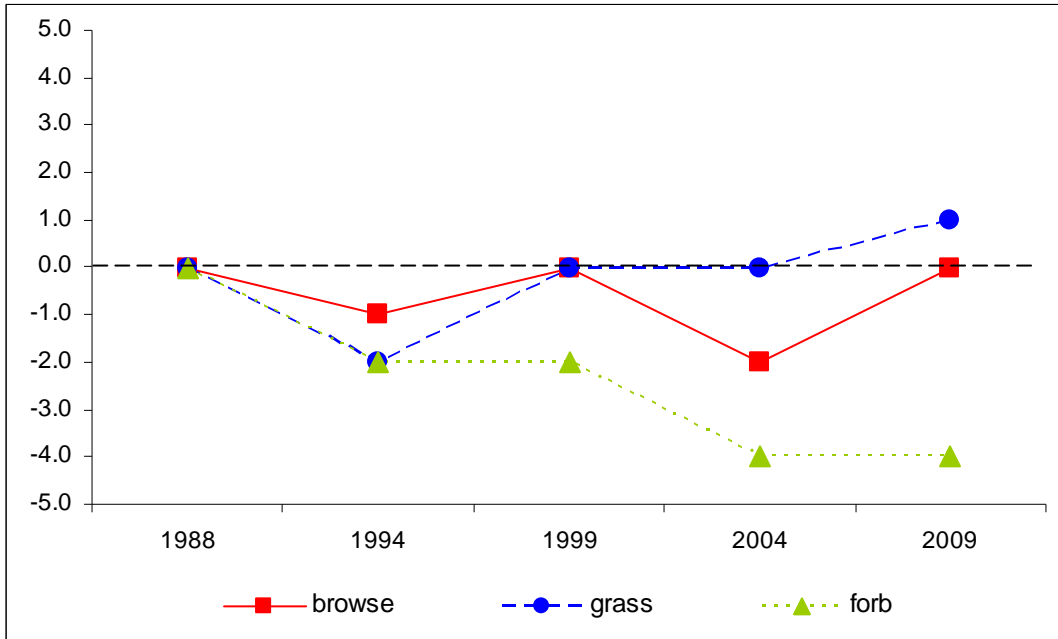
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 25

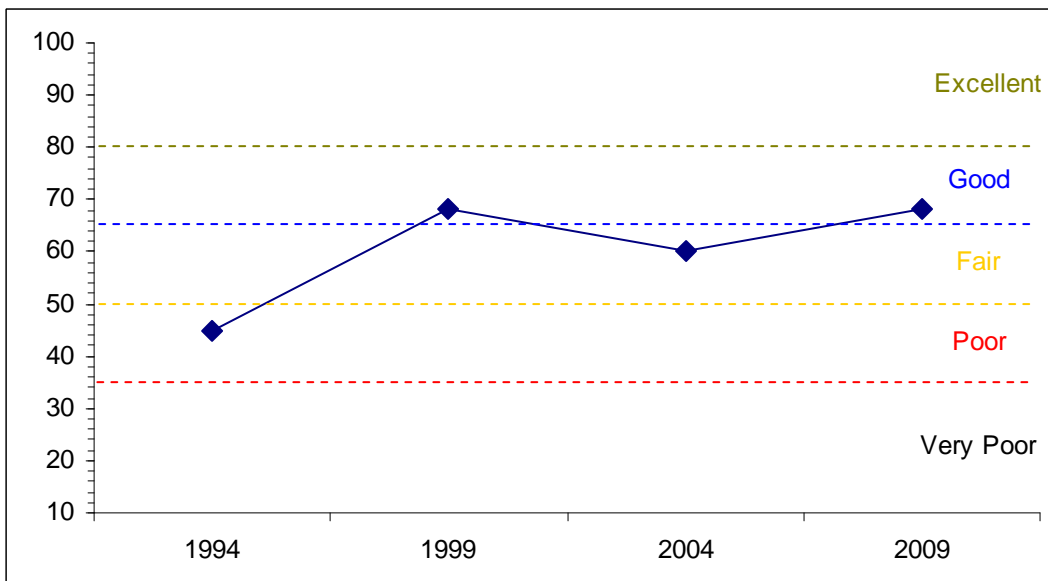
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	12.5	2.7	2.7	17.0	0.0	9.9	0.0	44.8	Poor
99	13.1	11.9	9.3	24.1	0.0	10.0	0.0	68.3	Good
04	14.1	8.8	6.9	20.5	0.0	10.0	0.0	60.3	Fair
09	12.8	10.4	15.0	20.1	0.0	10.0	0.0	68.2	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 25



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 16C, Study no: 25



HERBACEOUS TRENDS--

Management unit 16C, Study no: 25

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	a-	a-	a5	b39	b61	-	.03	.34	.31
G	Agropyron spicatum	-	-	-	7	1	-	-	.16	.03
G	Bouteloua gracilis	9	26	15	12	7	.39	.40	.15	.04
G	Carex sp.	a-	a-	b14	a-	a-	-	.42	-	-
G	Elymus salina	19	8	25	14	27	.33	.47	.10	.33
G	Koeleria cristata	c91	c66	b37	b17	a-	.42	.95	.10	-
G	Oryzopsis hymenoides	-	2	3	9	-	.00	.15	.16	-
G	Poa fendleriana	c254	b192	b190	a113	a118	3.29	6.55	1.98	1.80
G	Poa secunda	a64	c200	b131	ab94	c198	1.75	1.45	2.10	4.27
G	Sitanion hystrich	b52	b44	b51	b52	a4	.22	.64	.51	.03
G	Stipa comata	b143	b118	a53	b134	b150	2.07	.96	4.63	3.23
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		632	656	524	491	566	8.49	12.04	10.27	10.05
Total for Grasses		632	656	524	491	566	8.49	12.04	10.27	10.05
F	Allium sp.	b14	a-	a-	a-	a-	-	-	.00	-
F	Antennaria rosea	4	-	-	3	-	-	-	.00	-
F	Arabis sp.	b73	a12	a18	a18	a1	.03	.04	.05	.03
F	Aster sp.	a1	a-	a-	b19	a-	-	-	.19	-
F	Astragalus convallarius	-	5	6	7	3	.15	.18	.01	.00
F	Astragalus sp.	1	4	4	-	-	.03	.03	-	-
F	Castilleja chromosa	c183	b36	a-	a-	a-	.15	-	-	-
F	Castilleja linariaefolia	a3	a6	b22	a2	a6	.02	.62	.03	.03
F	Chenopodium sp. (a)	-	-	-	6	4	-	-	.01	.01
F	Cirsium calcareum	-	-	1	-	-	-	.03	-	-
F	Collinsia parviflora (a)	-	-	-	-	4	-	-	-	.01
F	Collomia linearis (a)	-	a-	a-	b126	a8	-	-	.44	.06
F	Comandra pallida	-	-	-	-	9	-	-	-	.07
F	Crepis acuminata	c169	b55	b64	b66	b19	.30	2.25	1.12	.18
F	Cryptantha sp.	c51	a7	a1	ab22	bc32	.04	.00	.20	.34
F	Delphinium nuttallianum	b14	b9	a-	a-	a-	.02	-	-	-
F	Draba sp. (a)	-	3	-	-	-	.00	-	-	-
F	Erigeron eatonii	b113	b113	b125	a32	a28	.80	1.80	.17	.21
F	Erigeron pumilus	a16	b48	a10	a12	a19	.18	.07	.06	.06
F	Eriogonum alatum	a-	b15	b17	b17	b23	.06	.18	.32	.23
F	Eriogonum racemosum	a19	b42	ab33	ab28	ab30	.19	.76	.45	.21
F	Eriogonum umbellatum	b166	a15	a28	a11	a35	.35	.61	.42	.52
F	Gilia sp. (a)	-	6	3	-	-	.01	.03	-	-
F	Heterotheca villosa	a-	a3	b36	b29	b25	.15	1.74	.81	.99
F	Lappula occidentalis (a)	-	-	-	4	-	-	-	.01	-
F	Linum lewisii	1	-	-	-	-	-	-	-	-
F	Lithospermum ruderales	8	1	2	3	-	.00	.00	.03	-
F	Lupinus sp.	-	-	-	2	4	-	-	.00	.09
F	Lygodesmia sp.	-	-	-	5	1	-	-	.06	.00

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
F	<i>Machaeranthera canescens</i>	-	-	-	-	-	-	-	.03	-
F	<i>Machaeranthera grindelioides</i>	ab22	b26	ab11	a-	a3	.09	.40	-	.04
F	<i>Oxytropis lambertii</i>	-	-	-	1	-	-	-	.00	-
F	<i>Penstemon comarrhenus</i>	a-	a-	b58	b33	b36	-	1.83	.32	.57
F	<i>Penstemon humilis</i>	b36	b37	a4	a14	ab16	.66	.15	.39	.11
F	<i>Phlox austromontana</i>	b121	ab74	b99	a61	ab80	1.49	2.34	.93	1.40
F	<i>Phlox longifolia</i>	-	1	-	-	-	.00	-	-	-
F	<i>Polygonum douglasii</i> (a)	-	a12	a6	b115	a10	.05	.01	.32	.01
F	<i>Potentilla gracilis</i>	-	-	7	1	6	-	.06	.03	.09
F	<i>Schoenocrambe linifolia</i>	-	-	3	-	-	-	.03	-	-
F	<i>Senecio integerrimus</i>	-	6	8	3	-	.04	.04	.03	-
F	<i>Senecio multilobatus</i>	b23	ab15	ab12	a7	a5	.03	.03	.05	.01
F	<i>Townsendia</i> sp.	2	-	-	-	-	-	-	-	-
F	<i>Trifolium</i> sp.	c75	ab21	a5	b36	ab21	.09	.01	.09	.05
F	<i>Zigadenus paniculatus</i>	b15	a-	a1	a3	a-	-	.00	.01	-
Total for Annual Forbs		0	21	9	251	26	0.07	0.04	0.78	0.09
Total for Perennial Forbs		1130	551	575	435	402	4.94	13.27	5.86	5.32
Total for Forbs		1130	572	584	686	428	5.01	13.31	6.65	5.42

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

BROWSE TRENDS--

Management unit 16C, Study no: 25

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	<i>Amelanchier utahensis</i>	5	2	0	2	1.18	.00	-	.03
B	<i>Artemisia frigida</i>	1	2	2	2	.00	.00	.03	.00
B	<i>Artemisia nova</i>	0	2	5	1	-	.30	.00	.00
B	<i>Artemisia tridentata vaseyana</i>	84	77	66	80	7.41	8.27	8.61	8.01
B	<i>Ceratoides lanata</i>	0	3	1	1	-	.00	.00	.00
B	<i>Chrysothamnus depressus</i>	50	49	47	56	1.20	1.92	2.67	2.16
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	31	28	25	34	.46	.60	1.05	.89
B	<i>Eriogonum corymbosum</i>	0	0	0	0	.03	-	-	-
B	<i>Gutierrezia sarothrae</i>	18	15	43	29	.21	.19	1.81	.83
B	<i>Leptodactylon pungens</i>	32	24	23	13	.51	.61	.42	.09
B	<i>Pediocactus simpsonii</i>	1	1	0	0	.00	.00	-	-
B	<i>Symphoricarpos oreophilus</i>	3	3	6	5	.15	.00	.00	.01
B	<i>Tetradymia canescens</i>	6	5	5	4	.03	.15	.18	.03
Total for Browse		231	211	223	227	11.23	12.06	14.80	12.07

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 25

Species	Percent Cover	
	'04	'09
Amelanchier utahensis	-	.43
Artemisia frigida	.06	-
Artemisia nova	.68	-
Artemisia tridentata vaseyana	9.44	9.00
Ceratoides lanata	-	.06
Chrysothamnus depressus	1.88	1.95
Chrysothamnus viscidiflorus viscidiflorus	1.21	.95
Gutierrezia sarothrae	1.08	.91
Leptodactylon pungens	.58	.05
Symphoricarpos oreophilus	.36	.38
Tetradymia canescens	.36	.13

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 25

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	6.6	1.0
Artemisia tridentata vaseyana	2.0	1.5

BASIC COVER--

Management unit 16C, Study no: 25

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	12.50	25.56	32.70	31.19	28.50
Rock	.25	.42	3.50	2.20	2.65
Pavement	1.50	.37	1.58	3.03	1.02
Litter	44.25	33.93	24.04	32.25	35.53
Cryptogams	4.00	2.63	3.77	2.83	1.52
Bare Ground	37.50	38.25	33.43	41.58	40.37

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 25, Study Name: South Horn 1/4 Corner

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.5	6.8	57.4	28.7	13.8	1.3	2.5	115.2	0.5

PELLET GROUP DATA--

Management unit 16C, Study no: 25

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	23	14	4	29
Elk	38	34	48	59
Deer	6	19	4	3
Cattle	-	3	4	10

Days use per acre (ha)		
'99	'04	'09
-	-	-
71 (175)	84 (207)	26 (65)
9 (22)	5 (12)	7 (18)
3 (7)	9 (22)	-

BROWSE CHARACTERISTICS--
Management unit 16C, Study no: 25

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
88	0	0	0	-	-	0	0	0	-/-
94	180	0	100	-	-	11	0	0	27/36
99	40	0	100	-	-	50	50	0	36/45
04	0	0	0	-	-	0	0	0	34/50
09	40	50	50	-	-	0	0	0	37/45
<i>Artemisia frigida</i>									
88	0	0	0	-	133	0	0	0	-/-
94	20	0	100	-	-	0	0	0	5/7
99	40	0	100	-	-	0	0	0	9/9
04	40	0	100	-	-	50	0	0	7/12
09	40	0	100	-	-	0	0	0	-/-
<i>Artemisia nova</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	40	50	50	-	-	0	0	0	6/18
04	200	10	90	-	-	0	0	0	5/13
09	20	0	100	-	-	100	0	0	5/10
<i>Artemisia tridentata vaseyana</i>									
88	10132	33	22	45	133	33	14	10	10/13
94	4180	7	40	54	-	22	20	36	12/22
99	4840	21	67	13	60	30	65	6	16/25
04	3180	18	57	25	19420	45	18	11	19/31
09	6360	54	28	18	8740	14	23	13	15/28
<i>Ceratoides lanata</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	100	20	80	-	-	60	0	0	-/-
04	40	0	100	-	-	100	0	0	6/9
09	60	0	100	-	-	100	0	0	2/3
<i>Chrysothamnus depressus</i>									
88	4398	42	36	21	133	21	15	8	3/5
94	2500	1	98	2	-	11	2	0	3/7
99	3060	3	95	1	40	5	0	0	3/8
04	3660	0	93	7	-	7	5	1	4/9
09	5080	9	85	6	-	3	0	4	3/7

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
88	1665	76	24	0	-	12	20	0	6/6	
94	1200	2	98	0	-	15	0	0	5/8	
99	1260	5	95	0	-	0	0	0	6/9	
04	1040	0	100	0	-	0	0	0	8/13	
09	2060	0	98	2	160	0	2	3	6/9	
<i>Gutierrezia sarothrae</i>										
88	266	50	50	0	-	0	0	0	3/4	
94	580	0	100	0	-	0	0	0	4/6	
99	740	14	86	0	-	0	0	0	5/7	
04	2220	10	89	1	400	0	5	7	6/10	
09	1860	12	84	4	60	0	0	2	4/7	
<i>Leptodactylon pungens</i>										
88	9598	18	77	5	466	.69	0	1	4/4	
94	1380	1	96	3	-	0	0	0	3/6	
99	1320	9	91	0	20	0	0	0	4/5	
04	880	7	93	0	-	0	0	0	5/7	
09	580	7	93	0	-	0	0	0	3/5	
<i>Pediocactus simpsonii</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	20	0	100	-	-	0	0	0	1/2	
99	20	0	100	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	1/3	
09	0	0	0	-	-	0	0	0	-/-	
<i>Purshia tridentata</i>										
88	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	12/53	
<i>Symphoricarpos oreophilus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	80	0	50	50	-	25	0	25	13/28	
99	80	0	100	0	-	0	0	0	13/20	
04	160	13	63	25	-	0	0	0	7/10	
09	120	0	100	0	-	0	17	50	9/14	
<i>Tetradymia canescens</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	180	22	78	0	-	22	0	0	4/6	
99	100	20	80	0	-	40	0	0	6/8	
04	120	17	67	17	-	17	17	17	6/10	
09	100	20	80	0	-	0	20	0	6/11	

DRY MOUNTAIN - TREND STUDY NO. 16C-26-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 7,850 ft (2,393 m)

Aspect: North

Slope: 5%

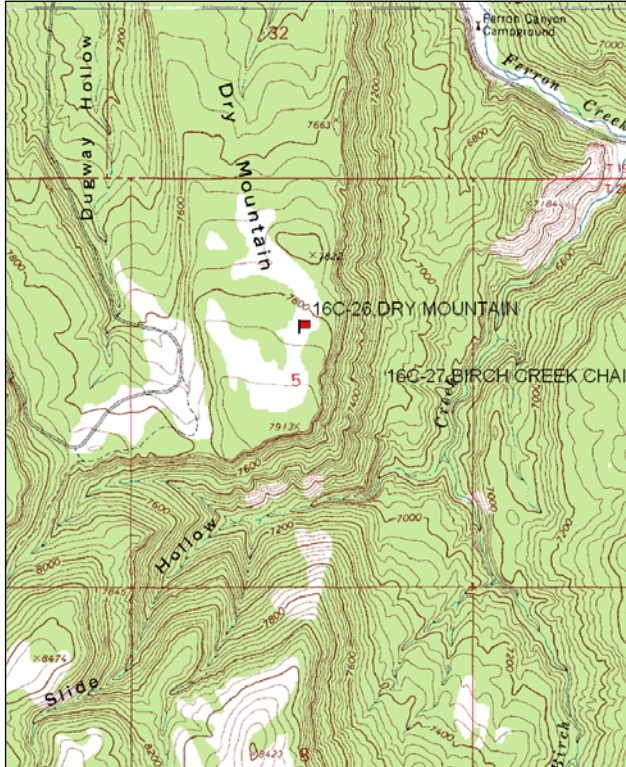
Transect bearing: 180 degrees magnetic.

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

Directions:

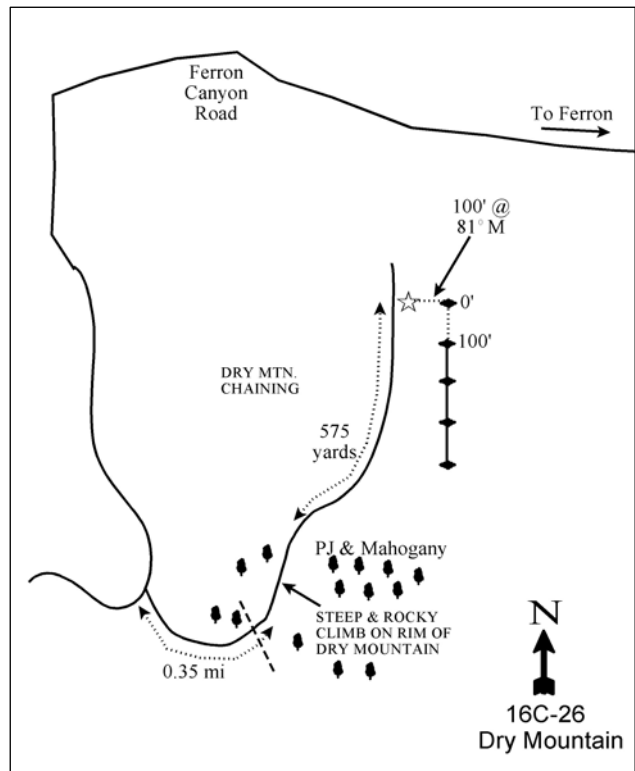
From the junction of Highway U-10 and Canyon Road in Ferron, proceed west up Ferron Canyon toward Ferron Reservoir for 12.85 miles. At this point, bear left (SE) and go 0.35 mile to the base of Dry Mountain, where the road becomes impassably steep and rocky. From the top of this steep section, hike north down the road approximately 575 yards to a witness post on the right side of the road. From the witness post walk east at 81° M about 100 feet to the 0-foot baseline stake. The study stakes are short green fenceposts.

Map Name: Flagstaff Peak



Township: 20S, Range: 6E, Section: 5

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 476587 E 4329154 N

DRY MOUNTAIN - TREND STUDY NO. 16C-26

Site Information

Site Description: The study is on the north-facing Dry Mountain Plateau which provides excellent winter range for deer and elk in mild to normal winters. The plateau was chained and seeded in 1967 and now supports a vigorous stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*). Along the edges are mature pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) populations. The area is managed as part of the Ferron grazing allotment. Summer cattle use is restricted by the lack of water and access to the plateau. Pellet group data has indicated heavy use by deer and light use by elk and cattle since 1999 (Table - Pellet Group Data).

Browse: Both mountain big sagebrush and antelope bitterbrush are abundant on the site and provide valuable forage. Mountain big sagebrush is the dominant species in cover on the site (Table - Browse Trends). The sagebrush population is mostly healthy, but does have moderately high amounts of decadence and poor vigor. Recruitment of young sagebrush plants has been low since 1994. Utilization of sagebrush has been mostly moderate with some heavy use over the study years. The highly palatable antelope bitterbrush is abundant and has a healthy population with low decadence and poor vigor. Decadence of bitterbrush was high in 2004, following a drought. Recruitment of young bitterbrush plants has been mostly low, but there was good recruitment in 1988 and 1999. Utilization of bitterbrush has been mostly moderate and heavy. Stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) is also fairly abundant on the site and has been steadily increasing in cover since 1994 (Table - Browse Characteristics). Juniper and pinyon trees had begun to reestablish at moderate density by 1994, and a lop-and-scatter treatment was done in 1999 prior to the sampling. Density of pinyon and juniper has been less than 18 trees/acre for each species since the treatment (Table - Point-Quarter Tree Data).

Herbaceous Understory: Grasses are diverse, but not very abundant due to the dominance of shrubs. The most abundant grass species include western wheatgrass (*Agropyron smithii*), blue grama (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*), and Indian ricegrass (*Oryzopsis hymenoides*). Many forb species have been sampled over the study years, but forbs are not common. Lobeleaf groundsel (*Senecio multilobatus*) was fairly abundant in 1999, but not in any other sample year (Table - Herbaceous Trends).

Soil: The soil has a loamy sand texture with a neutral to slightly alkaline pH (7.3). Phosphorus and potassium have limited availability for plant growth and development at 2.9 ppm and 41.6 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is fairly low due to high amounts of protective cover provided by litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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. Poor vigor of mountain big sagebrush increased from 2% to 21% of the population and recruitment decreased from 27% to 2%.
- **1994 to 1999 - slightly up (+1):** The density of bitterbrush increased by 14% and decadence decreased from 23% to 9%. Recruitment of young bitterbrush plants increased from 3% to 20% of the population. There was little change in the density of mountain big sagebrush, but poor vigor decreased to 5%.
- **1999 to 2004 - slightly down (-1):** Bitterbrush density decreased by 24%, but mountain big sagebrush density remained similar. Decadence of bitterbrush increased to 48% and poor vigor increased from 1% to 18%. Recruitment of young bitterbrush plants decreased to 5%. Cover of bitterbrush also decreased from 7% to 5%, but again, there was little change in sagebrush.

- **2004 to 2009 - slightly up (+1):** The density of bitterbrush increased by 24% and decadence decreased to 12%. Recruitment of young bitterbrush plants remained low at 6%. There was little change in the mountain big sagebrush population.

Grass:

- **1988 to 1994 - stable (0):** The sum of nested frequency of perennial grasses changed little.
- **1994 to 1999 - down (-2):** Perennial grass sum of nested frequency decreased by 23%, though there was little change in cover.
- **1999 to 2004 - down (-2):** There was a 40% decrease in the sum of nested frequency and cover decreased from 4% to 3%. There was a significant decrease in the nested frequency of needle-and-thread.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased by 40% and cover increased to 5%. Indian ricegrass increased significantly in nested frequency.

Forb:

- **1988 to 1994 - down (-2):** There was a 52% decrease in the sum of nested frequency of perennial forbs.
- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial forbs increased over four-fold and cover increased from less than 0.5% to 3%. Most of the increase was due to a significant increase in the nested frequency and a large increase in cover of lobeleaf groundsel.
- **1999 to 2004 - down (-2):** Perennial forb sum of nested frequency decreased by 66% and cover decreased to less than 1%. Again, most of the decrease was due to a significant decrease in the nested frequency and a large decrease in cover of lobeleaf groundsel. Forbs are now very rare on the site.
- **2004 to 2009 - slightly down (-1):** Both the sum of nested frequency and cover of perennial forbs continued to decrease. Forbs are very rare on the site.

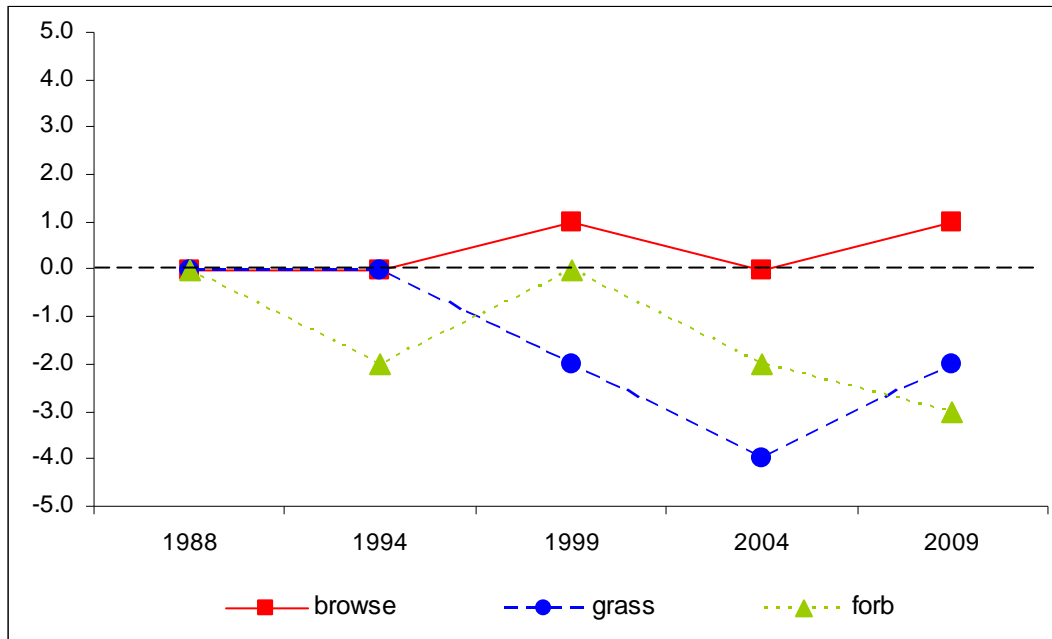
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 26

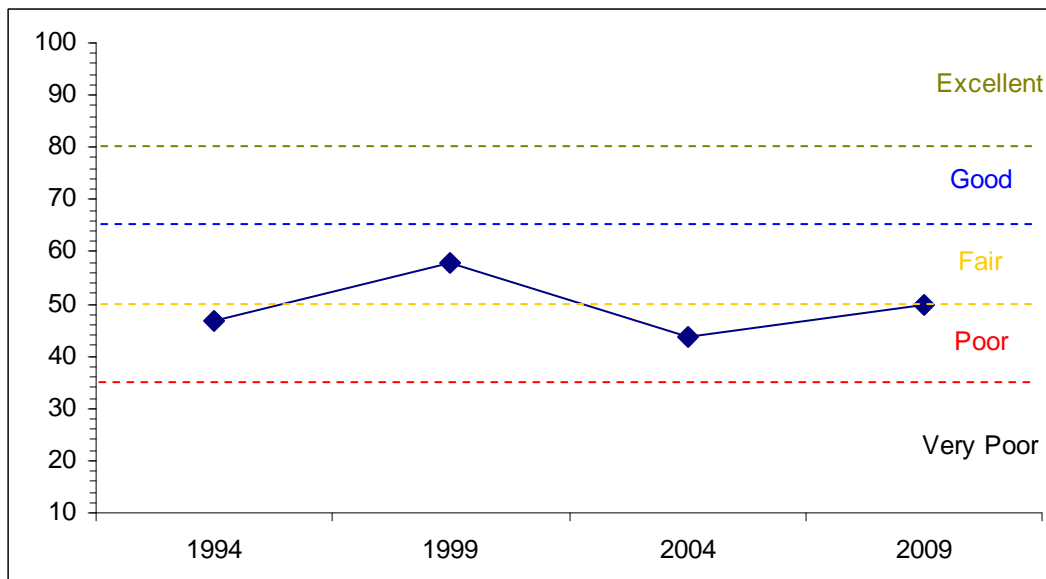
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	30.0	5.5	1.1	9.6	0.0	0.6	0.0	46.8	Poor
99	30.0	9.4	4.4	8.7	0.0	5.5	0.0	57.9	Fair
04	30.0	4.3	1.3	6.5	0.0	1.7	0.0	43.8	Poor
09	28.9	7.8	1.0	10.6	0.0	1.2	0.0	49.7	Poor-Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 26



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 16C, Study no: 26



HERBACEOUS TRENDS--
Management unit 16C, Study no: 26

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron intermedium	-	-	-	4	-	-	-	.03	-

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	_b 105	_b 98	_{ab} 68	_a 42	_a 38	.35	.40	.47	.26
G	Bouteloua gracilis	64	47	42	34	40	1.86	1.60	1.16	2.15
G	Carex sp.	1	4	4	-	-	.03	.15	.03	-
G	Elymus salina	_a -	_a -	_a 3	_{ab} 5	_b 14	-	.03	.37	.54
G	Oryzopsis hymenoides	_a 6	_a 26	_a 16	_a 15	_b 53	.69	.43	.29	1.31
G	Poa fendleriana	12	15	10	7	5	.05	.02	.18	.06
G	Sitanion hystrix	_a -	_b 11	_{ab} 6	_b 9	_b 9	.02	.02	.08	.22
G	Sporobolus cryptandrus	3	3	2	5	-	.00	.15	.06	-
G	Stipa comata	_d 117	_{cd} 97	_{bc} 75	_a 19	_{ab} 37	1.76	1.34	.52	.74
G	Stipa lettermani	-	-	6	-	-	-	.18	.03	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		308	301	232	140	196	4.78	4.34	3.24	5.31
Total for Grasses		308	301	232	140	196	4.78	4.34	3.24	5.31
F	Androsace septentrionalis (a)	-	_a -	_b 14	_a -	_a -	-	.06	-	-
F	Antennaria sp.	2	-	-	-	-	-	-	-	-
F	Arabis perennans	_b 13	_a 1	_a -	_a -	_a -	.00	-	-	-
F	Arabis sp.	_{ab} 23	_{ab} 3	22	_{ab} 9	_b 22	.01	.05	.03	.09
F	Aster sp.	_a -	_a -	_b 30	_a -	_a -	-	.17	-	-
F	Astragalus convallarius	2	-	-	2	-	-	-	.03	-
F	Astragalus sp.	-	1	4	2	-	.00	.03	.03	-
F	Chaenactis douglasii	_b 12	_a 3	_b 16	_a 3	_a -	.01	.08	.00	-
F	Chenopodium sp. (a)	-	-	-	3	-	-	-	.00	-
F	Crepis acuminata	4	-	1	-	1	-	.00	-	.03
F	Cryptantha sp.	_a -	_{ab} 15	_b 27	_a 7	_a 4	.09	.72	.18	.03
F	Descurainia pinnata (a)	-	-	1	3	3	-	.00	.00	.00
F	Erigeron pumilus	_a 3	_a -	_b 15	_{ab} 11	_{ab} 6	-	.14	.03	.09
F	Eriogonum cernuum (a)	-	-	-	2	-	-	-	.00	-
F	Eriogonum racemosum	4	2	3	7	1	.01	.04	.09	.03
F	Gaillardia pinnatifida	-	1	-	-	-	.00	-	-	-
F	Gayophytum ramosissimum(a)	-	2	-	3	3	.00	-	.01	.00
F	Heterotheca villosa	-	-	-	1	-	-	-	.03	-
F	Ipomopsis aggregata	-	-	1	-	-	-	.00	-	-
F	Lygodesmia sp.	-	1	3	-	4	.03	.15	-	.01
F	Machaeranthera canescens	-	-	11	1	4	-	.08	.01	.16
F	Oenothera sp.	3	-	1	-	1	-	.00	-	.00
F	Polygonum douglasii (a)	-	3	-	-	-	.00	-	-	-
F	Schoenrambe linifolia	22	23	12	10	2	.08	.03	.07	.01
F	Senecio multilobatus	_a 36	_a 10	_b 118	_a 36	_a 24	.06	1.24	.33	.15
F	Trifolium sp.	-	-	2	1	-	-	.01	.00	-
Total for Annual Forbs		0	5	15	11	6	0.00	0.07	0.02	0.00
Total for Perennial Forbs		124	60	266	90	69	0.31	2.77	0.86	0.62
Total for Forbs		124	65	281	101	75	0.31	2.84	0.88	0.62

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

BROWSE TRENDS--

Management unit 16C, Study no: 26

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia tridentata vaseyana	88	86	88	87	19.94	21.67	22.86	17.55
B	Chrysothamnus viscidiflorus viscidiflorus	53	55	56	47	1.53	2.07	2.45	1.77
B	Echinocereus triglochidatus	0	4	0	1	-	.00	-	.00
B	Gutierrezia sarothrae	7	8	9	11	.00	.02	.21	.24
B	Juniperus osteosperma	0	0	0	0	.66	-	-	-
B	Leptodactylon pungens	19	18	16	21	.13	.25	.78	.40
B	Opuntia sp.	5	9	11	7	.00	.05	.18	.07
B	Pinus edulis	0	3	1	1	.44	.18	.00	.00
B	Purshia tridentata	43	51	46	50	5.56	7.15	4.94	4.67
Total for Browse		215	234	227	225	28.28	31.39	31.43	24.71

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 26

Species	Percent Cover	
	'04	'09
Artemisia tridentata vaseyana	25.98	25.33
Chrysothamnus viscidiflorus viscidiflorus	3.90	2.48
Gutierrezia sarothrae	.26	.61
Leptodactylon pungens	.33	.25
Purshia tridentata	6.93	7.58

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 26

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	1.6	0.9
Purshia tridentata	3.6	1.8

POINT-QUARTER TREE DATA--

Management unit 16C, Study no: 26

Species	Trees per Acre		Average diameter (in)	
	'94	'99	'94	'99
Juniperus osteosperma	52	9	-	6.6
Pinus edulis	25	13	-	2.2

BASIC COVER--

Management unit 16C, Study no: 26

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	5.75	37.89	34.27	36.88	30.00
Rock	2.25	2.88	3.32	3.91	4.66
Pavement	.25	.52	.63	.79	.43
Litter	69.50	46.47	49.09	54.00	53.30
Cryptogams	2.50	3.01	2.12	2.16	4.82
Bare Ground	19.75	24.49	26.34	22.61	26.62

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 26, Study Name: Dry Mountain

Effective rooting depth (in)	pH	loamy sand			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14	n/a	83.6	5.8	10.6	1	2.9	41.6	0.7

PELLET GROUP DATA--

Management unit 16C, Study no: 26

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	21	42	13	36	-	-	-
Elk	2	-	-	-	1 (3)	-	3 (7)
Deer	64	34	38	26	72 (178)	110 (271)	41 (101)
Cattle	-	-	-	1	2 (5)	3 (7)	2 (4)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 26

		Age class distribution					Utilization		
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>									
88	7198	27	42	31	999	61	7	2	19/29
94	3840	2	64	34	20	42	8	21	20/36
99	3940	5	73	22	20	53	10	5	23/36
04	3640	2	65	33	520	66	19	12	20/36
09	3520	1	72	27	120	40	31	18	20/37
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
88	5064	25	71	4	133	1	1	0	8/9
94	1960	0	99	1	-	9	3	1	11/14
99	2120	16	82	2	160	9	0	.94	14/16
04	2280	2	84	14	20	3	.87	4	13/17
09	2440	3	88	9	40	2	0	6	12/17

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Echinocereus triglochidatus</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	80	25	75	-	-	0	0	0	1/3	
04	0	0	0	-	-	0	0	0	-/-	
09	20	0	100	-	-	0	0	0	3/13	
<i>Gutierrezia sarothrae</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	360	6	94	0	-	0	0	0	5/6	
99	400	30	70	0	20	0	0	0	7/6	
04	580	41	59	0	260	0	0	0	9/10	
09	1000	0	98	2	-	0	0	0	7/7	
<i>Juniperus osteosperma</i>										
88	66	100	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	-/-	
<i>Leptodactylon pungens</i>										
88	2465	38	59	3	133	0	0	0	5/5	
94	800	0	100	0	-	0	0	0	6/6	
99	1040	21	71	8	180	0	0	6	5/7	
04	900	7	87	7	20	0	0	2	7/10	
09	1120	0	100	0	-	0	0	0	5/8	
<i>Opuntia sp.</i>										
88	199	0	100	0	-	0	0	0	2/2	
94	120	17	83	0	-	0	0	0	3/11	
99	280	21	71	7	-	0	0	7	2/6	
04	340	12	88	0	-	0	0	12	2/9	
09	240	8	83	8	-	0	0	8	3/13	
<i>Pinus edulis</i>										
88	266	100	0	-	133	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	60	100	0	-	-	0	0	33	-/-	
04	20	100	0	-	20	0	100	0	-/-	
09	20	100	0	-	-	0	0	0	-/-	
<i>Purshia tridentata</i>										
88	998	27	60	13	66	67	0	0	14/28	
94	1500	3	75	23	-	51	7	5	15/40	
99	1720	20	71	9	60	12	23	1	19/39	
04	1300	5	48	48	-	20	77	18	15/38	
09	1620	6	81	12	-	25	33	9	16/36	

BIRCH CREEK CHAINING - TREND STUDY NO. 16C-27-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 7,360 ft (2,243 m)

Aspect: West

Slope: 5%

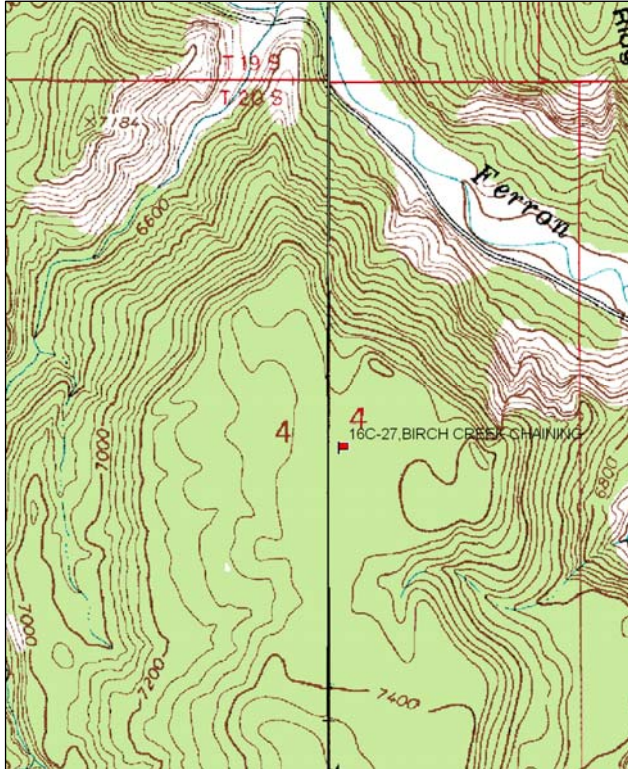
Transect bearing: 180 degrees magnetic.

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

Directions:

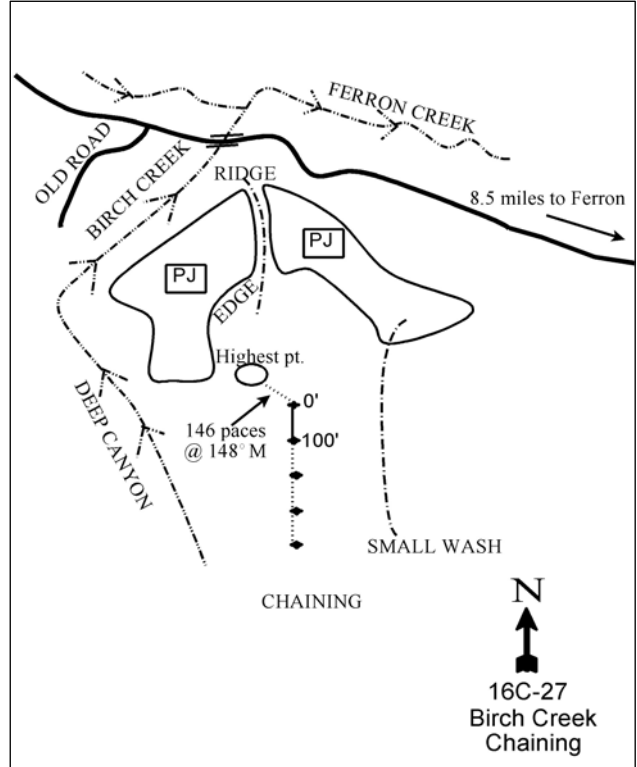
From Ferron, go west up the Ferron Canyon Road approximately 8.5 miles, past Millsite Reservoir and the FS boundary, to a bridge over Birch Creek, a tributary of Ferron Creek (2.1 miles from forest boundary). The Birch Creek chaining is located on top of the bench to the south. The easiest way to the study site is to hike up along the steep and rocky ridge to the P-J on top. Continue south up through the P-J to the edge of the chaining. The study site is in the middle of the chaining, marked by 18" fenceposts. From the highest point along the edge of the P-J, walk south (148° M) for 146 paces to the 0-foot baseline stake. This stake is marked by browse tag #9026.

Map Name: Flagstaff Peak



Township: 20S, Range: 6E, Section: 4

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 478355 E 4328837 N

BIRCH CREEK CHAINING - TREND STUDY NO. 16C-27

Site Information

Site Description: The study is located on the remote, north end of a bench above Ferron Creek. A large area was chained, trenched on contour, and seeded in 1972. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the dominant vegetation over much of the area with grasses fairly abundant within the chaining. The study is located in the center of the chaining. A lop and scatter treatment was done to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) in the fall of 2004, after the site was read. This site is managed by the Forest Service as part of the Ferron allotment. Pellet group data has indicated lightly moderate use by deer and cattle since 1999. Estimated elk use was moderate in 1999, heavy in 2004, and light in 2009 (Table - Pellet Group Data).

Browse: Browse species are limited on the site with mountain big sagebrush providing the majority of the browse cover over the study. Following the removal treatment of pinyon and juniper trees, mountain big sagebrush provided almost all of the browse cover in 2009 (Table - Browse Trends). The sagebrush population is healthy with low decadence, good vigor, and good recruitment of young plants over the length of the study. Sagebrush plants have displayed mostly light with some moderate to heavy utilization since 1994 (Table - Browse Characteristics). Prior to the removal treatment, pinyon and juniper trees had reestablished on the site following the original chaining at moderate densities and size. Following the treatment, there were few trees on the site (Table - Point-Quarter Tree Data) and those sampled were mostly smaller than 4 feet tall. Valuable browse species such as curleaf and true mountain mahogany (*Cercocarpus ledifolius* and *C. montanus*), Utah serviceberry (*Amelanchier utahensis*), ephedra (*Ephedra veridis*), and bitterbrush (*Purshia tridentata*) are found on the undisturbed slopes.

Herbaceous Understory: Grasses are a very important forage resource on this chained site, though they are not very diverse being dominated by seeded species. Seeded species include crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*A. intermedium*), and smooth brome (*Bromus inermis*), with crested wheatgrass being the dominant grass species. Indian ricegrass (*Oryzopsis hymenoides*) is common and is the most prevalent native grass species on the site. Forbs are extremely rare on the site and have provided less than 1% cover since 1994 (Table - Herbaceous Trends).

Soil: Soil texture is a sandy clay loam with a slightly alkaline pH. Potassium has limited availability for plant growth and development 51.2 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is low with good protective ground cover coming primarily from large debris from the chaining and lop-and-scatter treatments (Table - Basic Cover). The well-vegetated trenches also help to prevent erosion on this gentle slope. The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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 mountain big sagebrush population.
- **1994 to 1999 - up (+2):** Density of mountain big sagebrush increased by 22% from 3,000 plants/acre to 3,660 plants/acre, and cover increased from 8% to 11%. Decadence, vigor, and recruitment of mountain big sagebrush all remained good.
- **1999 to 2004 - stable (0):** There was little change in the density of mountain big sagebrush, though cover increased to 13%. Decadence of sagebrush increased from 13% to 25% and poor vigor increased from 2% to 10%. Recruitment of young sagebrush decreased from 15% to 10%, but is still considered good.

- **2004 to 2009 - up (+2):** The density of mountain big sagebrush increased by 54% from 3,540 plants/acre to 5,480 plants/acre. Decadence of sagebrush decreased to 12% and recruitment of young plants increased to 22% of the population.

Grass:

- **1988 to 1994 - down (-2):** The sum of nested frequency of perennial grasses decreased by 34% with a significant decrease in intermediate wheatgrass and bottlebrush squirreltail (*Sitanion hystrix*) nested frequency.
- **1994 to 1999 - slightly up (+1):** Perennial grass sum of nested frequency increased by 19% and cover increased from 12% to 14%. There was a significant increase in the nested frequency of crested wheatgrass and smooth brome.
- **1999 to 2004 - down (-2):** There was a 47% decrease in the sum of nested frequency of perennial grasses and cover decreased to 8%. There was a significant decrease in the three seeded species, crested wheatgrass, intermediate wheatgrass, and smooth brome.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased by 28% and cover increased to 11%.

Forb:

- **1988 to 1994 - stable (0):** Forbs are very rare on the site.
- **1994 to 1999 - stable (0):** Forbs are very rare on the site.
- **1999 to 2004 - stable (0):** Forbs are very rare on the site.
- **2004 to 2009 - stable (0):** Forbs are very rare on the site.

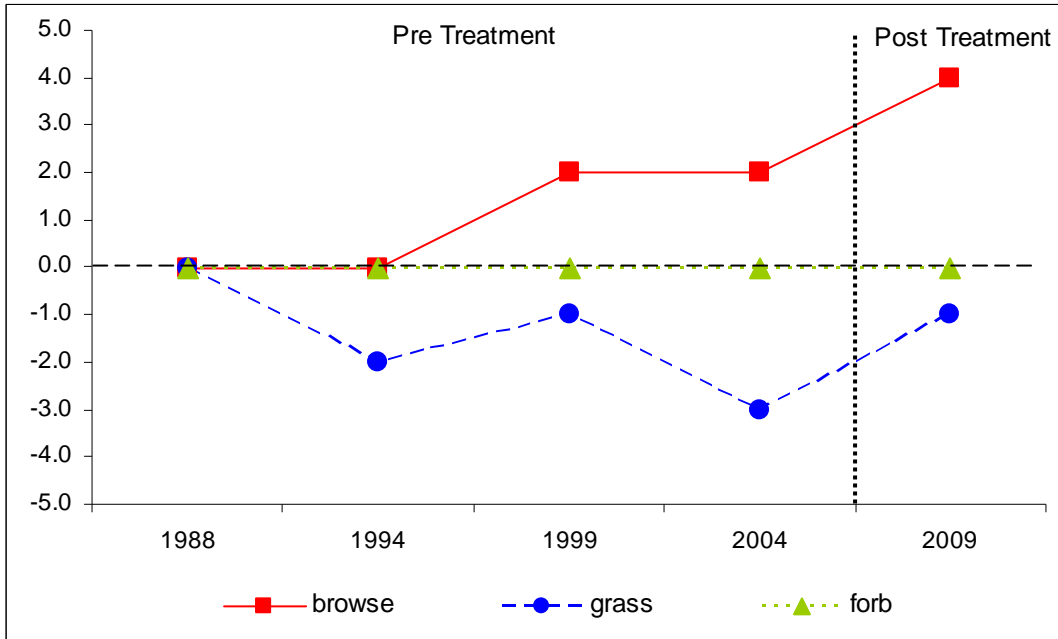
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 27

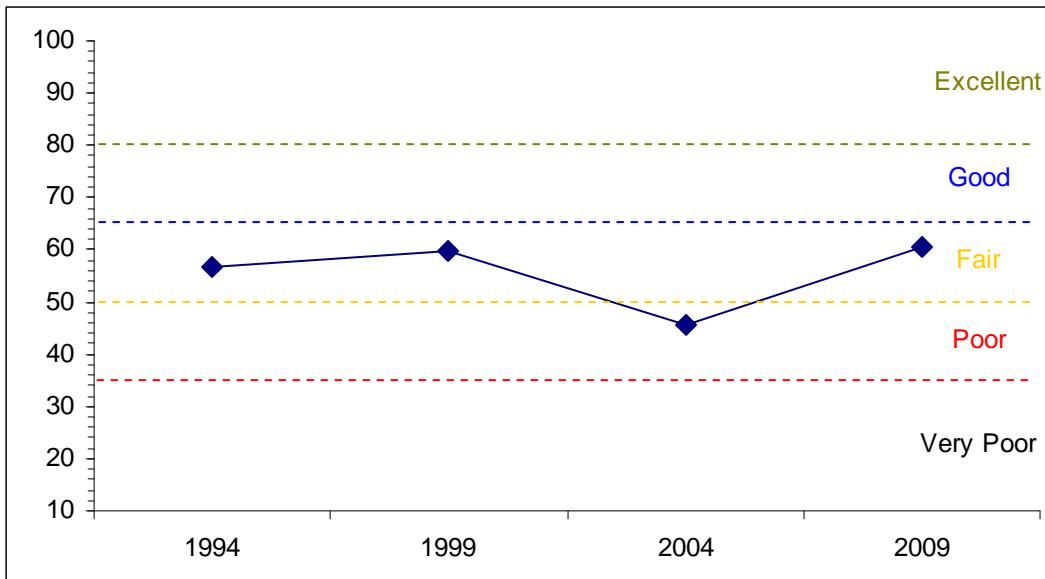
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	9.8	11.7	11.5	23.8	0.0	0.1	0.0	56.9	Fair
99	13.8	11.1	7.5	27.4	0.0	0.0	0.0	59.8	Fair
04	16.7	7.5	5.0	16.3	0.0	0.1	0.0	45.5	Poor
09	16.3	11.4	11.0	21.7	0.0	0.0	0.0	60.4	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 27



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 16C, Study no: 27



HERBACEOUS TRENDS--

Management unit 16C, Study no: 27

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	a159	a154	b191	a131	ab157	8.27	10.18	7.07	9.55
G	Agropyron intermedium	d162	c77	bc56	a15	ab25	1.88	.99	.11	.20
G	Bromus inermis	bc77	ab53	c90	a25	a39	1.08	1.47	.28	.17
G	Elymus salina	-	2	-	-	-	.00	-	.00	-
G	Oryzopsis hymenoides	37	18	23	15	28	.61	1.00	.59	.94
G	Sitanion hystrix	b23	a3	a7	a5	a-	.00	.04	.03	-
G	Sporobolus cryptandrus	-	1	-	3	-	.00	-	.03	-
G	Stipa pinetorum	9	-	-	-	-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		467	308	367	194	249	11.88	13.69	8.13	10.87
Total for Grasses		467	308	367	194	249	11.88	13.69	8.13	10.87
F	Arabis sp.	-	2	-	-	-	.03	-	-	-
F	Chenopodium fremontii (a)	-	-	-	2	3	-	-	.03	.00
F	Chenopodium glaucum (a)	b9	a1	a-	a-	a-	.00	-	-	-
F	Chenopodium sp. (a)	-	a-	a-	b12	a-	-	-	.19	-
F	Cryptantha sp.	1	-	-	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	a5	a-	b30	a-	.01	-	.22	-
F	Ipomopsis aggregata	3	3	-	-	-	.00	-	-	-
F	Penstemon caespitosus	5	5	-	-	3	.03	-	-	.00
F	Senecio multilobatus	b11	a-	a-	a1	a-	-	-	.03	-
Total for Annual Forbs		9	6	0	44	3	0.01	0	0.45	0.00
Total for Perennial Forbs		20	10	0	1	3	0.07	0	0.03	0.00
Total for Forbs		29	16	0	45	6	0.09	0	0.48	0.00

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

BROWSE TRENDS--

Management unit 16C, Study no: 27

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	0	1	1	1	-	.00	.00	.00
B	Artemisia tridentata vaseyana	56	68	71	81	7.80	11.05	13.35	13.01
B	Chrysothamnus parryi	0	0	0	1	-	-	-	.00
B	Gutierrezia sarothrae	2	5	4	2	.00	.16	.00	.00
B	Juniperus osteosperma	0	1	2	0	2.36	1.62	1.64	.03
B	Opuntia sp.	1	1	3	3	.00	.00	.03	.03
B	Pinus edulis	0	2	2	0	2.64	1.85	2.99	.03
B	Symphoricarpos oreophilus	0	0	1	0	-	-	.00	-
Total for Browse		59	78	84	88	12.81	14.69	18.01	13.10

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 27

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata vaseyana	-	17.36	13.78
Chrysothamnus parryi	-	-	1.36
Juniperus osteosperma	2.00	1.70	-
Opuntia sp.	-	.05	.11
Pinus edulis	-	4.15	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 27

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.9	0.6

POINT-QUARTER TREE DATA--

Management unit 16C, Study no: 27

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	76	77	30	3.4	4.3	1.1
Pinus edulis	53	54	9	3.6	3.8	1.3

BASIC COVER--

Management unit 16C, Study no: 27

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	2.50	25.13	27.78	25.98	24.28
Rock	1.75	2.50	2.96	2.81	2.67
Pavement	2.00	.49	1.72	1.97	3.48
Litter	65.00	44.10	56.28	44.98	53.02
Cryptogams	0	.09	.04	1.07	.07
Bare Ground	28.75	26.70	24.94	38.90	28.48

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 27, Study Name: Birch Creek Chaining

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15	7.4	72.7	5.4	21.8	1.7	9.6	51.2	0.6

PELLET GROUP DATA--

Management unit 16C, Study no: 27

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	31	40	10	20	-	-	-
Elk	23	18	32	21	35 (87)	67 (165)	12 (30)
Deer	24	14	9	4	11 (27)	17 (41)	21 (51)
Cattle	-	3	1	4	23 (57)	22 (56)	7 (18)

BROWSE CHARACTERISTICS--
Management unit 16C, Study no: 27

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
88	0	0	0	0	-	0	0	0	-/-
94	0	0	0	0	-	0	0	0	-/-
99	20	100	0	0	-	0	0	0	-/-
04	20	0	100	0	-	100	0	0	17/13
09	20	0	0	100	-	0	100	100	23/17
<i>Artemisia tridentata vaseyana</i>									
88	3131	34	53	13	599	43	28	4	12/18
94	3000	23	65	11	40	31	8	1	17/27
99	3660	15	73	13	-	26	21	2	17/27
04	3540	10	66	25	1020	38	14	10	15/32
09	5480	22	66	12	480	23	16	9	16/28
<i>Chrysothamnus parryi</i>									
88	0	0	0	0	-	0	0	0	-/-
94	0	0	0	0	-	0	0	0	-/-
99	0	0	0	0	-	0	0	0	-/-
04	0	0	0	0	-	0	0	0	-/-
09	20	0	0	100	-	0	100	100	-/-
<i>Gutierrezia sarothrae</i>									
88	66	0	100	-	-	0	0	0	27/11
94	40	0	100	-	-	0	0	0	5/7
99	100	0	100	-	-	0	0	0	6/7
04	140	29	71	-	-	0	0	0	6/11
09	40	0	100	-	-	0	0	0	5/6
<i>Juniperus osteosperma</i>									
88	132	50	50	-	-	0	0	0	47/19
94	0	0	0	-	-	0	0	0	-/-
99	40	0	100	-	-	0	0	0	-/-
04	40	50	50	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Opuntia sp.</i>									
88	66	0	0	100	-	0	0	100	-/-
94	20	0	100	0	-	0	0	0	2/4
99	20	0	100	0	-	0	0	0	5/11
04	60	0	100	0	-	0	0	0	4/12
09	60	0	100	0	-	0	0	0	4/15

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Pinus edulis</i>										
88	332	80	20	-	-	0	0	20	43/57	
94	0	0	0	-	-	0	0	0	-/-	
99	40	50	50	-	-	0	0	0	-/-	
04	40	50	50	-	-	0	0	0	-/-	
09	0	0	0	-	20	0	0	0	-/-	
<i>Purshia tridentata</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	31/80	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	28/75	
<i>Symphoricarpos oreophilus</i>										
88	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	9/10	
09	0	0	0	-	-	0	0	0	-/-	

SOUTH OF DRY WASH - TREND STUDY NO. 16C-28-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 6,800 ft (2,073 m)

Aspect: North

Slope: 5%-7%

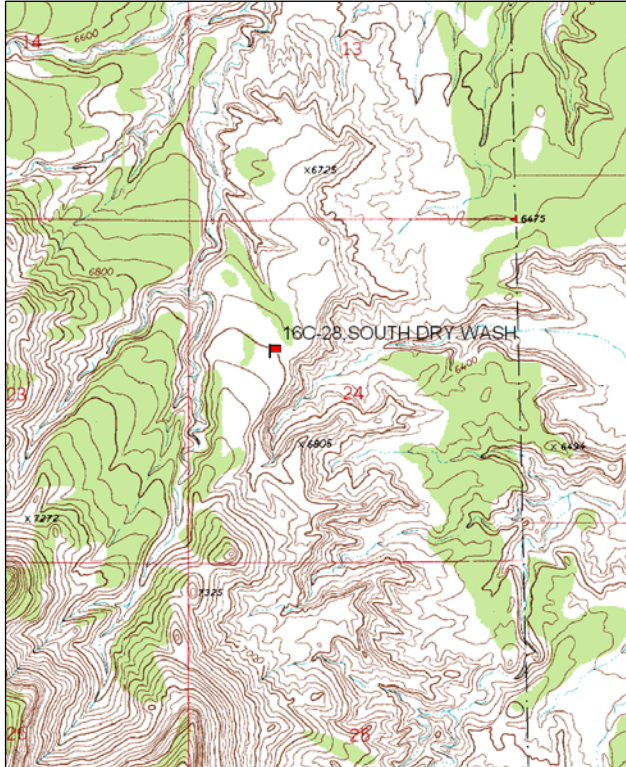
Transect bearing: 170 degrees magnetic.

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

Directions:

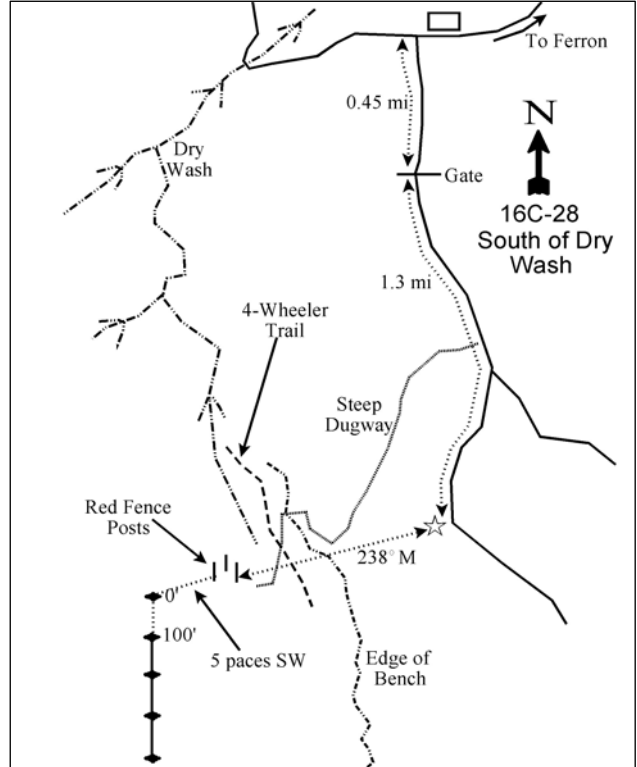
From the town of Ferron, proceed west up Canyon Road for 3.7 miles. 300 ft after the entrance to Millsite Golf Course, turn left onto a dirt road. Go south on the dirt road 0.45 miles to a gate. Continue 1.3 miles to a witness post on F.S. Road #118. From the witness post, walk up the ridge to the west. There is a game trail going to the top at a bearing of 238°M. Take this trail southwest along the edge of the chained area. The road continues up into the east edge of the chaining, where FS photo study plots and the trend study are located. The FS study is marked by tall red fenceposts. The range trend study, marked by 2 foot fenceposts, is adjacent.

Map Name: Ferron



Township: 20S, Range: 6E, Section: 24

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 482610 E 4324073 N

SOUTH OF DRY WASH - TREND STUDY NO. 16C-28

Site Information

Site Description: The study samples a chaining on a bench below Nelson Mountain, south of Dry Wash. The 35 acre chaining and seeding was done in 1972 as a Forest Service wildlife habitat enhancement project. A rather isolated site, it receives little use by cattle. The site produces an abundance of quality forage for wintering big game and appears to be used into the spring by deer. Pellet group data has indicated light to moderate use by elk and heavy use by deer since 1999 (Table - Pellet Group Data).

Browse: The site supports a variety of browse species with three preferred species, black sagebrush (*Artemisia nova*), true mountain mahogany (*Cercocarpus montanus*), and green ephedra (*Ephedra veridis*), providing a large proportion of the browse cover (Table - Browse Trends). Black sagebrush is the most numerous browse species on the site. The black sagebrush population is fairly healthy with low decadence and good vigor, but low recruitment of young plants since 1994. Black sagebrush plants have displayed moderate utilization since 1994. True mountain mahogany is one of the most preferred browse species on the site and has displayed heavy use over the study, with very high use in 2004. The true mountain mahogany population has been mostly healthy, but decadence was high in 2009. Green ephedra plants displayed moderate use in many of the sample years, but had very light utilization in 2009 (Table - Browse Characteristics).

Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees have reestablished on the site and are abundant. Many of the trees are mature, but rather small. The density and average diameter of pinyon and juniper trees have remained similar since 1999 (Table - Point-Quarter Tree Data). The line intercept canopy cover of both species has also remained similar since 2004 (Table - Canopy Cover). Many of the juniper trees sampled were knocked down by the chaining, but were still living.

Herbaceous Understory: Grasses are not particularly diverse or abundant. Two native perennial grasses, Salina wildrye (*Elymus salina*) and Indian ricegrass (*Oryzopsis hymenoides*) provide almost all of the grass cover for the site. Forbs are rare, typically small, and don't offer much forage or cover (Table - Herbaceous Trends).

Soil: Soil texture is a sandy clay loam with a slightly alkaline pH. Phosphorus and potassium have a low availability for plant growth and development at only 3 ppm and 38.4 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is fairly low with good protective ground cover provided by vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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. Decadence of black sagebrush increased from 11% to 30%, but decadence of true mountain mahogany decreased from 14% to 4% and poor vigor decreased from 14% to 0%.
- **1994 to 1999 - slightly up (+1):** Density of black sagebrush increased by 10% and density of true mountain mahogany increased by 14%. Decadence of black sagebrush decreased to 17% and recruitment of young plants increased slightly.
- **1999 to 2004 - slightly up (+1):** Black sagebrush and true mountain mahogany density continued to increase by 12% and 16%, respectively. Cover of black sagebrush increased from 8% to 10%.
- **2004 to 2009 - stable (0):** Density of black sagebrush increased slightly, but the density of true mountain mahogany decreased by 11%. Decadence of true mountain mahogany increased from 3% to 34%. Recruitment of mahogany decreased, but is still high. Cover of mahogany decreased from 8% to 7%.

Grass:

- **1988 to 1994 - stable (0):** There was no change in the sum of nested frequency of perennial grasses.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 15%, but cover changed little.
- **1999 to 2004 - down (-2):** Perennial grass sum of nested frequency decreased by 29% and cover decreased from 9% to 3%. Most of the change came from a large decrease in the nested frequency and cover of Indian ricegrass.
- **2004 to 2009 - up (+2):** There was a 30% increase in the sum of nested frequency and cover increased to 7%. There was a significant increase in the nested frequency of crested wheatgrass.

Forb:

- **1988 to 1994 - down (-2):** Forbs are rare on the site. There was a 25% decrease in the sum of nested frequency of perennial forbs.
- **1994 to 1999 - down (-2):** Perennial forb sum of nested frequency decreased by 55% and cover decreased from 2% to less than 0.5%.
- **1999 to 2004 - up (+2):** The sum of nested frequency of perennial forbs increased by 50%, though cover continued to decrease.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased by 74% and cover increased to 1%. Forbs remain rare on the site.

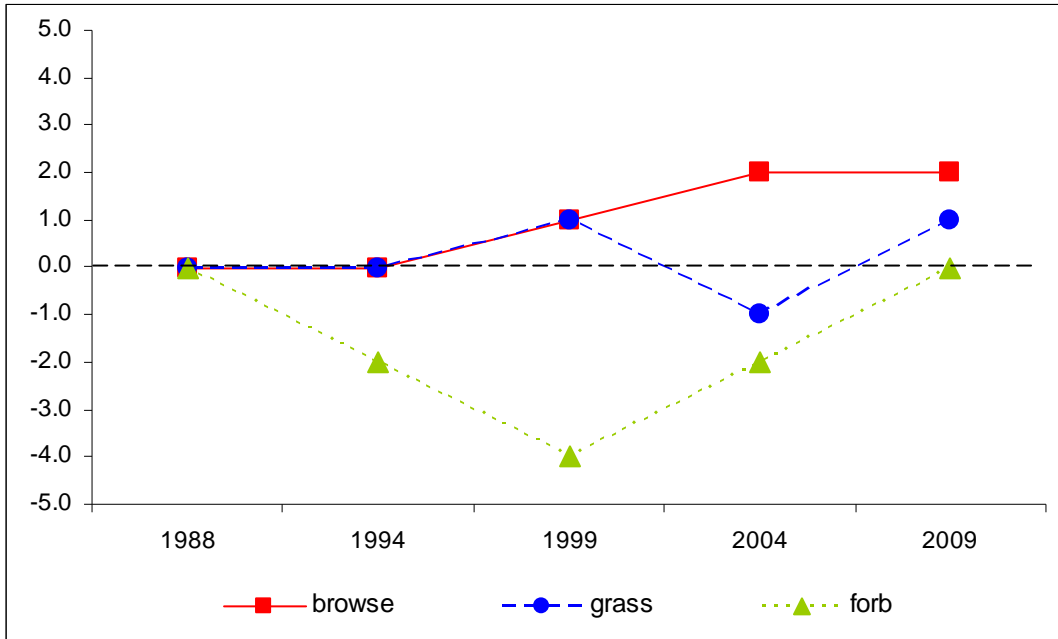
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 28

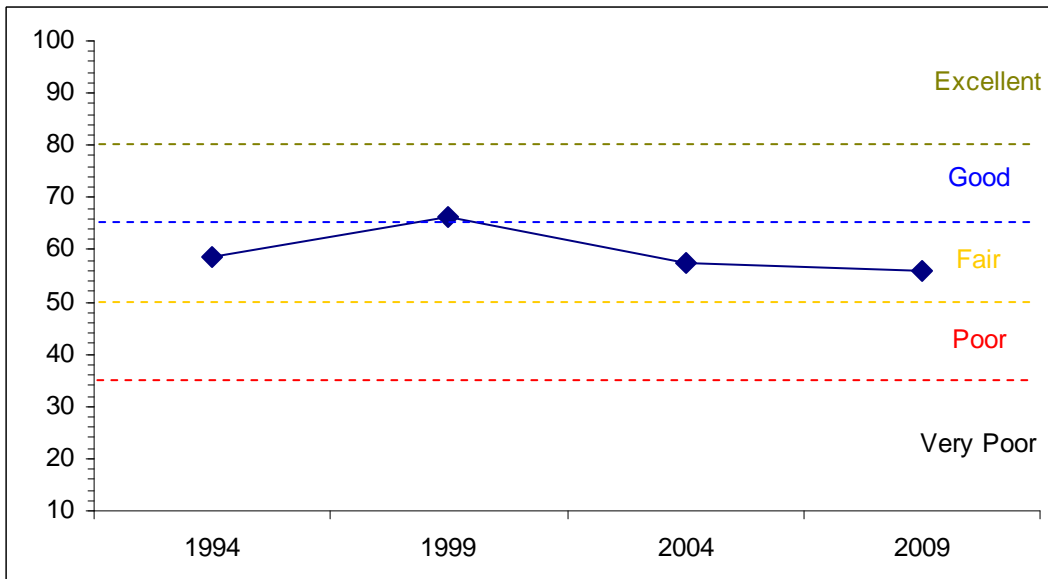
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	21.1	10.1	6.0	18.4	0.0	3.1	0.0	58.6	Fair
99	23.4	11.4	13.4	17.2	0.0	0.9	0.0	66.3	Fair-Good
04	27.3	12.5	10.3	6.9	0.0	0.5	0.0	57.6	Fair
09	25.0	8.6	6.6	13.6	0.0	2.1	0.0	55.9	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 28



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 16C, Study no: 28



HERBACEOUS TRENDS--

Management unit 16C, Study no: 28

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	a4	a5	a1	a13	b26	.03	.00	.10	.57
G	Bromus tectorum (a)	-	-	-	1	-	-	-	.00	-
G	Elymus junceus	-	-	-	6	1	-	-	.45	.15
G	Elymus salina	a-	c34	b30	b10	bc29	1.88	1.61	1.07	2.51
G	Oryzopsis hymenoides	116	84	113	79	79	7.11	6.82	1.72	3.48
G	Sitanion hystrix	20	17	17	7	14	.19	.16	.08	.07
Total for Annual Grasses		0	0	0	1	0	0	0	0.00	0
Total for Perennial Grasses		140	140	161	115	149	9.22	8.61	3.44	6.79
Total for Grasses		140	140	161	116	149	9.22	8.61	3.44	6.79
F	Artemisia ludoviciana	-	3	-	-	-	.00	-	-	-
F	Chenopodium fremontii (a)	-	-	-	7	-	-	-	.01	-
F	Cryptantha sp.	ab45	b52	ab29	a19	ab46	1.48	.42	.12	.48
F	Descurainia pinnata (a)	-	-	3	2	-	-	.00	.00	-
F	Eriogonum ovalifolium	4	6	2	-	-	.01	.01	-	-
F	Gilia sp. (a)	-	3	-	5	-	.00	-	.01	-
F	Lepidium sp. (a)	-	-	5	5	-	-	.06	.22	-
F	Machaeranthera canescens	2	-	-	-	-	-	-	-	-
F	Penstemon carnosus	b23	a9	a3	a2	a-	.02	.01	.00	-
F	Phlox austromontana	4	-	-	-	-	-	-	-	-
F	Schoenocrambe linifolia	a-	a-	a2	ab12	b41	-	.00	.03	.19
F	Thelesperma subnudum	b14	a2	a-	a2	a-	.00	-	.00	-
F	Thelypodopsis sagittata	b12	ab5	a-	a-	ab7	.01	-	.00	.39
F	Townsendia incana	a3	a3	a-	b19	a-	.00	-	.10	-
Total for Annual Forbs		0	3	8	19	0	0.00	0.06	0.24	0
Total for Perennial Forbs		107	80	36	54	94	1.55	0.44	0.27	1.06
Total for Forbs		107	83	44	73	94	1.55	0.50	0.51	1.06

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

BROWSE TRENDS--

Management unit 16C, Study no: 28

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia nova	69	74	73	78	7.10	8.23	10.03	9.34
B	Cercocarpus montanus	26	26	32	27	7.46	7.96	8.09	6.80
B	Chrysothamnus nauseosus	2	0	0	0	.00	-	-	-
B	Chrysothamnus viscidiflorus	0	1	0	0	-	.00	-	-
B	Ephedra viridis	15	15	13	16	.78	.96	2.11	1.89
B	Eriogonum microthecum	21	15	20	12	.02	.01	.03	.63
B	Gutierrezia sarothrae	0	0	1	0	-	-	.00	-
B	Juniperus osteosperma	0	8	8	5	1.58	2.04	3.14	3.52
B	Opuntia polyacantha	4	4	3	4	.03	.18	.18	.15
B	Pinus edulis	0	13	10	14	4.87	5.03	4.67	6.25
Total for Browse		137	156	160	156	21.87	24.42	28.27	28.59

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 28

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	8.64	7.36
Cercocarpus montanus	3.40	9.21	8.51
Ephedra viridis	-	2.29	1.89
Eriogonum microthecum	-	-	.01
Juniperus osteosperma	-	4.26	3.65
Opuntia polyacantha	-	-	.06
Pinus edulis	-	8.69	9.63

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 28

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	1.3	0.4
Cercocarpus montanus	4.3	1.2

POINT-QUARTER TREE DATA--

Management unit 16C, Study no: 28

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	108	144	140	3.3	3.4	2.1
Pinus edulis	185	156	165	2.0	2.4	2.3

BASIC COVER--

Management unit 16C, Study no: 28

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	2.25	29.27	32.51	31.79	32.76
Rock	6.00	10.97	8.50	8.25	8.14
Pavement	16.25	4.17	12.60	9.40	12.22
Litter	52.00	39.35	48.24	40.99	45.93
Cryptogams	.25	.16	.75	.48	.68
Bare Ground	23.25	24.50	19.09	28.55	19.52

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 28, Study Name: South of Dry Wash

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.1	7.5	54.7	21.4	23.8	3.9	3	38.4	0.7

PELLET GROUP DATA--

Management unit 16C, Study no: 28

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	17	18	19	30	-	-	-
Elk	-	6	8	6	11 (27)	8 (20)	21 (53)
Deer	34	27	24	16	85 (209)	41 (101)	44 (109)
Cattle	-	-	-	1	-	-	-

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 28

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	6/7
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
Artemisia nova									
88	2332	36	53	11	233	19	0	3	8/17
94	3440	2	69	30	-	47	20	6	7/21
99	3800	8	74	17	20	23	2	9	8/20
04	4280	3	86	12	-	39	4	7	8/19
09	4480	1	83	15	200	13	0	11	8/20

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Atriplex canescens</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	19/20	
99	0	0	0	-	-	0	0	0	28/35	
04	0	0	0	-	-	0	0	0	21/26	
09	0	0	0	-	-	0	0	0	41/50	
<i>Cercocarpus montanus</i>										
88	232	28	57	14	1166	0	0	14	45/47	
94	540	22	74	4	-	56	15	0	52/64	
99	620	48	45	6	60	35	6	0	59/67	
04	720	47	50	3	20	11	56	0	55/74	
09	640	28	38	34	80	13	31	9	47/58	
<i>Chrysothamnus nauseosus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	40	0	50	50	-	50	50	50	11/13	
99	0	0	0	0	-	0	0	0	-/-	
04	0	0	0	0	-	0	0	0	-/-	
09	0	0	0	0	-	0	0	0	-/-	
<i>Chrysothamnus viscidiflorus</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	-	0	100	0	-/-	
04	0	0	0	-	-	0	0	0	9/11	
09	0	0	0	-	-	0	0	0	52/48	
<i>Ephedra viridis</i>										
88	832	20	52	28	99	4	8	4	27/22	
94	340	6	82	12	20	18	12	6	34/43	
99	340	12	71	18	-	53	12	0	39/46	
04	500	4	84	12	-	32	4	4	40/49	
09	460	22	65	13	60	0	0	9	37/49	
<i>Eriogonum microthecum</i>										
88	965	14	83	3	66	0	0	0	2/2	
94	580	3	93	3	-	3	14	3	1/3	
99	540	37	59	4	20	19	7	0	2/4	
04	600	13	87	0	-	43	10	0	2/3	
09	480	8	88	4	-	0	13	4	2/3	
<i>Gutierrezia sarothrae</i>										
88	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	-/-	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Juniperus osteosperma									
88	199	83	17	-	33	0	0	0	63/41
94	0	0	0	-	-	0	0	0	-/-
99	160	88	13	-	-	0	0	0	-/-
04	160	50	50	-	20	0	0	0	-/-
09	100	40	60	-	-	0	0	0	-/-
Opuntia polyacantha									
88	399	33	58	8	-	0	0	8	2/5
94	80	0	75	25	-	0	0	0	3/13
99	80	25	75	0	-	0	0	0	3/12
04	60	0	100	0	-	0	0	0	3/10
09	80	0	100	0	-	0	0	0	3/8
Pinus edulis									
88	399	83	17	0	166	0	0	8	44/52
94	0	0	0	0	-	0	0	0	-/-
99	260	54	46	0	40	0	0	0	-/-
04	220	36	64	0	-	0	0	0	-/-
09	280	29	64	7	20	0	0	43	-/-
Sclerocactus sp.									
88	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	5/7
Yucca harrimaniae									
88	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	9/12
09	0	0	0	-	-	0	0	0	6/10

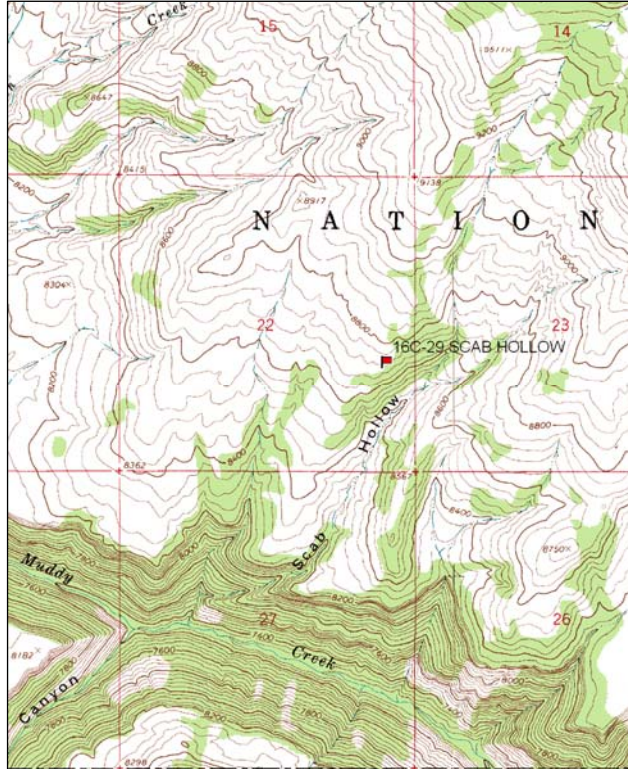
SCAB HOLLOW - TREND STUDY NO. 16C-29-09

Vegetation Type: Curleaf Mountain Mahogany
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,700 ft (2,652 m)
Aspect: Southeast
Slope: 23%-25%
Transect bearing: 183 degrees magnetic.
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

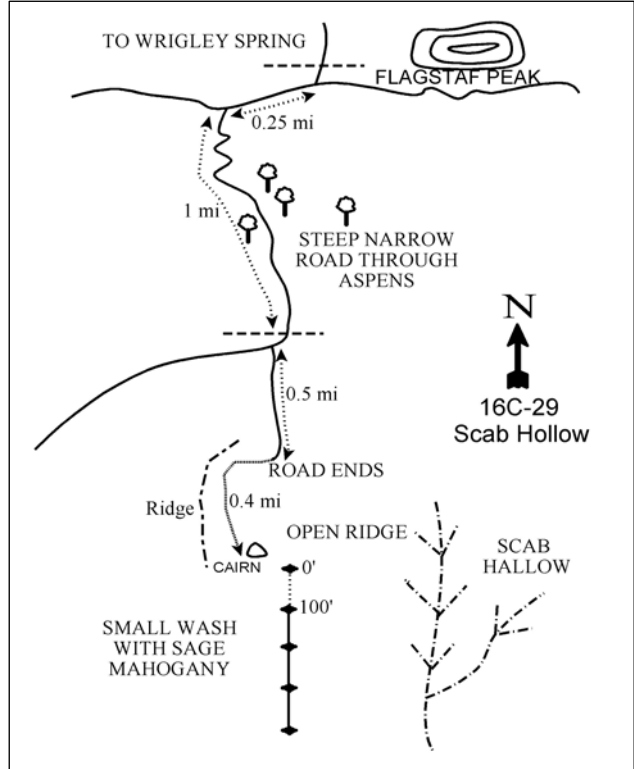
From the Forest Service boundary up Ferron Canyon, travel 7.8 miles to Wrigley Reservoir. From Wrigley Springs Reservoir on F.S. Road #43, continue on the main road SW to Wrigley Spring. Proceed south 0.9 miles to a T-intersection. Turn right toward Twelve Mile Flat. Go 0.25 miles and turn left onto a dirt road (F.S. Road #274). Go 1.0 miles down through the aspens on the steep narrow road to a fence. Just past the fence, bear left at a faint fork. Continue 0.5 miles to the end of the road. It is possible to continue driving down the ridge. Turn right down the small hill then go down the ridge bearing left through the clearings for .4 miles to the SE edge of the small, open ridge above Scab Hollow. There is a rock cairn along the edge to mark the study site. From the cairn, it is 15 feet SE to the 0-foot baseline stake, identified by a red browse tag #9027 on the short fencepost. The study runs down across the slope.

Map Name: Flagstaff Peak



Township: 20S, Range: 5E, Section: 22

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 470708 E 4322590 N

SCAB HOLLOW - TREND STUDY NO. 16C-29

Site Information

Site Description: The study is located in the upper end of Scab Hollow, a small drainage on the north side of Muddy Creek. The area is managed by the Forest Service as part of the Ferron allotment. The study samples a curlleaf mountain mahogany (*Cercocarpus ledifolius*) and grass slope, and the area is considered important elk winter range. Little elk sign was observed in 1994, but pellet group data has indicated increasingly heavy use by elk since 1999. Estimated deer and cattle use has been minimal since 1999 (Table - Pellet Group Data).

Browse: The slope is dominated by a mature stand of curlleaf mountain mahogany which provides the majority of the browse cover on the site (Table - Browse Trends). Some of the mature plants are large trees which are highlined and mostly unavailable to browsing. The mountain mahogany population is healthy with low decadence and good vigor, and good recruitment of young plants over the study period. Mountain mahogany plants have displayed moderate utilization in most sample years, but showed heavy use in 2004. There are pockets of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*Artemisia nova*) on the ridge which have shown mostly light use, but with a few years of heavy use. Other browse species which occur infrequently include stickleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), Fremont's buckwheat (*Eriogonum corymbosum*), broom snakeweed (*Gutierrezia sarothrae*), snowberry (*Symphoricarpos oreophilus*), and gray horsebrush (*Tetradymia canescens*). A few scattered pinyon pine (*Pinus edulis*) and Rocky Mountain juniper (*Juniperus scopulorum*) trees occur on the site (Table - Browse Characteristics).

Herbaceous Understory: Grasses are abundant and provides the majority of the vegetation cover on the site, but are not very diverse. The dominant species in cover on the site is Salina wildrye (*Elymus salina*) which provides most of the grass and herbaceous cover. There is also some bluebunch wheatgrass (*Agropyron spicatum*) and Indian ricegrass (*Oryzopsis hymenoides*) present in small numbers. A variety of forbs are present on the site, but all species combined provide little cover or usable forage. Only the somewhat weedy species bastard toadflax (*Comandra pallida*) is fairly common.

Soil: The soil is derived from a limestone parent material with a clay texture and a slightly alkaline pH. Phosphorus has a limited availability for plant growth and development at only 2.6 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Open areas have high amounts of rock and pavement cover. Bare ground cover is moderately low due to the cover provided by rock, pavement, and the herbaceous vegetation on the site (Table - Basic Cover). There is evidence of soil and litter movement, pedestaling and terracing on the steeper slopes, and the soil erosion condition was classified as slight in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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 primary browse species, curlleaf mountain mahogany, though decadence did decrease from 20% to 0%.
- **1994 to 1999 - slightly up (+1):** The density of curlleaf mountain mahogany increased from 580 plants/acre to 660 plants/acre, and cover increased from 3% to 6%. The Point-Quarter method estimated mountain mahogany density at 93 trees/acre and the line-intercept method estimated cover to be 14%. Decadence of mahogany is low, vigor is good, and half the population is comprised of young plants.
- **1999 to 2004 - stable (0):** The Point-Quarter density of curlleaf mountain mahogany decreased to 68 trees/acre, though canopy cover increased to 15%. There was a slight increase in the decadence and poor vigor of the mahogany population, but both are still considered good.

- **2004 to 2009 - stable (0):** The Point-Quarter density of curleaf mountain mahogany remained similar, though canopy cover increased slightly to 16%. There was a decrease in the strip density of mountain mahogany primarily due to a decrease in the recruitment of young mahogany plants from 45% of the population to 13%.

Grass:

- **1988 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1994 to 1999 - stable (0):** Perennial grass sum of nested frequency changed little, but cover decreased from 21% to 18%.
- **1999 to 2004 - stable (0):** The sum of nested frequency and cover of perennial grasses changed little.
- **2004 to 2009 - stable (0):** The sum of nested frequency of perennial grasses changed little, though cover increased from 17% to 24%.

Forb:

- **1988 to 1994 - slightly down (-1):** Perennial forb sum of nested frequency decreased by 66% mostly due to a significant decrease in bastard toadflax.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs more than doubled and cover increased from less than 1% to over 5%. However, most of the increase was due to a significant increase in the less desirable species, bastard toadflax.
- **1999 to 2004 - slightly down (-1):** Perennial forb sum of nested frequency decreased to 1994 levels and cover decreased to less than 1%.
- **2004 to 2009 - stable (0):** There was a decrease in the sum of nested frequency of perennial forbs, but forbs are so rare on the site that it made little difference to the community. Total forb cover was less than 1%.

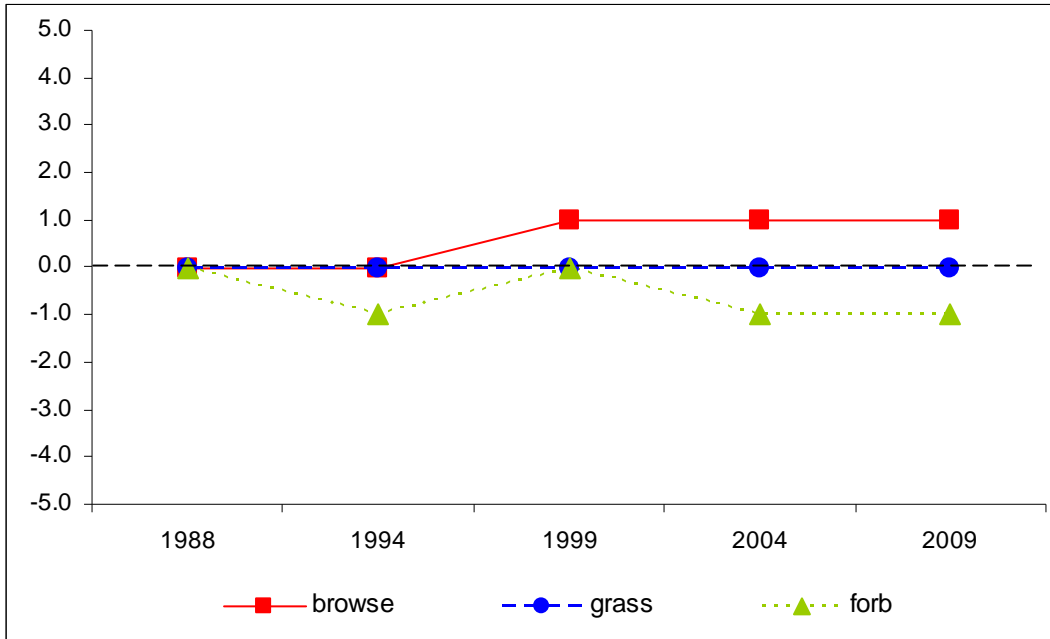
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 29

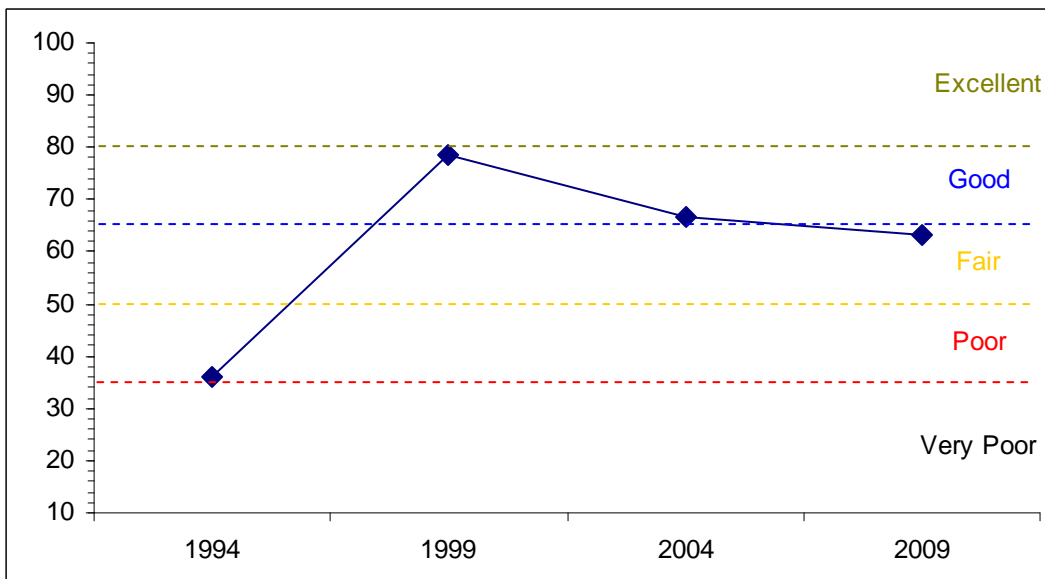
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	5.0	0.0	0.0	30.0	0.0	1.2	0.0	36.2	Very Poor-Poor
99	8.6	14.9	15.0	30.0	0.0	10.0	0.0	78.4	Good-Excellent
04	8.2	11.8	15.0	30.0	0.0	1.7	0.0	66.8	Fair-Good
09	10.4	14.7	6.7	30.0	0.0	1.6	0.0	63.3	Fair-Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 29



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 16C, Study no: 29



HERBACEOUS TRENDS--

Management unit 16C, Study no: 29

T y p e	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron spicatum	a-	a-	a ²	ab ²⁴	b ⁴⁸	-	.02	.76	2.25
G	Agropyron trachycaulum	b ¹⁸	a ⁵	ab ²¹	a-	a-	.18	.65	-	-
G	Carex sp.	4	-	2	-	-	-	.03	-	-
G	Elymus salina	286	276	268	262	252	20.00	17.11	15.33	20.35
G	Oryzopsis hymenoides	27	33	19	15	24	.84	.37	1.11	1.06
G	Poa sp.	3	-	-	-	-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		338	314	312	301	324	21.03	18.19	17.20	23.65
Total for Grasses		338	314	312	301	324	21.03	18.19	17.20	23.65
F	Astragalus convallarius	3	-	-	3	-	-	-	.00	-
F	Calochortus nuttallii	1	-	3	-	-	-	.00	-	-
F	Castilleja linariaefolia	3	-	2	-	-	-	.03	-	-
F	Chaenactis douglasii	a ³	a-	b ²⁰	a-	a-	-	.25	-	-
F	Chenopodium fremontii (a)	-	a-	a-	b ¹¹	a ⁴	-	-	.02	.00
F	Chenopodium leptophyllum(a)	-	a-	a-	b ¹¹	a ¹	-	-	.03	.00
F	Comandra pallida	bc ⁶¹	a ²⁵	c ⁸²	ab ⁴⁸	ab ³⁷	.06	3.60	.46	.36
F	Cymopterus sp.	-	-	1	-	-	-	.00	-	-
F	Descurainia pinnata (a)	-	-	-	-	2	-	-	-	.00
F	Erigeron eatonii	-	-	2	-	-	-	.00	-	-
F	Erigeron pumilus	-	-	3	3	-	-	.03	.00	-
F	Erigeron sp.	2	-	-	-	-	-	-	-	-
F	Eriogonum alatum	-	1	7	4	1	.00	.06	.01	.00
F	Hymenopappus filifolius	8	5	-	-	-	.01	-	-	-
F	Hymenoxys richardsonii	12	2	3	8	3	.03	.18	.30	.06
F	Lappula occidentalis (a)	-	a ²	a-	b ¹⁷	a-	.00	-	.72	-
F	Lesquerella sp.	b ²⁸	a ⁴	ab ⁸	a-	a-	.01	.10	-	-
F	Linum lewisii	-	4	3	-	2	.03	.04	-	.10
F	Lithospermum ruderae	3	-	-	-	-	-	-	-	-
F	Machaeranthera canescens	9	-	3	3	8	-	.00	.00	.06
F	Machaeranthera grindelioides	b ⁵¹	ab ²¹	ab ²⁰	a ⁴	a-	.32	.67	.07	-
F	Madia glomerata (a)	-	-	-	-	-	-	-	.03	-
F	Penstemon caespitosus	6	1	8	2	7	.00	.04	.00	.18
F	Petradoria pumila	8	4	9	-	-	.06	.33	-	-
F	Phlox hoodii	b ¹⁴	ab ⁶	ab ⁴	a-	a-	.03	.06	-	-
F	Senecio multilobatus	1	-	-	-	-	-	-	-	-
F	Tragopogon dubius	-	-	2	3	-	-	.03	.00	-
Total for Annual Forbs		0	2	0	39	7	0.00	0	0.81	0.01
Total for Perennial Forbs		213	73	180	78	58	0.58	5.47	0.87	0.78
Total for Forbs		213	75	180	117	65	0.59	5.47	1.68	0.79

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

BROWSE TRENDS--

Management unit 16C, Study no: 29

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	0	0	1	0	-	-	.00	-
B	Artemisia nova	4	3	7	6	.30	.18	.44	.38
B	Artemisia tridentata vaseyana	2	2	0	1	.00	.00	-	.15
B	Ceratoides lanata	0	0	0	1	-	-	-	.00
B	Cercocarpus ledifolius	19	22	20	12	3.09	5.56	5.12	6.47
B	Chrysothamnus viscidiflorus viscidiflorus	1	2	4	11	.00	.06	.03	.36
B	Eriogonum corymbosum	18	9	13	5	.52	.48	.24	.23
B	Gutierrezia sarothrae	13	20	28	11	.05	.44	1.06	.09
B	Juniperus scopulorum	0	1	1	1	2.25	2.00	2.23	3.19
B	Mahonia repens	10	11	13	11	.04	.06	.18	.03
B	Pediocactus simpsonii	0	0	1	0	-	-	.00	-
B	Pinus flexilis	0	1	0	0	.98	.00	-	-
B	Symphoricarpos oreophilus	2	1	4	4	.00	.00	.00	.00
B	Tetradymia canescens	2	2	2	7	.15	.03	.15	.06
Total for Browse		71	74	94	70	7.40	8.84	9.48	10.98

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 29

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	.58	.21
Artemisia tridentata vaseyana	-	-	.26
Cercocarpus ledifolius	13.60	15.25	16.13
Chrysothamnus viscidiflorus viscidiflorus	-	-	.10
Eriogonum corymbosum	-	.03	.08
Gutierrezia sarothrae	-	1.85	.05
Juniperus scopulorum	2.79	3.20	3.20
Mahonia repens	-	-	.05

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 29

Species	Average leader growth (in)	
	'04	'09
Cercocarpus ledifolius	3.6	1.2

POINT-QUARTER TREE DATA--

Management unit 16C, Study no: 29

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Cercocarpus ledifolius	93	68	61	9.7	7.8	7.2

BASIC COVER--

Management unit 16C, Study no: 29

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	5.50	29.47	30.78	29.20	33.79
Rock	6.50	19.67	16.20	14.73	13.47
Pavement	13.25	9.30	20.36	15.73	12.32
Litter	51.00	22.71	28.31	22.69	25.11
Cryptogams	0	.00	.04	.24	.15
Bare Ground	23.75	30.78	21.73	30.37	30.82

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 29, Study Name: Scab Hollow

Effective rooting depth (in)	pH	clay			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.7	7.6	34	24.2	41.8	2.9	2.3	89.6	0.6

PELLET GROUP DATA--

Management unit 16C, Study no: 29

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	27	15	10	10	-	-	-
Elk	11	29	34	41	61 (151)	88 (218)	137 (337)
Deer	7	6	5	1	10 (25)	-	7 (18)
Cattle	1	-	-	1	2 (5)	1 (2)	2 (5)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 29

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	20	100	0	-	-	0	0	0	21/22
09	0	0	0	-	60	0	0	0	-/-
Artemisia nova									
88	0	0	0	0	-	0	0	0	-/-
94	280	43	21	36	-	43	0	7	10/22
99	140	0	86	14	-	57	43	0	8/19
04	320	19	63	19	-	0	0	13	8/21
09	300	27	53	20	-	0	0	7	9/25

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Artemisia tridentata vaseyana</i>										
88	66	0	100	0	-	0	0	0	12/15	
94	40	0	100	0	-	50	0	0	6/10	
99	40	0	50	50	-	0	50	0	15/17	
04	0	0	0	0	-	0	0	0	25/22	
09	20	0	100	0	-	0	0	0	9/15	
<i>Ceratoides lanata</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	0	0	0	0	-	0	0	0	-/-	
99	0	0	0	0	-	0	0	0	-/-	
04	0	0	0	0	-	0	0	0	-/-	
09	20	0	0	100	-	0	0	100	5/7	
<i>Cercocarpus ledifolius</i>										
88	165	40	40	20	33	20	0	0	119/116	
94	580	52	48	0	20	17	0	0	77/67	
99	660	52	48	0	80	24	12	0	84/78	
04	620	45	45	10	20	35	52	3	66/61	
09	300	13	87	0	-	33	0	0	50/47	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	20	0	100	0	-	100	0	0	7/11	
99	40	0	50	50	-	100	0	0	7/9	
04	160	13	88	0	-	0	0	0	10/15	
09	420	5	95	0	-	0	0	5	12/22	
<i>Eriogonum corymbosum</i>										
88	66	50	0	50	-	0	0	0	-/-	
94	920	39	57	4	-	17	9	4	10/13	
99	420	0	90	10	20	29	0	0	7/9	
04	380	21	63	16	-	5	16	0	5/9	
09	100	20	80	0	-	0	0	0	6/11	
<i>Gutierrezia sarothrae</i>										
88	1499	9	91	0	-	0	0	0	8/10	
94	380	42	53	5	-	0	0	5	11/11	
99	1720	12	87	1	-	0	0	0	6/8	
04	2300	6	94	0	-	0	0	0	7/8	
09	360	0	89	11	-	0	0	6	7/8	
<i>Juniperus scopulorum</i>										
88	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	-/-	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Mahonia repens									
88	899	96	0	4	-	0	0	0	-/-
94	580	66	34	0	80	0	0	0	3/4
99	900	58	42	0	20	0	0	0	2/4
04	880	2	98	0	-	0	0	0	3/4
09	580	7	93	0	-	0	0	0	3/4
Pediocactus simpsonii									
88	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	-/-
Pinus edulis									
88	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	-/-
Symphoricarpos oreophilus									
88	66	100	0	0	-	0	0	0	-/-
94	120	67	33	0	-	0	33	0	7/13
99	40	50	50	0	40	0	0	0	7/11
04	160	13	75	13	-	0	0	0	6/11
09	160	38	63	0	-	0	0	0	6/7
Tetradymia canescens									
88	66	50	50	0	33	0	0	0	8/11
94	80	0	100	0	-	25	0	0	7/13
99	40	0	50	50	-	50	0	0	7/18
04	40	0	100	0	-	50	0	0	9/21
09	200	30	40	30	-	0	0	10	7/9

UPPER HOLE TRAIL - TREND STUDY NO. 16C-30-09

Vegetation Type: Mixed Mountain Brush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,600 ft (2,621 m)

Aspect: Southeast

Slope: 12%

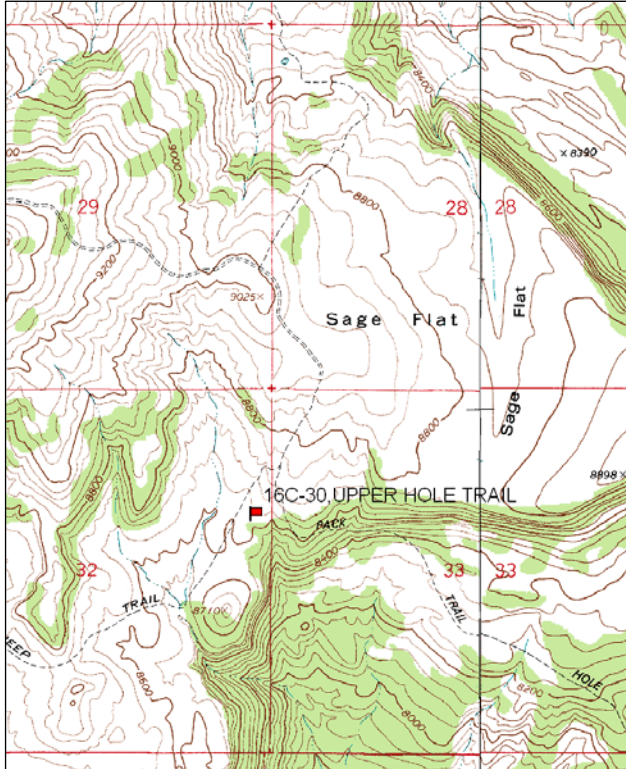
Transect bearing: 181 degrees magnetic.

Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft); belt 3 rebar @ 5', belt 5 rebar @ 5'

Directions:

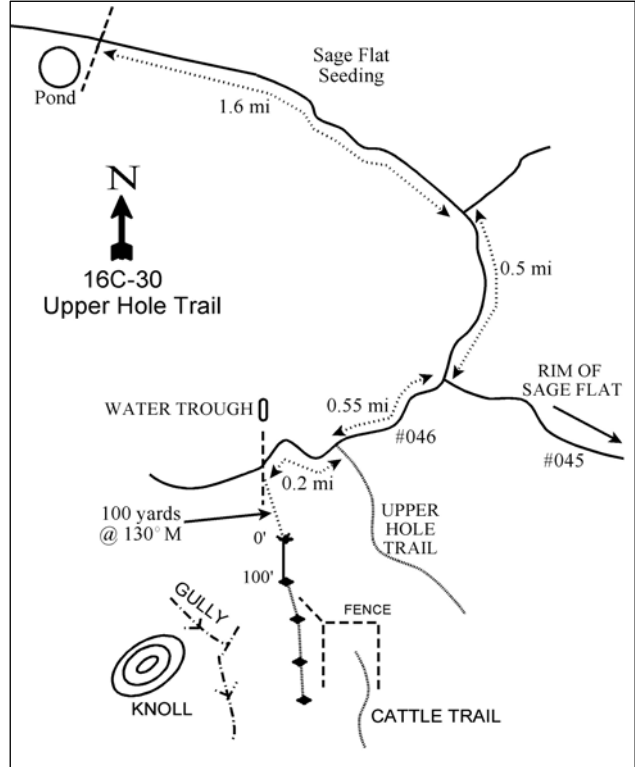
From Wrigley Springs Reservoir, continue SE 3.0 miles to the T-intersection by Flagstaff Peak. Turn left towards Sage Flat. Go 1.65 miles and cross a cattleguard. Continue straight 0.9 miles to a fence and cattleguard by a pond. Continue SE 1.0 miles to the Sage Flat seeding. Go 0.6 miles to a fork. Continue straight on the main road about 0.5 miles to a fork. At this point, a road that runs along the rim of Sage Flat takes off to the left (#045). Turn right at 0.35 miles on F.S. Road #046. Continue south 0.2 miles to the Hole Trail. Go another 0.2 miles on the main road to an old fence line by an unused water trough. The study starts about 100 yards south of the road at 130° M. The first baseline stake, a 2' green fencepost with browse tag #9020 attached, is along an old fence line.

Map Name: Flagstaff Peak



Township: 20S, Range: 6E, Section: 32

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 477289 E 4320940 N

Site Information

Site Description: The study is located near Sage Flat, an open sagebrush community with scattered mountain brush, mostly on the slopes. The study itself is located in a low saddle between the large sagebrush flats, in a mixed mountain brush type near the edge of the cliffs where the Upper Hole Trail climbs up from the pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) communities below. The area is managed by the Forest Service as part of the Ferron allotment. Pellet group data has estimated moderate elk and light deer use since 1999. Estimated cattle use was moderate in 1999 and 2009, but was light in 2004 (Table - Pellet Group Data).

Browse: The mountain brush species on the slope are very diverse and abundant. The dominant browse species in cover on the site include curlleaf mountain mahogany (*Cercocarpus ledifolius*), antelope bitterbrush (*Purshia tridentata*), mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*), and Utah serviceberry (*Amelanchier utahensis*). Wood's rose (*Rosa woodsii*), black sagebrush (*Artemisia nova*), and snowberry (*Symphoricarpos oreophilus*) are also common (Table - Browse Trends). Curlleaf mountain mahogany is the most abundant browse species, and the stand is predominantly mature with a mixture of shrub-like and tree-like forms. The average height of curlleaf mountain mahogany is over 5 feet tall and the tree-like forms are highlined and partially unavailable. The population of curlleaf mountain mahogany is healthy with low decadence and good vigor, but recruitment of young plants has been low in many of the sample years. Utilization of curlleaf mountain mahogany has been mostly light in past sample years, but plants have displayed heavy use since 1999. There is also a small population of heavily hedged true mountain mahogany (*Cercocarpus montanus*) on the site (Table - Browse Characteristics).

The other three abundant preferred browse species, antelope bitterbrush, Utah serviceberry, and mountain big sagebrush, all have healthy populations with good vigor, low decadence, and fairly good recruitment of young plants. Utilization of bitterbrush has been moderate to heavy since 1999 with much of the population displaying a clubbed growth form. Some of the difference in density between 1994 estimates and 1999 counts may be caused by the difficulty in counting this large, prostrate shrub. In some instances, it is hard to tell where one plant stops and another starts. Serviceberry plants on the site are large with some of the plants being partially unavailable due to height. Utilization of serviceberry has been mostly light over the sample years but plants have displayed heavier use since 1999. The mountain big sagebrush population is mostly mature and has displayed mostly light use over the length of the study. The other preferred browse species on the site, black sagebrush, dwarf rabbitbrush (*Chrysothamnus depressus*), and Wood's rose, have all displayed mostly light use over the sample years (Table - Browse Characteristics). There are also a few scatter pinyon pine and limber pine (*Pinus flexilis*) trees on the site.

Herbaceous Understory: Diversity is also high in the herbaceous component of the community, though grasses are not particularly abundant. Salina wildrye (*Elymus salina*) is the most abundant grass and provides most of the grass cover on the site. Diversity of forbs is excellent with many being valuable forage species. Wyoming painted-cup (*Castilleja linariaefolia*), penstemon (*Penstemon* spp.), redroot and sulfur eriogonum (*Eriogonum racemosum* and *E. umbellatum*), and Eaton fleabane (*Erigeron eatonii*) are most often utilized. Two low value forbs, rock goldenrod (*Petroradia pumila*) and desert phlox (*Phlox austromontana*), provide nearly half of the forb cover.

Soil: The soil has a clay loam texture with a neutral pH. Phosphorus and potassium have limited availability for plant growth and development at just 2.6 ppm and 54.4 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover has remained moderately low with protective ground cover provided primarily by litter and herbaceous vegetation cover (Table - Basic Cover). There has been substantial soil movement and gullyng on the site and in surrounding areas. The soil erosion condition was classified as moderate in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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 decadence and vigor of most of the preferred browse species. Decadence and poor vigor did increase slightly in black sagebrush, and decadence increased in mountain big sagebrush, but poor vigor decreased.
- **1994 to 1999 - stable (0):** There was a large decrease in the density of serviceberry, but cover remained similar. Density of curlleaf mountain mahogany increased slightly. Decadence and poor vigor decreased in both mountain big and black sagebrush.
- **1999 to 2004 - stable (0):** There was little change in the populations of the four key browse species, curlleaf mountain mahogany, serviceberry, mountain big sagebrush, and antelope bitterbrush.
- **2004 to 2009 - stable (0):** Serviceberry density nearly doubled, but cover remained similar. The three other key browse species had little change in their populations.

Grass:

- **1988 to 1994 - stable (0):** The sum of nested frequency of perennial grasses changed little, though there was a slight change in composition as Salina wildrye decreased significantly in nested frequency and sedge (*Carex sp.*) and Letterman needlegrass (*Stipa lettermani*) increased significantly.
- **1994 to 1999 - stable (0):** Perennial grass sum of nested frequency and cover changed little. There was a significant increase in the nested frequency of Letterman needlegrass.
- **1999 to 2004 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses. Western wheatgrass (*Agropyron smithii*) decreased significantly in nested frequency and mutton bluegrass (*Poa fendleriana*) increased significantly.
- **2004 to 2009 - slightly down (-1):** Perennial grass sum of nested frequency decreased by 18%, though cover remained similar. Mutton bluegrass had a significant decrease in nested frequency and western wheatgrass increased significantly.

Forb:

- **1988 to 1994 - up (+2):** Perennial forb sum of nested frequency increased by 25%.
- **1994 to 1999 - stable (0):** The sum of nested frequency of perennial forbs decreased slightly, but cover increased slightly from 8% to 10%.
- **1999 to 2004 - down (-2):** There was a 27% decrease in the sum of nested frequency, though there was little change in cover. There was a significant decrease in the nested frequency of many of the palatable forbs.
- **2004 to 2009 - stable (0):** Perennial forb sum of nested frequency changed little, but cover decreased to 8%.

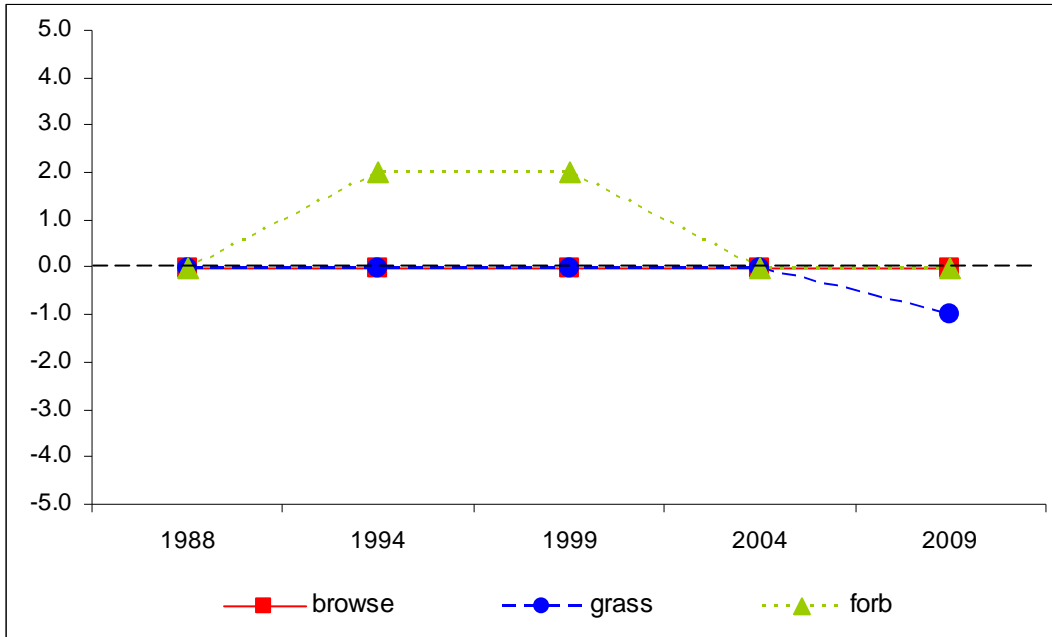
DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --

Management unit 16C, study no: 30

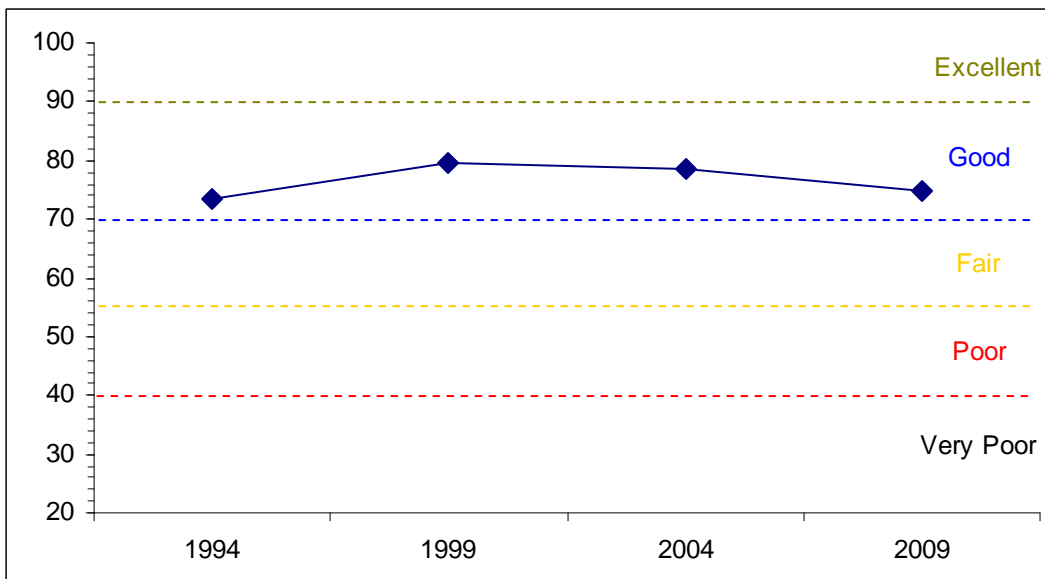
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	26.6	13.4	6.3	17.1	0.0	10.0	0.0	73.4	Good
99	30.0	12.6	12.4	14.5	0.0	10.0	0.0	79.5	Good
04	30.0	13.1	8.0	17.4	0.0	10.0	0.0	78.5	Good
09	30.0	13.8	5.0	16.0	0.0	10.0	0.0	74.8	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 30



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL
Management unit 16C, Study no: 30



HERBACEOUS TRENDS--
Management unit 16C, Study no: 30

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	-	1	4	4	4	.03	.03	.18	.03
G	Agropyron dasystachyum	-	-	-	8	-	-	-	.04	-
G	Agropyron smithii	ab32	b52	b41	a6	b40	1.06	.26	.03	.21
G	Agropyron spicatum	-	-	-	7	-	-	-	.18	-
G	Aristida purpurea	-	-	1	-	-	-	.00	-	-
G	Bouteloua gracilis	-	1	-	-	-	.00	-	-	-
G	Carex sp.	a6	b35	ab16	b21	b24	.41	.37	.36	.49
G	Elymus salina	b251	a173	a169	a146	a145	5.05	4.10	4.52	6.32
G	Koeleria cristata	10	5	1	-	-	.06	.00	-	-
G	Oryzopsis hymenoides	10	12	10	8	-	.10	.09	.02	-
G	Poa fendleriana	a63	ab85	a76	b129	a64	1.14	1.08	2.49	.69
G	Sitanion hystrix	1	7	3	10	-	.04	.00	.09	-
G	Stipa comata	7	8	2	-	-	.04	.00	-	-
G	Stipa lettermani	a-	b31	c66	bc44	bc37	.57	1.25	.76	.25
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		380	410	389	383	314	8.53	7.24	8.69	8.01
Total for Grasses		380	410	389	383	314	8.53	7.24	8.69	8.01
F	Antennaria rosea	-	-	3	-	-	-	.03	-	-
F	Arenaria fendleri	-	5	9	10	12	.03	.24	.12	.07
F	Aster sp.	a-	a-	a4	ab10	b27	-	.01	.07	.97
F	Astragalus convallarius	2	13	1	1	1	.11	.01	.03	.00
F	Astragalus minthorniae	-	-	-	2	-	-	-	.00	-
F	Astragalus miser	-	7	-	-	1	.15	-	-	.00
F	Astragalus tenellus	a10	ab19	b33	ab19	ab32	.16	.99	1.46	.67
F	Astragalus utahensis	-	-	-	-	1	-	-	-	.01
F	Calochortus nuttallii	-	3	-	-	3	.00	-	-	.00
F	Castilleja linariaefolia	c62	bc29	b28	a4	ab10	.19	.22	.09	.05
F	Caulanthus crassicaulis	3	-	-	-	-	-	-	-	-
F	Chaenactis douglasii	b23	a1	ab19	a-	a-	.00	.06	-	-
F	Cirsium sp.	1	6	8	4	5	.04	.10	.03	.03
F	Crepis acuminata	13	6	4	8	10	.01	.01	.13	.08
F	Cryptantha sp.	1	-	-	-	-	-	-	-	-
F	Cymopterus sp.	2	2	-	-	-	.01	-	.00	-
F	Erigeron eatonii	c40	c48	bc35	a6	ab17	.33	.18	.03	.12
F	Erigeron flagellaris	-	-	3	4	3	-	.00	.06	.03
F	Erigeron pumilus	8	8	4	10	-	.02	.15	.05	-
F	Erigeron sp.	-	-	9	-	-	-	.04	-	-
F	Erigeron speciosus	b16	c29	a-	a-	a-	.33	-	-	-
F	Eriogonum racemosum	a-	b42	b36	b33	b25	.27	.26	.63	.35
F	Eriogonum umbellatum	-	9	14	8	14	.22	.30	.33	.27
F	Hymenopappus filifolius	b10	a-	a2	a2	ab4	-	.03	.18	.01
F	Hymenoxys richardsonii	28	25	17	28	30	.08	.14	.36	.21
F	Ipomopsis aggregata	-	-	-	3	-	-	-	.03	-

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
F	<i>Lesquerella</i> sp.	b7	b18	b20	b13	a-	.05	.09	.06	-
F	<i>Linum lewisii</i>	-	2	-	-	-	.01	-	-	-
F	<i>Lithospermum incisum</i>	-	5	-	-	-	.01	-	.03	-
F	<i>Lupinus argenteus</i>	2	10	8	6	12	.08	.16	.10	.73
F	<i>Lygodesmia grandiflora</i>	-	-	-	3	3	-	-	.03	.03
F	<i>Machaeranthera canescens</i>	b46	ab18	a11	a7	a7	.10	.10	.10	.04
F	<i>Machaeranthera grindelioides</i>	b37	a11	a8	a9	a6	.08	.07	.04	.09
F	<i>Oxytropis lambertii</i>	b22	a1	a-	a5	a-	.00	-	.03	-
F	<i>Penstemon carnosus</i>	b34	ab39	b33	a10	ab14	.18	.68	.14	.07
F	<i>Penstemon</i> sp.	b33	b39	b35	a-	a-	1.21	.81	-	-
F	<i>Penstemon watsonii</i>	a-	a-	a-	b11	b16	-	-	.84	.31
F	<i>Petroradia pumila</i>	a19	b63	b56	b73	b56	2.26	2.49	2.96	1.44
F	<i>Phlox austromontana</i>	a-	b71	b71	b56	b70	1.92	2.25	2.23	1.96
F	<i>Phlox longifolia</i>	-	-	-	2	-	-	-	.00	-
F	<i>Polygonum douglasii</i> (a)	-	ab11	ab6	b12	a-	.02	.01	.05	-
F	<i>Senecio multilobatus</i>	3	5	14	4	2	.01	.07	.01	.03
F	<i>Taraxacum officinale</i>	4	-	3	2	3	-	.01	.03	.03
F	<i>Zigadenus paniculatus</i>	-	-	-	3	-	-	-	.03	-
Total for Annual Forbs		0	11	6	12	0	0.01	0.00	0.05	0
Total for Perennial Forbs		426	534	488	356	384	7.95	9.57	10.31	7.67
Total for Forbs		426	545	494	368	384	7.97	9.59	10.36	7.67

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

BROWSE TRENDS--

Management unit 16C, Study no: 30

T y p e	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	<i>Amelanchier utahensis</i>	29	23	26	27	3.48	2.87	4.01	3.27
B	<i>Artemisia nova</i>	7	21	31	13	.42	.91	2.83	1.61
B	<i>Artemisia tridentata vaseyana</i>	66	50	48	49	2.99	5.00	5.60	4.76
B	<i>Ceratoides lanata</i>	0	0	0	1	-	-	-	.00
B	<i>Cercocarpus ledifolius</i>	24	26	20	18	5.79	7.88	9.30	10.44
B	<i>Cercocarpus montanus</i>	5	5	4	6	.00	.21	.33	.62
B	<i>Chrysothamnus depressus</i>	19	17	15	11	.28	.37	.45	.08
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	21	19	14	21	.69	.45	.63	.60
B	<i>Eriogonum corymbosum</i>	3	2	1	0	.15	.03	.00	-
B	<i>Gutierrezia sarothrae</i>	14	12	31	18	.21	.10	.71	.22
B	<i>Juniperus osteosperma</i>	0	0	1	1	.15	-	.03	.30
B	<i>Leptodactylon pungens</i>	8	8	6	6	.15	.36	.60	.21
B	<i>Pediocactus simpsonii</i>	0	0	2	0	-	-	.00	-
B	<i>Pinus edulis</i>	0	1	1	1	.15	.00	.00	.00
B	<i>Purshia tridentata</i>	33	37	40	38	4.69	4.87	6.39	5.74
B	<i>Rosa woodsii</i>	13	13	16	13	.82	.96	1.37	1.39
B	<i>Symphoricarpos oreophilus</i>	36	41	36	41	3.26	4.06	3.30	4.59
B	<i>Tetradymia canescens</i>	1	1	3	3	.03	.00	.00	.00
B	<i>Yucca baileyi navajoa</i>	7	7	5	5	.09	.16	.19	.04
Total for Browse		286	283	300	272	23.40	28.29	35.79	33.93

CANOPY COVER, LINE INTERCEPT--
Management unit 16C, Study no: 30

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	2.79	7.46	6.58
Artemisia nova	-	1.43	.25
Artemisia tridentata vaseyana	-	8.39	8.50
Cercocarpus ledifolius	10.60	17.46	17.64
Cercocarpus montanus	-	.85	.60
Chrysothamnus depressus	-	.33	.30
Chrysothamnus viscidiflorus viscidiflorus	-	.85	.86
Eriogonum corymbosum	-	.08	-
Gutierrezia sarothrae	-	.73	.15
Juniperus osteosperma	-	.61	.53
Leptodactylon pungens	-	.30	.40
Pinus edulis	2.00	2.00	2.03
Purshia tridentata	-	8.69	9.14
Rosa woodsii	-	2.06	1.33
Symphoricarpos oreophilus	-	6.34	7.76
Yucca baileyi navajoa	-	.06	.03

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 16C, Study no: 30

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	3.4	2.0
Cercocarpus ledifolius	4.9	3.6
Cercocarpus montanus	5.3	1.8
Purshia tridentata	4.2	1.8

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 30, Study Name: Upper Hole Trail

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.1	7.3	44	22.2	33.8	2.6	2.6	54.4	0.6

POINT-QUARTER TREE DATA--
Management unit 16C, Study no: 30

Species	Trees per Acre		
	'99	'04	'09
Cercocarpus ledifolius	119	92	89
Pinus edulis	20	-	-
Pinus flexilis	19	-	-

Average diameter (in)		
'99	'04	'09
3.8	4.9	2.7
12.3	-	-
13.8	-	-

BASIC COVER--

Management unit 16C, Study no: 30

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	13.25	38.02	42.09	51.63	46.43
Rock	.50	3.47	5.51	5.17	3.52
Pavement	0	.59	2.87	1.95	1.04
Litter	55.50	38.12	52.62	45.40	52.71
Cryptogams	.25	.03	.03	0	0
Bare Ground	30.50	26.51	21.57	23.04	24.60

PELLET GROUP DATA--

Management unit 16C, Study no: 30

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	15	48	21	39	-	-	-
Elk	3	14	17	10	32 (79)	29 (72)	23 (56)
Deer	3	3	5	4	5 (12)	15 (36)	6 (15)
Cattle	5	8	7	3	31 (77)	8 (20)	21 (52)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 30

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
88	4799	99	1	0	1333	7	0	0	27/12
94	1180	22	76	2	-	8	2	0	29/31
99	680	44	44	12	120	50	24	6	80/81
04	640	31	56	13	-	19	44	3	42/44
09	1260	33	65	2	-	19	17	2	42/45
Artemisia nova									
88	265	25	50	25	-	0	0	25	7/8
94	300	0	60	40	-	0	0	33	11/19
99	1280	22	64	14	140	22	2	11	8/15
04	2320	36	46	18	40	.86	0	8	8/18
09	600	7	67	27	20	3	0	23	9/16
Artemisia tridentata vaseyana									
88	2132	41	44	16	799	9	3	38	20/21
94	2420	17	60	23	40	7	0	14	17/21
99	2200	30	60	10	980	9	0	5	19/27
04	2300	27	69	4	140	13	3	2	19/25
09	2500	9	85	6	-	5	0	.80	18/24

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Ceratoides lanata</i>										
88	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	100	0	-	-	0	0	0	-/-	
<i>Cercocarpus ledifolius</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	720	11	89	0	-	3	6	0	46/47	
99	800	13	80	8	40	33	28	0	68/57	
04	480	8	88	4	20	4	50	0	62/57	
09	460	4	96	0	240	9	30	0	65/55	
<i>Cercocarpus montanus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	240	25	75	0	-	67	0	0	25/37	
99	220	9	91	0	40	9	73	0	20/24	
04	200	20	80	0	-	0	80	0	18/22	
09	200	20	30	50	120	20	10	0	20/23	
<i>Chrysothamnus depressus</i>										
88	0	0	0	0	-	0	0	0	-/-	
94	1000	0	92	8	-	18	0	2	5/6	
99	660	12	64	24	-	45	18	3	3/12	
04	700	0	100	0	-	3	0	0	5/10	
09	340	6	94	0	-	6	0	0	4/8	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
88	1065	31	63	6	-	6	6	56	2/4	
94	780	5	90	5	-	5	0	0	6/10	
99	560	4	79	18	-	54	11	18	12/13	
04	660	0	100	0	-	0	0	15	11/13	
09	580	0	100	0	-	0	3	3	9/11	
<i>Eriogonum corymbosum</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	140	0	100	-	-	14	0	0	9/15	
99	40	0	100	-	-	0	0	0	7/18	
04	20	100	0	-	20	0	0	0	7/12	
09	0	0	0	-	-	0	0	0	14/31	
<i>Gutierrezia sarothrae</i>										
88	66	0	100	-	-	0	0	0	6/2	
94	480	8	92	-	-	0	0	0	6/6	
99	680	21	79	-	20	0	0	0	6/6	
04	1480	0	100	-	-	0	0	0	8/8	
09	540	0	100	-	-	0	0	0	8/7	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Juniperus osteosperma										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	20	100	0	-	-	0	0	0	-/-	
09	20	0	100	-	-	0	0	0	-/-	
Leptodactylon pungens										
88	0	0	0	0	-	0	0	0	-/-	
94	600	3	97	0	-	0	0	0	13/8	
99	800	5	90	5	-	0	0	0	6/7	
04	660	3	82	15	-	0	0	3	7/6	
09	660	0	100	0	-	0	0	0	4/5	
Mahonia repens										
88	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	2/6	
Pediocactus simpsonii										
88	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	-/-	
09	0	0	0	-	-	0	0	0	-/-	
Pinus edulis										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	20	100	0	-	-	0	0	0	-/-	
04	20	100	0	-	-	0	0	0	-/-	
09	20	100	0	-	-	0	0	0	-/-	
Purshia tridentata										
88	1131	53	41	6	-	41	0	0	12/39	
94	2720	6	93	1	-	18	.73	0	11/36	
99	1980	22	75	3	60	44	47	2	16/38	
04	2080	3	92	5	60	30	63	0	16/40	
09	1840	9	90	1	-	36	10	1	15/36	
Rosa woodsii										
88	0	0	0	-	-	0	0	0	-/-	
94	3060	18	82	-	-	0	0	0	8/5	
99	2080	64	36	-	780	0	0	0	17/10	
04	2920	7	93	-	-	0	0	0	9/8	
09	2400	8	93	-	80	0	0	0	11/10	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Symphoricarpos oreophilus</i>										
88	1532	96	4	0	733	0	0	0	64/43	
94	2360	7	92	2	-	8	4	0	12/24	
99	1740	30	69	1	140	5	0	0	17/27	
04	1560	6	94	0	40	19	0	0	15/28	
09	2900	17	82	1	-	.68	0	0	17/25	
<i>Tetradymia canescens</i>										
88	665	70	30	-	-	0	0	0	5/6	
94	40	100	0	-	-	0	0	0	4/6	
99	20	100	0	-	-	0	0	0	-/-	
04	80	50	50	-	-	0	0	0	4/7	
09	60	0	100	-	-	0	0	0	5/6	
<i>Yucca baileyi navajoa</i>										
88	66	0	100	0	-	0	0	0	9/10	
94	320	69	31	0	-	0	0	0	8/10	
99	320	56	44	0	-	0	0	0	6/12	
04	140	14	86	0	-	0	0	0	7/9	
09	240	0	92	8	-	0	0	8	5/8	

BOX CANYON KNOLLS - TREND STUDY NO. 16C-31-09

Vegetation Type: Black Sagebrush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,500 ft (2,591 m)

Aspect: South

Slope: 0%-2%

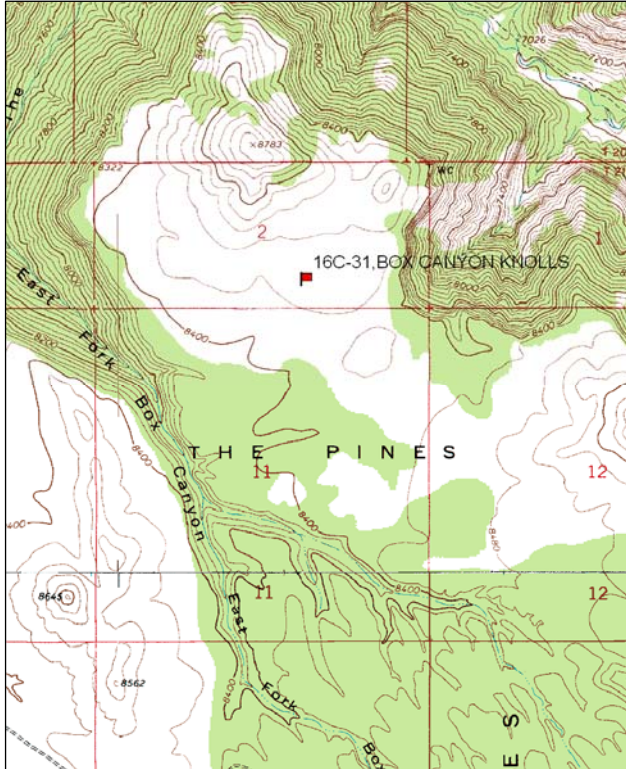
Transect bearing: 180 degrees magnetic.

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

Directions:

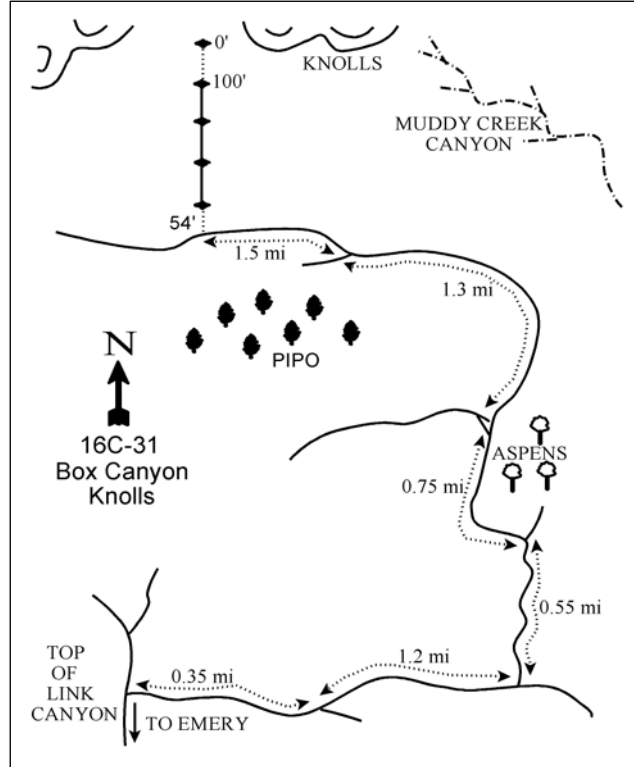
From Center Street in the town of Emery, continue south on Highway 10 for 1.2 miles. Turn right onto a dirt road and go 0.6 miles. Turn left and travel up Link Canyon 7 miles (4WD road) to the top. Turn right at the fork and proceed 0.35 miles. Bear left and continue 1.2 miles. Turn left off the jeep trail and go 0.55 miles to a faint fork. Bear left onto F.S. Road #28 and go 0.75 miles to a junction. Bear right and continue northwest 1.3 miles to another fork. Stay right on F.S. #278. Travel 1.5 miles and stop just past a lone limber pine. In the sage flat on the right side of the road, the study is marked by short fenceposts. The 400-foot baseline stake is 54 feet north of the road. The 0-foot baseline stake is 400 feet further north, and is marked by browse tag #9028.

Map Name: Flagstaff Peak



Township: 21S, Range: 5E, Section: 2

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 471967 E 4318207 N

BOX CANYON KNOLLS - TREND STUDY NO. 16C-31

Site Information

Site Description: The study is located in a remote area on the south side of the steep Muddy Creek Canyon. The study site is located in the open black sagebrush (*Artemisia nova*) and perennial grass community that covers most the flats. The area is managed by the Forest Service as part of the Emery cattle allotment. Pellet group data has estimated heavy elk and light deer use since 1999. Estimated cattle use has been light to moderate since 1999 (Table - Pellet Group Data).

Browse: The most abundant preferred browse species is a low-growing, dense population of black sagebrush. Black sagebrush densities decreased dramatically from 1999 to 2004, but rebounded in 2009. The decrease is attributed to drought conditions. The black sagebrush population is mostly healthy with low decadence, good vigor, and excellent recruitment of young plants in all sample years except for 2004. The majority of the black sagebrush plants have displayed light hedging over the study period. A small population of stunted mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) also occurs on the site and also had a substantial decrease in density in 2004, but did not recover in 2009. Mountain big sagebrush plants displayed moderate to heavy use in 2009 (Table - Browse Characteristics). The dominant species in cover on the site is stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) which is extremely abundant on the site (Table - Browse Trends). Rabbitbrush density also decreased markedly in 2004, but increased to the highest rate sampled in 2009. These shrubs are small, in good vigor, have low decadence, and have high recruitment of young plants. Other species on the site include an increasing population of winterfat (*Ceratoides lanata*) and small numbers of Utah serviceberry (*Amelanchier utahensis*), fringed sagebrush (*Artemisia frigida*), dwarf rabbitbrush (*Chrysothamnus depressus*), and gray horsebrush (*Tetradymia canescens*) (Table - Browse Characteristics).

Herbaceous Understory: Grasses are fairly diverse and abundant on the site, but there has been a change in composition over the length of the study. Pinewoods needlegrass (*Stipa pinetorum*) was the dominant grass species at the outset of the study in 1988 with sheep fescue (*Festuca ovina*) being common. Both species have decreased significantly in nested frequency and sheep fescue was rare in 2009. There may have been some problems differentiating western wheatgrass (*Agropyron smithii*) and slender wheatgrass (*A. trachycaulum*). Mutton bluegrass (*Poa fendleriana*) and western wheatgrass were the dominant grass species in cover in 2009 with pinewoods needlegrass also being common. Perennial forbs are diverse on the site and have steadily increased in cover since 1994. Some of the most common perennial forb species include redroot eriogonum (*Eriogonum racemosum*), Eaton fleabane (*Erigeron eatonii*), and mat penstemon (*Penstemon caespitosus*).

Soil: Soil texture is a clay loam with a neutral pH (Table - Soil Analysis Data). The surface of the clay loam soil shows expansion and/or contraction cracking which would indicate the presence of shrink/swell clays. Soil parent material appears to be limestone. Bare ground cover has been moderately low over the sample years except for 2004, when it was high. Most of the protective ground cover is provided by litter and herbaceous vegetation cover (Table - Basic Cover). There is some pedestaling of plants, but the soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1988 to 1994 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. Decadence of the primary browse species, black sagebrush, decreased from 34% to 7%.
- **1994 to 1999 - up (+2):** There was a 23% increase in the density of black sagebrush from 10,260 plants/acre to 12,680 plants/acre and cover increased from 6% to 9%. Decadence of black sagebrush

increased slightly, but is still low at 14%. There was also a 25% increase in the density of mountain big sagebrush, but decadence increased from 2% to 25%.

- **1999 to 2004 - down (-2):** There was a 75% decrease in the density of black sagebrush to 3,220 plants/acre and cover decreased to 3%. Recruitment of young black sagebrush plants decreased to 1% of the population. Mountain big sagebrush density and cover also decreased substantially.
- **2004 to 2009 - up (+2):** The density of black sagebrush increased five-fold to 16,940 plants/acre and cover increased to 6%. However, stickyleaf low rabbitbrush also increased in cover and density, but mountain big sagebrush did not recover.

Grass:

- **1988 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1994 to 1999 - stable (0):** Perennial grass sum of nested frequency changed little, but cover decreased from 14% to 11%. Pinewoods needlegrass and slender wheatgrass decreased significantly in nested frequency and sheep fescue increased significantly.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 52% and cover decreased to 6%. There was a significant decrease in the nested frequency of sheep fescue, mutton bluegrass, and pinewood needlegrass.
- **2004 to 2009 - up (+2):** Perennial grass sum of nested frequency increased by 63% and cover increased to 8%. Mutton bluegrass and pinewood needlegrass increased significantly in nested frequency.

Forb:

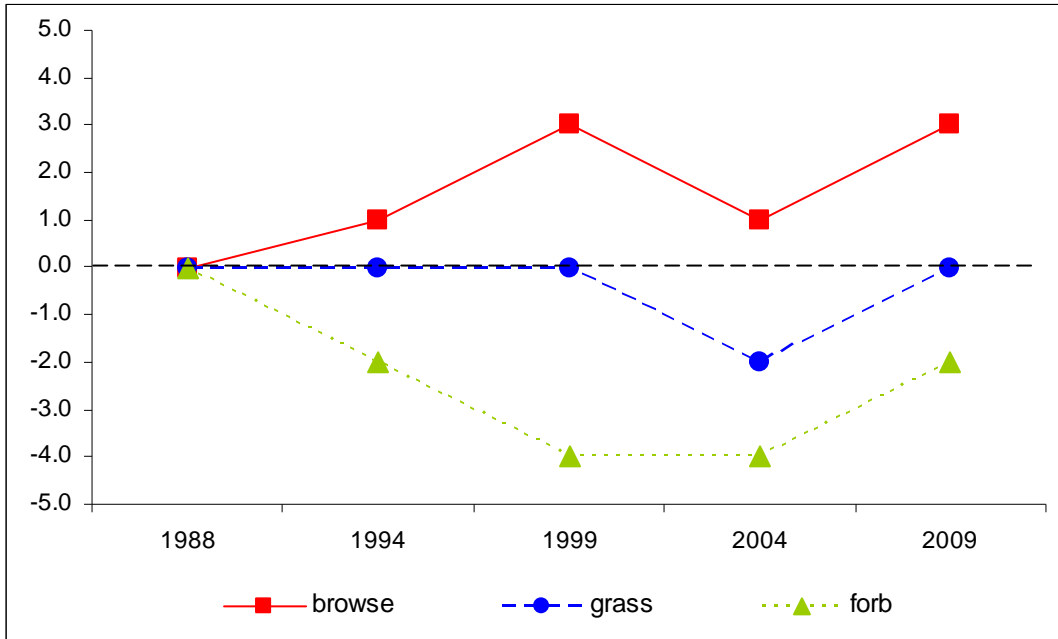
- **1988 to 1994 - down (-2):** Perennial forb sum of nested frequency decreased by 32%.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 20%, but cover increased from 2% to 3%.
- **1999 to 2004 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, but cover increased to 4%. There was also a large increase in the sum of nested frequency and cover of annual forbs.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased 58% and cover increased to 5%. There was a substantial decrease in the sum of nested frequency and cover of annual forbs.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 16C, study no: 31

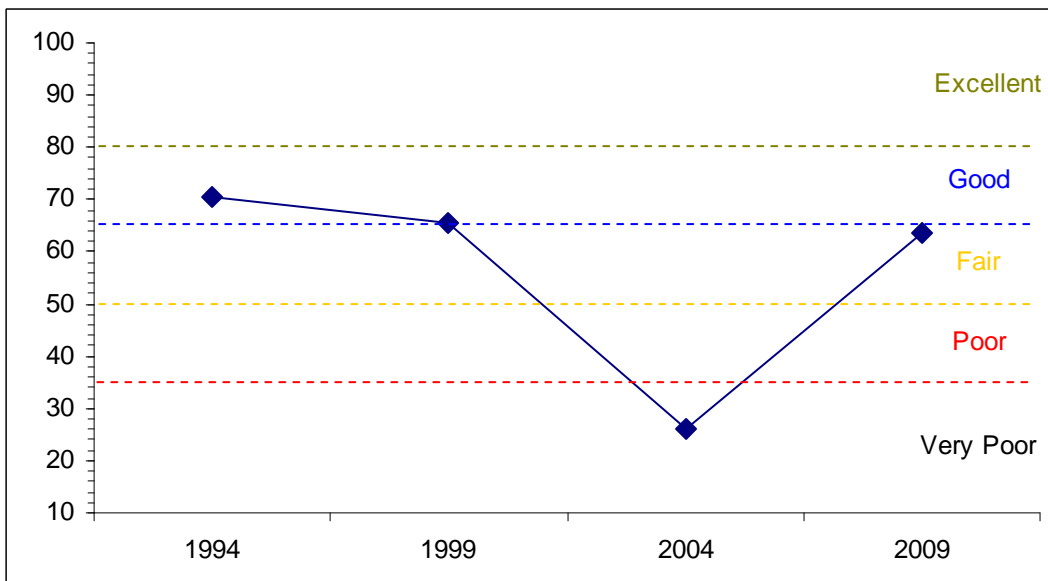
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	9.4	13.3	14.7	29.0	0.0	3.9	0.0	70.4	Good
99	14.0	10.3	13.3	21.9	0.0	6.2	0.0	65.6	Fair-Good
04	4.4	0.0	0.0	12.9	0.0	8.5	0.0	25.9	Very Poor
09	8.7	13.2	15.0	16.9	0.0	9.9	0.0	63.7	Fair-Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 31



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 16C, Study no:31



HERBACEOUS TRENDS--

Management unit 16C, Study no: 31

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	a-	a-	a-	b63	c164	-	-	1.36	3.41
G	Agropyron trachycaulum	c121	c128	b72	a39	a7	1.15	.84	1.56	.12
G	Festuca ovina	b26	b15	c110	b18	a-	.10	2.92	.07	-
G	Poa fendleriana	a130	b157	b140	a79	b177	2.85	2.59	2.28	3.87
G	Poa pratensis	-	-	-	3	-	-	-	.15	-
G	Sitanion hystrix	b27	a1	ab19	b28	a-	.00	.13	.57	-
G	Stipa comata	-	-	-	3	-	-	-	.15	-
G	Stipa pinetorum	d236	d281	c208	a32	b84	10.37	4.43	.31	1.04
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		540	582	549	265	432	14.49	10.93	6.47	8.45
Total for Grasses		540	582	549	265	432	14.49	10.93	6.47	8.45
F	Androsace septentrionalis (a)	-	a-	b33	c66	a-	-	.15	.36	-
F	Antennaria parvifolia	5	16	18	1	10	.65	.84	.03	.16
F	Arabis sp.	b18	a-	a3	a4	a3	-	.00	.01	.00
F	Artemisia frigida	-	2	-	-	-	.00	-	-	-
F	Astragalus agrestis	abc8	bc16	c19	a1	ab3	.03	.17	.00	.00
F	Astragalus convallarius	-	3	2	6	-	.01	.00	.09	.00
F	Calochortus nuttallii	b20	a-	ab8	a3	a2	-	.02	.00	.00
F	Castilleja linariaefolia	b46	a3	a7	a-	a-	.00	.10	-	-
F	Chaenactis douglasii	b21	a-	a1	a-	a3	-	.00	-	.00
F	Chenopodium sp. (a)	-	a-	a-	b186	a5	-	-	2.72	.01
F	Crepis acuminata	ab11	a5	ab4	a4	b13	.01	.06	.06	.09
F	Cryptantha sp.	-	2	-	-	-	.00	-	-	-
F	Descurainia pinnata (a)	-	-	-	2	-	-	-	.00	-
F	Erigeron eatonii	d197	c141	b67	a2	b92	.54	.59	.00	1.19
F	Erigeron pumilus	a7	b22	a5	a-	a-	.21	.04	-	-
F	Eriogonum alatum	-	3	3	-	1	.00	.03	-	.03
F	Eriogonum racemosum	a72	a64	a70	b133	b163	.25	.92	2.25	1.76
F	Eriogonum umbellatum	ab24	b33	ab16	ab12	a6	.15	.09	.23	.18
F	Hymenoxys richardsonii	9	7	3	2	-	.02	.00	.15	-
F	Lappula occidentalis (a)	-	-	-	3	-	-	-	.00	-
F	Linum lewisii	-	-	-	1	-	-	-	.03	-
F	Lupinus argenteus	3	-	9	1	1	-	.08	.03	.00
F	Lupinus sp.	a-	a-	a-	b15	a-	-	-	.10	-
F	Machaeranthera canescens	9	-	-	-	3	-	-	-	.00
F	Penstemon caespitosus	b31	a7	a-	a4	b47	.04	-	.04	1.14
F	Penstemon carnosus	-	1	10	2	2	.00	.05	.18	.00
F	Polygonum douglasii (a)	-	a1	a-	b52	a3	.00	-	.11	.00
F	Senecio multilobatus	a-	a3	a8	b38	b30	.00	.04	.86	.28
F	Sphaeralcea coccinea	-	-	2	1	3	-	.00	.03	.03
F	Taraxacum officinale	-	-	-	3	-	-	-	.03	-
F	Townsendia incana	1	-	-	-	-	-	-	-	-
F	Tragopogon dubius	2	-	6	11	3	-	.01	.11	.00

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
	Total for Annual Forbs	0	1	33	309	8	0.00	0.15	3.21	0.01
	Total for Perennial Forbs	484	328	261	244	385	1.96	3.09	4.26	4.94
	Total for Forbs	484	329	294	553	393	1.97	3.24	7.47	4.96

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

BROWSE TRENDS--

Management unit 16C, Study no: 31

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia frigida	3	4	5	31	.00	.01	.41	.61
B	Artemisia nova	97	94	53	84	5.50	9.05	2.78	5.58
B	Artemisia tridentata vaseyana	22	29	3	3	1.80	1.95	.30	.33
B	Ceratoides lanata	0	1	9	15	.03	.03	.15	.55
B	Chrysothamnus depressus	3	6	2	2	.18	.16	-	-
B	Chrysothamnus nauseosus	0	0	0	1	-	-	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	93	93	80	89	5.15	7.64	5.67	8.25
B	Gutierrezia sarothrae	8	8	0	0	.04	.09	-	-
B	Tetradymia canescens	6	9	11	7	.18	.24	.53	.54
	Total for Browse	232	244	163	232	12.90	19.17	9.86	15.90

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 31

Species	Percent Cover	
	'04	'09
Artemisia frigida	.50	.23
Artemisia nova	3.53	5.59
Artemisia tridentata vaseyana	.23	.35
Ceratoides lanata	.25	.46
Chrysothamnus depressus	.40	-
Chrysothamnus viscidiflorus viscidiflorus	5.25	3.59
Tetradymia canescens	.36	.16

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 31

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	2.3	0.6

BASIC COVER--

Management unit 16C, Study no: 31

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	8.75	35.04	34.84	23.34	33.32
Rock	1.25	1.14	.76	.84	.35
Pavement	.25	.70	1.35	.59	1.33
Litter	35.75	37.44	27.93	26.64	36.97
Cryptogams	.50	.23	.82	.75	.19
Bare Ground	53.50	40.24	39.54	62.15	39.75

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 31, Study Name: Box Canyon Knolls

Effective rooting depth (in)	pH	clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.8	6.8	42	25.4	32.6	2.9	13.2	137.6	0.4

PELLET GROUP DATA--

Management unit 16C, Study no: 31

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	16	7	3	2	-	-	-
Elk	62	55	40	68	108 (267)	87 (215)	44 (109)
Deer	11	5	4	8	5 (12)	-	4 (10)
Cattle	1	7	1	5	9 (22)	25 (61)	20 (58)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 31

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	16/20
99	0	0	0	-	-	0	0	0	14/36
04	0	0	0	-	-	0	0	0	16/38
09	0	0	0	-	200	0	0	0	103/164
Artemisia frigida									
88	0	0	0	0	-	0	0	0	-/-
94	80	0	100	0	-	0	0	0	2/5
99	100	40	60	0	-	60	0	0	6/6
04	160	0	88	13	360	13	13	0	15/17
09	3100	46	54	0	320	12	21	37	5/7

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
88	10332	36	30	34	6133	17	2	9	8/13
94	10260	37	56	7	20	14	0	6	6/13
99	12680	31	55	14	1140	28	5	2	7/15
04	3220	1	89	11	3760	15	0	4	8/13
09	16940	62	32	6	24160	9	9	16	6/13
<i>Artemisia tridentata vaseyana</i>									
88	332	60	0	40	-	40	0	0	-/-
94	820	10	88	2	-	0	0	2	11/18
99	1060	8	68	25	60	34	23	4	15/24
04	140	0	71	29	-	14	0	14	13/19
09	160	0	75	25	140	75	25	0	10/21
<i>Ceratoides lanata</i>									
88	1264	16	79	5	66	0	0	0	6/6
94	0	0	0	0	-	0	0	0	5/7
99	40	0	100	0	-	100	0	0	4/5
04	2760	74	26	0	560	34	62	0	4/9
09	3300	22	78	0	240	72	13	0	4/5
<i>Chrysothamnus depressus</i>									
88	0	0	0	-	-	0	0	0	-/-
94	100	0	100	-	-	0	0	0	4/9
99	160	13	88	-	-	0	0	0	3/9
04	40	0	100	-	-	0	0	0	4/5
09	40	0	100	-	-	0	0	0	2/7
<i>Chrysothamnus nauseosus</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	21/24
99	0	0	0	-	-	0	0	0	18/24
04	0	0	0	-	-	0	0	0	-/-
09	20	100	0	-	-	0	0	0	14/11
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
88	32598	22	64	14	1199	7	0	4	3/6
94	22420	36	64	0	-	1	0	0	3/7
99	19220	15	81	4	80	3	0	.41	4/8
04	9420	7	91	2	75960	1	0	.21	6/10
09	56440	41	55	5	3740	.49	0	23	3/7
<i>Gutierrezia sarothrae</i>									
88	0	0	0	0	-	0	0	0	-/-
94	220	9	91	0	-	0	0	0	3/6
99	460	0	91	9	-	0	0	4	4/8
04	0	0	0	0	-	0	0	0	-/-
09	0	0	0	0	-	0	0	0	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Mahonia repens									
88	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	3/5
Opuntia polyacantha									
88	133	0	100	-	-	0	0	0	2/6
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	20	0	0	0	3/15
04	0	0	0	-	-	0	0	0	5/10
09	0	0	0	-	-	0	0	0	3/11
Purshia tridentata									
88	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	2/63
Tetradymia canescens									
88	0	0	0	0	-	0	0	0	-/-
94	160	13	88	0	-	13	0	0	6/8
99	240	0	100	0	-	42	25	0	6/8
04	300	0	100	0	-	0	20	0	9/13
09	140	0	86	14	20	43	29	0	6/17

MUDDY CREEK - TREND STUDY NO. 16C-32-09

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 6,600 ft (2,012 m)

Aspect: South

Slope: 1%

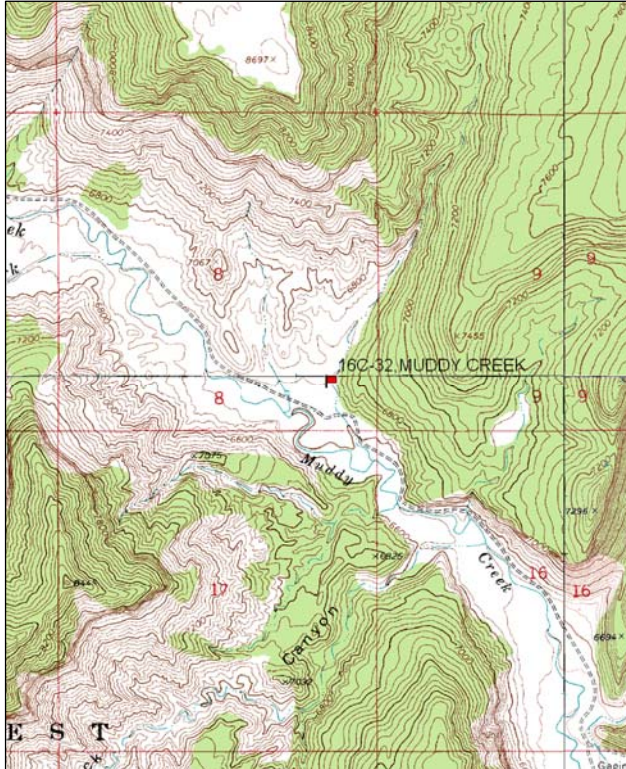
Transect bearing: line 1, 162°M, lines 2-4, 168°M

Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft); belt 2 rebar @ 1'

Directions:

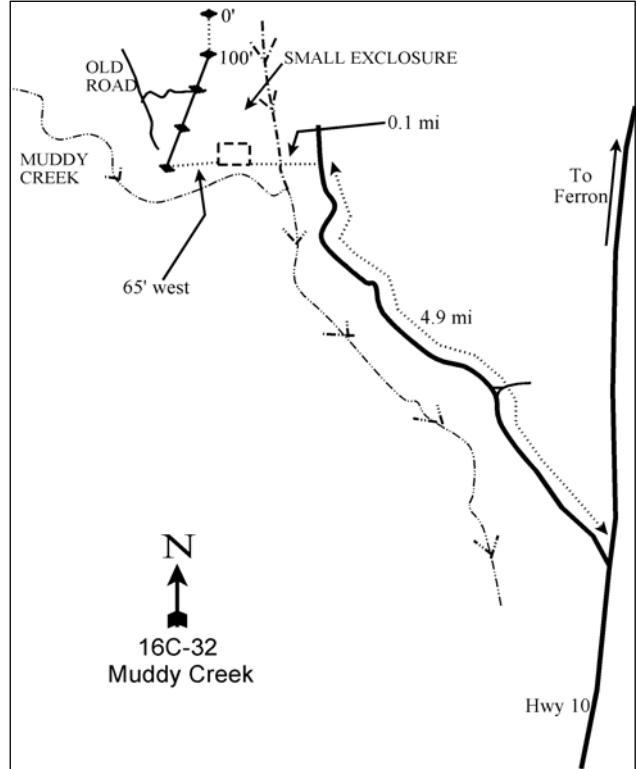
From Ferron, proceed south on Highway U-10 for 12 miles to the turnoff to Muddy Creek, which is just across from the southern Moore Road. Turn right and go 4.9 miles. Once you reach Muddy Creek, take a left across the creek for 0.1 miles to the site. From the small fenced enclosure, the 400-foot baseline stake is 65 feet west of the SW corner of the enclosure. The baseline start 400 feet north of this stake, and the 18 inch green fencepost marking the 0-foot end of the baseline has a red browse tag, #9029, attached.

Map Name: Emery West



Township: 21S, Range: 6E, Section: 17

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 477093 E 4316751 N

MUDDY CREEK - TREND STUDY NO. 16C-32

Site Information

Site Description: The study samples a unique area within the Muddy Creek drainage. A small flat (approximately 30 acres) in the bottom of the canyon supports a stand of Wyoming big sagebrush (*Artemisia tridentata* spp. *wyomingensis*) mixed with more typical desert shrubs. Large basin big sagebrush (*Artemisia tridentata* spp. *tridentata*) plants grow in the riparian areas, while pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland, and mountain mahogany (*Cercocarpus* spp.) dominate the surrounding slopes. The study site is adjacent to a small Forest Service exclosure. The flat is heavily used by deer and elk and to a lesser extent, trespass cattle from private land below the Forest Service fence. Pellet group data has estimated heavy use by elk and light use by deer and cattle since 1999 (Table - Pellet Group Data).

Browse: The site is dominated by salt desert shrubs, but Wyoming big sagebrush is the preferred browse species in this area. There was a large die-off of Wyoming big sagebrush between the 1999 and 2004 sample years that is attributed to drier than normal years prior to the 2004 sample year. The Wyoming big sagebrush population had recovered somewhat by 2009, but was comprised primarily of young and decadent plants. Wyoming big sagebrush plants have displayed heavy use since 1999. After the sagebrush die-off, shadscale (*Atriplex confertifolia*) became the dominant browse species on the site. This spiny plant shows light hedging with good vigor, low decadence, and good recruitment. Bud sagebrush (*Artemisia spinescens*) was fairly common in 1988, 1994 and 2009, but was not encountered in 1999 and 2004. Use is difficult to determine on these small prostrate shrubs and most were classified as lightly hedged. Low rabbitbrush (*Chrysothamnus viscidiflorus*) is very common and has fluctuated in density over the sample years. These shrubs are small and generally not utilized as forage. Other shrubs encountered on the site include a small number of winterfat (*Ceratoides lanata*), broom snakeweed (*Gutierrezia sarothrae*), greasewood (*Sarcobatus vermiculatus*), and spiny horsebrush (*Tetradymia spinosa*) (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is typical for a mixed salt desert shrub community with limited diversity and moderate abundance. Indian ricegrass (*Oryzopsis hymenoides*) is the dominant grass species, but blue grama (*Bouteloua gracilis*) and bottlebrush squirreltail (*Sitanion hystrix*) are also common. Forbs are rare and provide little cover. The only common forbs have been annual species in the past, but no forb species was common in 2009 (Table - Herbaceous Trends).

Soil: Soil texture is a sandy clay loam with a slightly alkaline pH. Phosphorus has a limited availability for plant growth and development at 5.9 ppm (Tiedemann and Lopez 2004). Organic matter was the lowest of all sites within this management unit (Table - Soil Analysis Data). Bare ground is very high on the site with little protective cover (Table - Basic Cover). Numerous gullies flow from the flat into the deeply cut washes surrounding the site. Even with the level terrain, there is obvious erosion, pedestaled plants, and large bare areas. Much of the soil on the site has eroded away. Pedestaling between plants has varied from 2 to 8 inches in height. The soil erosion condition was classified as moderate in 2004 and 2009.

Trend Assessments

Browse:

- **1988 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 two prevalent shrubs, Wyoming big sagebrush and shadscale. Decadence of Wyoming big sagebrush did increase slightly from 14% to 25% and poor vigor increased from 0% to 10%, but decadence of shadscale decreased from 18% to 9%.
- **1994 to 1999 - slightly down (-1):** There was little change in the density of Wyoming big sagebrush, but decadence increased to 50%. The density of shadscale decreased by 22% and decadence increased to 20%.

- **1999 to 2004 - down (-2):** The density of Wyoming big sagebrush decreased from 3,200 plants/acre to 400 plants/acre and cover decreased from 5% to less than 1%. Decadence of Wyoming big sagebrush increased to 90% of the population and poor vigor increased from 12% to 70%. There was no new recruitment of young Wyoming big sagebrush plants sampled.
- **2004 to 2009 - up (+2):** There was nearly a three-fold increase in the density of Wyoming big sagebrush to 1,500 plants/acre, though cover is still less than 1%. Most of the increase in density is due to a large increase in the recruitment of young sagebrush plants. The proportion of decadent Wyoming big sagebrush plants decreased substantially, but the actual density of decadent plants remained similar.

Grass:

- **1988 to 1994 - up (+2):** Perennial grass sum of nested frequency increased by 21% with a significant increase in the nested frequency of blue grama and Indian ricegrass. Bottlebrush squirreltail decreased significantly in nested frequency.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 10% and cover increased from 5% to 7%.
- **1999 to 2004 - slightly down (-1):** There was an 11% decrease in the sum of nested frequency of perennial grasses and cover decreased to 3%.
- **2004 to 2009 - up (+2):** Perennial grass sum of nested frequency increased by 38% and cover increased to 11%. Indian ricegrass increased significantly in nested frequency and also had a large increase in cover.

Forb:

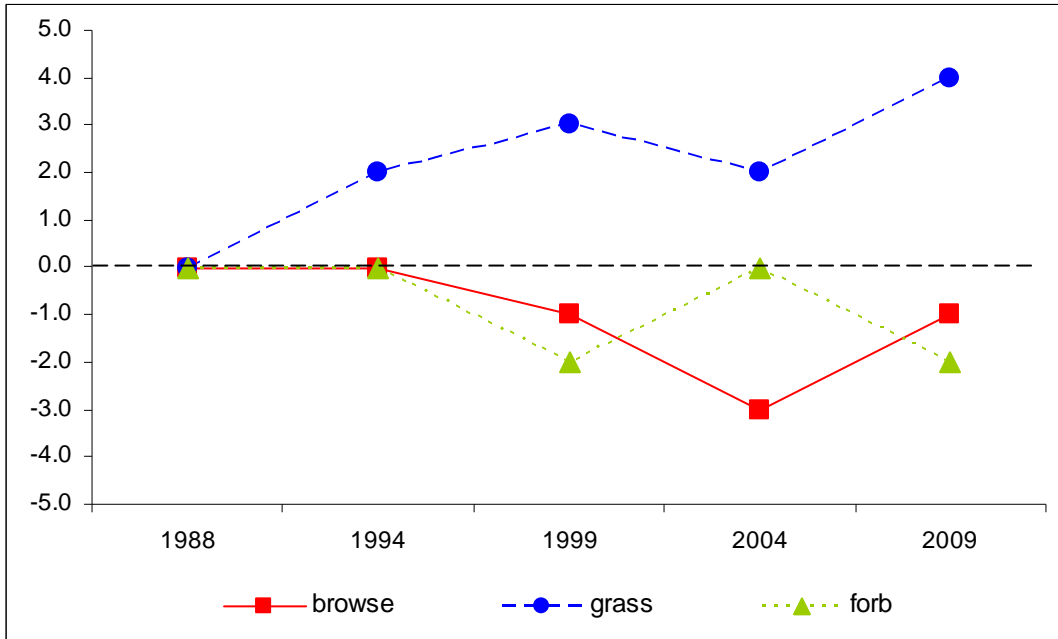
- **1988 to 1994 - stable (0):** Perennial forb sum of nested frequency changed little.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 58% and the sum of nested frequency of annual forbs increased substantially. Annual forbs now dominate the site.
- **1999 to 2004 - up (+2):** Perennial forb sum of nested frequency had a three-fold increase and cover increased to near 2%. Much of the increase was due to a significant increase in scarlet globemallow (*Sphaeralcea coccinea*) and hoary townsendia (*Townsendia incana*). Annual forbs continue to dominate the site.
- **2004 to 2009 - down (-2):** There was an 84% decrease in the sum of nested frequency of perennial forbs and cover decreased to 1999 levels. Annual species also decreased substantially in their sum of nested frequency and cover, and all forbs are now very rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 16C, study no: 32

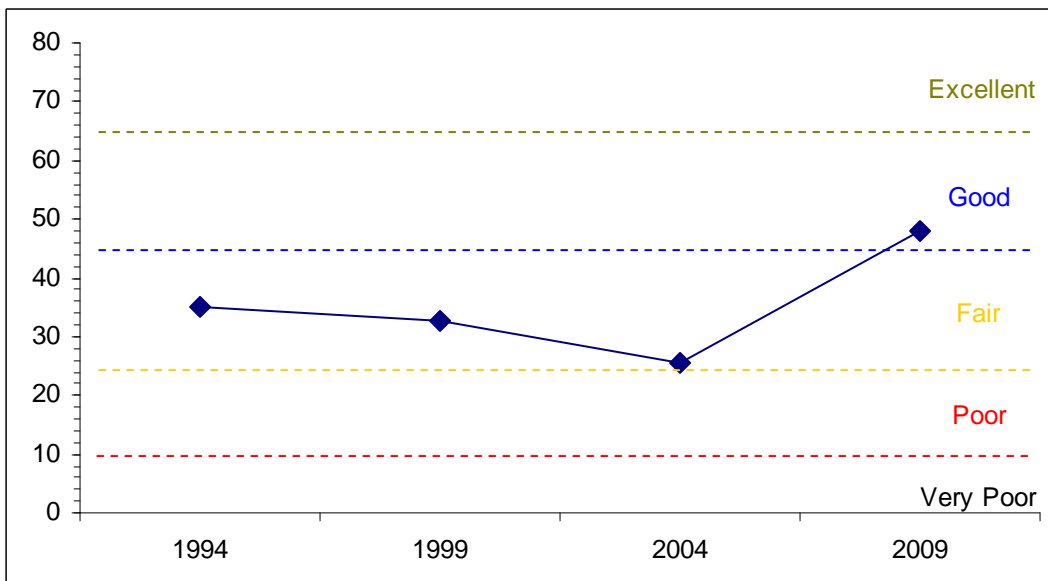
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	10.1	10.4	2.9	10.7	0.0	1.1	0.0	35.2	Fair
99	9.3	3.8	5.3	13.9	0.0	0.4	0.0	32.7	Fair
04	7.4	8.3	0.9	5.2	0.0	3.9	0.0	25.7	Poor-Fair
09	6.2	10.4	9.7	21.4	0.0	0.3	0.0	47.8	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 32



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 16C, Study no: 32



HERBACEOUS TRENDS--

Management unit 16C, Study no: 32

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	-	-	3	1	8	-	.03	.03	.33
G	Agropyron smithii	-	-	2	-	-	-	.15	-	-
G	Agropyron spicatum inerme	-	1	-	-	-	.15	-	-	-
G	Bouteloua gracilis	a2	b36	b55	b31	b30	2.23	3.11	.28	1.02
G	Bromus tectorum (a)	-	-	10	-	4	-	.02	-	.03
G	Oryzopsis hymenoides	a64	b112	ab113	b113	c168	2.57	3.27	1.92	7.40
G	Sitanion hystrix	b94	a51	a33	a30	a45	.39	.27	.15	1.30
G	Sporobolus cryptandrus	ab5	a-	b13	b20	b18	-	.10	.21	.61
Total for Annual Grasses		0	0	10	0	4	0	0.02	0	0.03
Total for Perennial Grasses		165	200	219	195	269	5.34	6.95	2.60	10.68
Total for Grasses		165	200	229	195	273	5.34	6.98	2.60	10.72
F	Arabis sp.	1	-	-	-	-	-	-	-	-
F	Astragalus sp.	ab23	b32	ab14	b36	a2	.12	.04	.17	.01
F	Calochortus nuttallii	-	-	4	5	-	-	.01	.01	-
F	Castilleja sp.	-	2	-	-	-	.00	-	-	-
F	Collinsia parviflora (a)	-	-	-	3	1	-	-	.00	.00
F	Descurainia pinnata (a)	-	1	7	2	-	.00	.01	.01	-
F	Draba sp. (a)	-	6	-	-	-	.01	-	-	-
F	Erigeron pumilus	7	5	10	-	-	.01	.02	-	-
F	Eriogonum sp.	-	2	-	-	-	.00	-	-	-
F	Lappula occidentalis (a)	-	b43	ab18	c190	a3	.07	.03	1.77	.00
F	Machaeranthera canescens	ab11	b19	a-	a1	a-	.11	-	.03	-
F	Malcolmia africana	-	-	-	1	-	-	-	.01	-
F	Oenothera sp.	-	-	-	4	-	-	-	.16	-
F	Plantago patagonica (a)	-	b104	c191	b97	a9	.45	1.08	.46	.02
F	Ranunculus testiculatus (a)	-	-	-	-	5	-	-	-	.01
F	Sphaeralcea coccinea	a5	a11	a8	b49	a21	.05	.03	.68	.13
F	Townsendia incana	b54	b34	a8	b44	a-	.25	.07	.87	-
F	Trifolium sp.	-	-	-	3	-	-	-	.00	-
F	Unknown forb-annual (a)	-	2	-	-	-	.00	-	-	-
Total for Annual Forbs		0	156	216	292	18	0.54	1.13	2.25	0.03
Total for Perennial Forbs		101	105	44	143	23	0.56	0.18	1.95	0.13
Total for Forbs		101	261	260	435	41	1.11	1.31	4.21	0.17

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

BROWSE TRENDS--

Management unit 16C, Study no: 32

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia spinescens	31	0	0	17	.51	-	-	.79
B	Artemisia tridentata wyomingensis	69	72	17	21	3.58	4.68	.66	.93
B	Atriplex confertifolia	81	69	70	73	5.55	3.45	6.32	4.78
B	Ceratoides lanata	6	4	5	12	.06	.00	.21	.21
B	Chrysothamnus viscidiflorus	64	70	25	42	2.06	1.99	.46	.66
B	Gutierrezia sarothrae	1	0	0	0	.00	-	-	-
B	Opuntia sp.	17	21	14	18	.40	.36	.07	.48
B	Sarcobatus vermiculatus	12	14	16	14	1.61	1.35	2.06	2.00
B	Sclerocactus sp.	2	8	0	9	.03	.15	-	.04
B	Tetradymia spinosa	13	14	0	1	.19	.36	-	.00
Total for Browse		296	272	147	207	14.03	12.38	9.80	9.91

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 32

Species	Percent Cover	
	'04	'09
Artemisia spinescens	-	.23
Artemisia tridentata wyomingensis	.95	1.11
Atriplex confertifolia	7.31	4.09
Ceratoides lanata	.08	.03
Chrysothamnus viscidiflorus	.91	2.23
Opuntia sp.	.23	.16
Sarcobatus vermiculatus	3.96	2.50
Sclerocactus sp.	-	.20

BASIC COVER--

Management unit 16C, Study no: 32

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	2.50	22.87	19.34	16.51	20.31
Rock	0	.91	.50	.52	.43
Pavement	.75	.21	.46	.33	.34
Litter	20.00	14.56	17.69	22.10	20.43
Cryptogams	10.00	3.65	7.27	5.55	1.41
Bare Ground	66.75	56.71	52.81	64.86	63.60

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 32, Study Name: Muddy Creek

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10.6	7.6	56	23.4	20.6	0.7	5.9	89.6	3.4

PELLET GROUP DATA--

Management unit 16C, Study no: 32

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	10	12	5	12	-	-	-
Elk	35	55	44	43	70 (173)	73 (180)	80 (197)
Deer	33	9	3	6	12 (30)	19 (46)	5 (13)
Cattle	3	-	1	-	1 (2)	6 (14)	3 (7)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 32

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia spinescens</i>									
88	1398	57	38	5	66	0	0	0	3/5
94	1560	1	71	28	-	46	0	10	4/9
99	0	0	0	0	-	0	0	0	-/-
04	0	0	0	0	-	0	0	0	-/-
09	1260	22	75	3	-	0	0	3	5/8
<i>Artemisia tridentata wyomingensis</i>									
88	7532	52	34	14	666	25	11	0	15/19
94	3120	7	68	25	-	32	3	10	13/17
99	3200	6	44	50	20	33	48	12	13/19
04	400	0	10	90	-	15	75	70	15/25
09	1500	53	25	21	-	9	67	19	13/22
<i>Atriplex confertifolia</i>									
88	7864	46	36	18	999	11	6	0	9/10
94	5580	5	86	9	-	.35	0	2	8/15
99	4340	17	64	20	20	10	.92	5	7/13
04	3480	2	82	16	360	3	0	12	10/20
09	4780	13	72	15	80	.83	.83	10	7/13
<i>Ceratoides lanata</i>									
88	598	33	67	0	-	11	33	0	6/6
94	140	0	86	14	-	43	0	0	6/6
99	120	0	17	83	20	0	100	0	4/5
04	120	0	100	0	120	33	17	33	9/11
09	420	14	86	0	-	67	10	0	6/7
<i>Chrysothamnus nauseosus</i>									
88	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	22/24

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Chrysothamnus viscidiflorus</i>										
88	9465	51	49	0	66	4	.70	.70	7/9	
94	4540	6	93	1	-	0	0	.88	9/11	
99	4080	11	84	4	40	15	.98	10	7/12	
04	960	4	69	27	20	0	0	29	10/16	
09	2080	16	72	12	-	0	0	39	7/12	
<i>Gutierrezia sarothrae</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	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	-/-	
<i>Opuntia sp.</i>										
88	133	0	100	0	-	0	0	0	6/16	
94	460	0	100	0	-	0	0	0	4/16	
99	760	18	76	5	120	0	0	5	5/13	
04	420	5	95	0	-	0	0	0	4/12	
09	480	4	92	4	-	0	0	8	4/13	
<i>Pediocactus simpsonii</i>										
88	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	
<i>Sarcobatus vermiculatus</i>										
88	399	83	17	0	-	0	17	0	19/31	
94	440	5	91	5	-	0	0	0	17/27	
99	640	13	72	16	-	0	0	13	16/30	
04	580	10	76	14	-	3	0	7	18/37	
09	620	13	81	6	-	3	0	0	20/28	
<i>Sclerocactus sp.</i>										
88	666	0	100	0	-	0	0	0	3/0	
94	120	0	100	0	-	0	0	0	3/4	
99	220	0	100	0	-	0	0	0	3/4	
04	0	0	0	0	-	0	0	0	-/-	
09	380	11	84	5	-	0	0	74	3/9	
<i>Tetradymia spinosa</i>										
88	66	0	100	0	-	0	0	0	12/16	
94	440	5	86	9	-	5	5	5	11/18	
99	600	13	80	7	-	0	3	97	4/11	
04	0	0	0	0	-	0	0	0	-/-	
09	20	0	100	0	-	0	0	0	6/12	

LITTLE NELSON MOUNTAIN - TREND STUDY NO. 16C-33-09

Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 6,340 ft (1,932 m)
Aspect: North
Slope: 5%
Transect bearing: 127 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

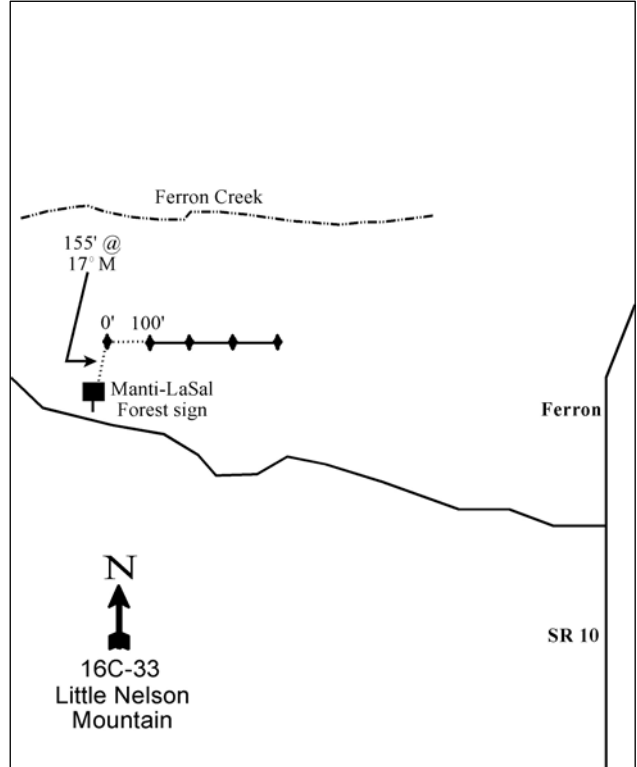
From Ferron, proceed up Ferron Canyon past Millsite State Park. Continue 0.7 miles past the forest boundary to the Manti-LaSal Forest sign. The 0-foot baseline stake is on the right hand side of the road approximately 155 feet away at a bearing of 17°M. The stake is marked with browse tag# 229.

Map Name: Ferron



Township: 20S, Range: 6E, Section: 3

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 479853 E 4328850 N

Site Information

Site Description: The study is in Ferron Canyon and samples a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community along the banks of Ferron Creek, just up stream from Millsite Reservoir. The area receives concentrated use from wintering deer. Pellet group data indicated deer use to be moderate in 1999, light in 2004, and heavy in 2009. Estimated cattle use has been light since 1999 (Table - Pellet Group Data). The site is within the Ferron allotment but is grazed only as cattle are trailed up the road to higher pastures.

Browse: The key browse species on the site consists of a moderately dense population of Wyoming big sagebrush. There was a large die-off of Wyoming big sagebrush between the 1999 and 2004 sample years attributed to drier than normal years prior to 2004. Decadence and poor vigor were very high in 2004, but have returned to lower levels in 2009. The sagebrush population appeared to be on the rebound with a large proportion of young plants sampled in 2009. Utilization of sagebrush was heavy in the early sample years of 1994 and 1999, but decreased to light use by 2009. Shadscale (*Atriplex confertifolia*) is also abundant, but has steadily decreased in density since 1994. Use of these small shrubs has been mostly light with some moderate use over the sample years (Table - Browse Characteristics). A number of other shrubs occur less frequently.

Herbaceous Understory: The herbaceous understory is diverse and moderately abundant for this type of site. The most common grass is blue grama (*Bouteloua gracilis*) which has accounted for most of the grass cover over the study years, but other perennial grass species have increased and provide a large amount of cover. These other fairly common grasses include Indian ricegrass (*Oryzopsis hymenoides*), galleta (*Hilaria jamesii*), bottlebrush squirreltail (*Sitanion hystrix*), and needle-and-thread (*Stipa comata*). Perennial forbs are diverse and had steadily increased from 1994 to 2004, before decreasing substantially in 2009. Annual forbs followed a similar trend, increasing from 1994 to 2004, before decreasing and being rare in 2009 (Table - Herbaceous Trends).

Soil: The soils are alluvially deposited and deep with some river cobble on the surface and within the profile. The soil texture is a loam with a slightly alkaline pH. Phosphorus has limited availability for plant growth and development at 3.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). There is a considerable amount of exposed bare ground between individual shrubs. Bare ground cover is high and has steadily increased since 1999 (Table - Basic Cover). Most erosion in the area comes from high intensity thunderstorm events. One such event on the day following study site establishment in 1994, washed out the road just past the reservoir. Soil pedestaling is evident to a height of 4 to 6 inches in some areas and active gullies near Ferron creek were back-filled to try and prevent further erosion in 2009. A ditch was dug through the site in 2009, as well. The soil erosion condition was classified as stable in 2004, but was slight in 2009 due to many of the factors mentioned above.

Trend Assessments

Browse:

- **1994 to 1999 - up (+2):** The density of Wyoming big sagebrush increased by 21% from 2,860 plants/acre to 3,480 plants/acre and cover increased from 3% to 7%. Wyoming big sagebrush decadence remained moderately high at 22%, but poor vigor decreased from 23% to 7%. Recruitment of young sagebrush plants increased from 8% to 25%.
- **1999 to 2004 - down (-2):** Wyoming big sagebrush density decreased by 68% to 1,100 plants/acre and cover decreased to 3%. Decadence of sagebrush increased to 40% and poor vigor increased to 27% of the population. There was no new recruitment of young sagebrush plants.

- **2004 to 2009 - up (+2):** The density of Wyoming big sagebrush increased more than three-fold to 3,900 plants/acre, though cover remained similar. Most of the increase in density came from a large increase in the recruitment of young sagebrush plants.

Grass:

- **1994 to 1999 - slightly up (+1):** Perennial grass sum of nested frequency increased by 14% and cover increased from 10% to 15%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 15% and cover decreased to 7%. There was a significant decrease in the nested frequency of the dominant grass, blue grama, and its cover decreased from 12% to 3%.
- **2004 to 2009 - up (+2):** There was a 27% increase in the sum of nested frequency of perennial grasses and cover increased to 10%. There was a significant increase in the nested frequency of galleta and needle-and-thread.

Forb:

- **1994 to 1999 - up (+2):** Perennial forb sum of nested frequency increased three-fold and cover increased from less than 1% to 3%. There was also a large increase in the sum of nested frequency and cover of annual forbs.
- **1999 to 2004 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though annual forbs sum of nested frequency and cover increased substantially.
- **2004 to 2009 - down (-2):** The sum of nested frequency of perennial forbs decreased by 46% and cover decreased to less than 1%. Annual forbs also decreased in sum of nested frequency and cover.

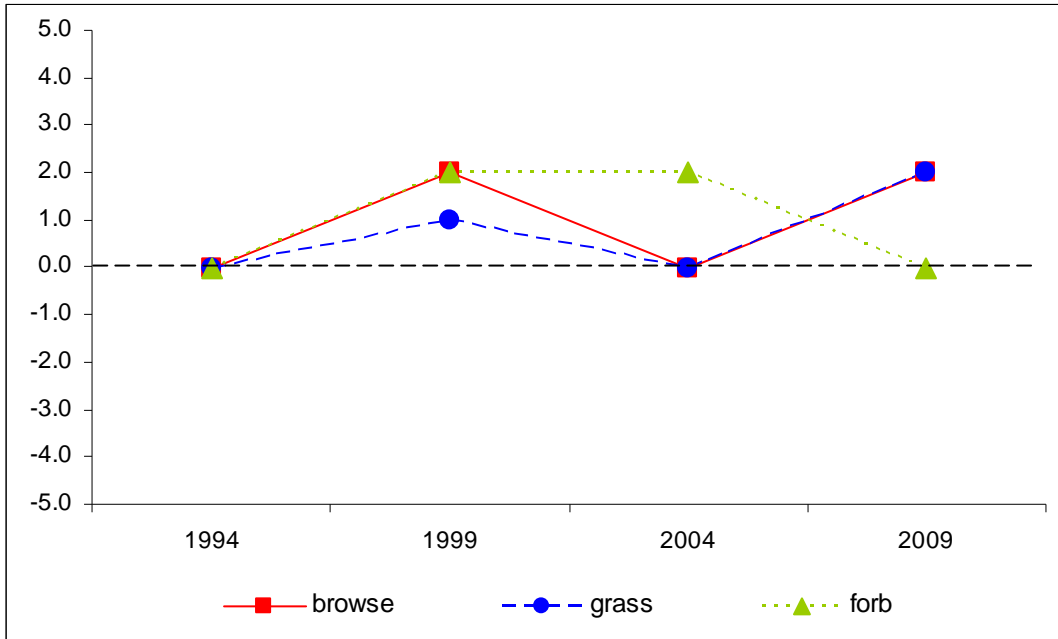
DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 16C, study no: 33

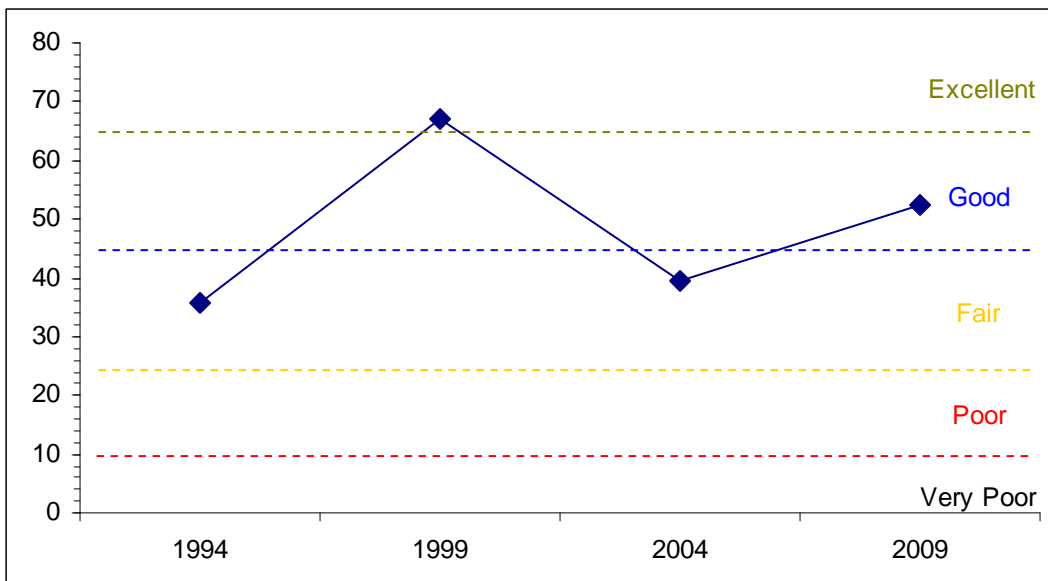
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	6.1	7.3	3.0	19.0	0.0	0.4	0.0	35.8	Fair
99	11.5	7.5	12.3	30.0	-0.3	5.9	0.0	66.9	Good-Excellent
04	8.8	8.6	0.0	14.3	0.0	7.8	0.0	39.5	Fair
09	5.8	10.1	15.0	20.9	-0.3	1.0	0.0	52.5	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 33



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 16C, Study no: 33



HERBACEOUS TRENDS--

Management unit 16C, Study no: 33

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	<i>Bouteloua gracilis</i>	bc143	c160	ab109	a96	7.73	11.74	2.79	4.84
G	<i>Bromus tectorum</i> (a)	a-	b75	a7	a8	-	.40	.02	.39
G	<i>Elymus salina</i>	b18	a-	a-	a4	.08	-	-	.15
G	<i>Hilaria jamesii</i>	a1	a5	a14	b45	.00	.03	.59	1.12
G	<i>Oryzopsis hymenoides</i>	57	79	62	67	.86	1.37	1.34	.91
G	<i>Poa fendleriana</i>	-	-	-	1	-	-	-	.03
G	<i>Poa secunda</i>	-	-	-	4	-	-	-	.01
G	<i>Sitanion hystrix</i>	78	70	57	64	.68	1.37	1.39	1.55
G	<i>Sporobolus cryptandrus</i>	ab12	ab43	b37	a10	.12	.52	.23	.13
G	<i>Stipa comata</i>	a6	a1	b27	c96	.03	.03	.79	1.64
Total for Annual Grasses		0	75	7	8	0	0.40	0.01	0.39
Total for Perennial Grasses		315	358	306	387	9.52	15.08	7.15	10.43
Total for Grasses		315	433	313	395	9.52	15.48	7.17	10.82
F	<i>Aster</i> sp.	b15	a-	a-	a-	.02	-	-	-
F	<i>Astragalus consobrinus</i>	a8	bc91	c89	b56	.02	.77	.96	.12
F	<i>Calochortus nuttallii</i>	-	-	2	-	-	-	.00	-
F	<i>Castilleja</i> sp.	1	-	1	-	.00	-	.00	-
F	<i>Chenopodium fremontii</i> (a)	-	-	10	-	-	-	.02	-
F	<i>Cryptantha</i> sp.	2	-	-	2	.00	-	-	.01
F	<i>Draba</i> sp. (a)	a-	b25	a-	a4	-	.07	-	.01
F	<i>Epilobium brachycarpum</i> (a)	-	-	-	3	-	-	-	.38
F	<i>Erigeron</i> sp.	2	14	-	-	.00	.07	-	-
F	<i>Eriogonum brevicale</i>	-	-	-	2	-	-	-	.00
F	<i>Eriogonum</i> sp.	-	-	8	-	-	-	.02	-
F	<i>Gilia</i> sp. (a)	-	-	75	-	-	-	.22	-
F	<i>Halogeton glomeratus</i> (a)	2	-	9	-	.00	-	.09	-
F	<i>Lappula occidentalis</i> (a)	a9	b46	c242	a-	.02	.11	2.71	-
F	<i>Lepidium densiflorum</i> (a)	a-	a-	b17	a8	-	-	.08	.01
F	<i>Machaeranthera canescens</i>	a4	b36	a-	a-	.01	1.70	-	-
F	<i>Malcolmia africana</i>	-	-	2	-	-	-	.03	-
F	<i>Microsteris gracilis</i> (a)	-	-	1	-	-	-	.00	-
F	<i>Navarretia intertexta</i> (a)	a-	a-	b51	a-	-	-	.38	-
F	<i>Plantago patagonica</i> (a)	b32	c95	c110	a-	.07	.91	2.69	-
F	<i>Salsola iberica</i> (a)	9	-	3	-	.01	-	.00	-
F	<i>Sphaeralcea coccinea</i>	a13	a11	b42	ab24	.06	.10	2.13	.12
F	<i>Sphaeralcea grossulariifolia</i>	-	-	-	3	-	-	.03	.18
F	<i>Townsendia incana</i>	a15	b47	b45	a16	.04	.31	.72	.03
F	Unknown forb-perennial	4	-	-	-	.01	-	-	-
Total for Annual Forbs		52	166	518	15	0.11	1.09	6.22	0.39
Total for Perennial Forbs		64	199	189	103	0.18	2.96	3.91	0.48
Total for Forbs		116	365	707	118	0.29	4.05	10.13	0.87

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

BROWSE TRENDS--

Management unit 16C, Study no: 33

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	0	1	0	0	-	.00	-	-
B	Artemisia nova	0	0	0	0	-	-	-	.15
B	Artemisia spinescens	1	3	0	0	.00	.06	-	.38
B	Artemisia tridentata wyomingensis	64	66	32	48	3.45	6.78	3.00	2.55
B	Atriplex canescens	0	0	0	0	.54	-	-	-
B	Atriplex confertifolia	50	53	44	40	1.08	3.03	4.65	2.23
B	Atriplex gardneri	0	0	0	0	.98	-	-	-
B	Ceratoides lanata	4	3	4	5	.00	.00	.33	.18
B	Chrysothamnus nauseosus	3	0	0	1	.00	-	-	.00
B	Chrysothamnus viscidiflorus stenophyllus	3	8	0	5	.03	.00	-	.03
B	Eriogonum corymbosum	0	0	0	1	-	-	-	.00
B	Eriogonum microthecum	1	0	0	0	.00	-	-	-
B	Gutierrezia sarothrae	0	0	1	3	-	-	.00	.03
B	Juniperus osteosperma	0	1	0	0	-	.00	-	-
B	Leptodactylon pungens	3	6	0	1	.03	.15	-	.00
B	Opuntia polyacantha	36	36	36	32	.84	1.57	.21	.54
B	Ribes sp.	0	0	0	1	-	-	-	.00
B	Pinus monophylla	0	0	0	0	-	-	-	.63
B	Sarcobatus vermiculatus	1	1	1	1	.38	.38	.66	.38
B	Sclerocactus sp.	0	4	2	2	-	.01	.00	.00
B	Tetradymia spinosa	0	2	0	0	-	.00	-	-
Total for Browse		166	184	120	140	7.36	12.00	8.86	7.11

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 33

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	4.90	3.04
Atriplex confertifolia	3.00	.75
Ceratoides lanata	.65	.26
Eriogonum corymbosum	-	.60
Opuntia polyacantha	.91	.85

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 33

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.9	1.7
Ceratoides lanata	5.9	3.5

BASIC COVER--

Management unit 16C, Study no: 33

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	16.88	30.04	25.68	19.04
Rock	3.92	4.51	2.88	2.70
Pavement	1.43	8.14	6.36	7.85
Litter	13.36	16.00	20.45	19.14
Cryptogams	2.23	9.79	2.85	2.01
Bare Ground	51.92	43.53	50.60	58.91

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 33, Study Name: Little Nelson Mountain

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
26.1	7.6	48	33.4	18.6	1.5	3.5	67.2	0.6

PELLET GROUP DATA--

Management unit 16C, Study no: 33

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	-	11	5	4	-	-	-
Elk	7	-	-	1	-	-	-
Deer	42	43	7	13	22 (54)	4 (10)	57 (141)
Cattle	2	3	3	8	17 (42)	3 (7)	3 (7)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 33

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Amelanchier utahensis									
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	-/-
Artemisia spinescens									
94	20	0	100	0	-	0	0	0	-/-
99	140	0	43	57	-	0	0	0	3/7
04	0	0	0	0	-	0	0	0	4/9
09	0	0	0	0	-	0	0	0	5/10
Artemisia tridentata wyomingensis									
94	2860	8	60	32	100	31	38	23	11/20
99	3480	25	53	22	180	42	30	7	12/20
04	1100	0	60	40	240	53	7	27	19/35
09	3900	71	22	8	2440	9	9	3	16/30

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Atriplex canescens</i>									
94	0	0	0	-	-	0	0	0	8/17
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	17/30
09	0	0	0	-	-	0	0	0	-/-
<i>Atriplex confertifolia</i>									
94	2700	3	78	19	20	20	7	9	8/16
99	2540	24	43	32	320	16	9	18	8/16
04	1660	0	89	11	-	4	0	6	10/19
09	1400	19	56	26	100	13	1	13	7/16
<i>Ceratoides lanata</i>									
94	80	0	75	25	-	0	25	0	6/11
99	160	0	100	0	20	13	0	0	5/9
04	80	0	100	0	20	25	25	0	13/18
09	100	0	100	0	-	20	60	0	11/16
<i>Chrysothamnus nauseosus</i>									
94	60	33	67	-	-	0	33	0	9/7
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	40	100	0	-	-	0	0	0	-/-
<i>Chrysothamnus viscidiflorus stenophyllus</i>									
94	60	0	100	-	-	0	0	0	8/9
99	160	13	88	-	-	0	0	0	6/12
04	0	0	0	-	-	0	0	0	10/12
09	260	54	46	-	20	0	0	0	9/16
<i>Eriogonum corymbosum</i>									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	60	100	0	-	-	100	0	100	-/-
<i>Eriogonum microthecum</i>									
94	20	0	100	-	20	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	-/-
<i>Gutierrezia sarothrae</i>									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	20	0	100	-	-	0	0	0	8/6
09	60	67	33	-	-	0	0	0	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Juniperus osteosperma									
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	-/-
Leptodactylon pungens									
94	140	14	86	-	20	0	0	0	7/10
99	240	0	100	-	-	0	0	0	5/7
04	0	0	0	-	-	0	0	0	-/-
09	40	50	50	-	-	0	0	0	-/-
Opuntia polyacantha									
94	1120	4	95	2	-	0	0	0	4/17
99	1080	7	74	19	160	0	0	15	4/18
04	1020	2	63	35	-	0	0	31	5/14
09	1260	3	81	16	-	0	0	16	5/12
Ribes sp.									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	80	0	100	-	-	100	0	0	-/-
Sarcobatus vermiculatus									
94	20	0	100	-	-	0	0	0	16/21
99	20	0	100	-	-	100	0	0	16/23
04	20	0	100	-	-	100	0	0	27/33
09	20	0	100	-	-	0	0	0	28/30
Sclerocactus sp.									
94	0	0	0	-	-	0	0	0	-/-
99	80	25	75	-	20	0	0	0	2/2
04	40	0	100	-	-	0	0	0	2/4
09	40	0	100	-	-	0	0	0	2/3
Tetradymia spinosa									
94	0	0	0	-	-	0	0	0	12/25
99	60	0	100	-	-	0	0	0	3/7
04	0	0	0	-	-	0	0	0	15/22
09	0	0	0	-	-	0	0	0	18/22

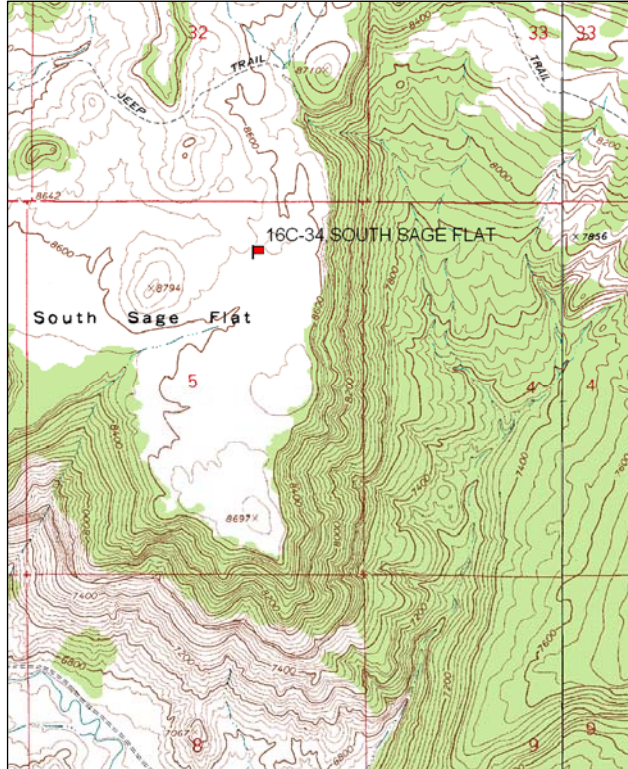
SOUTH SAGE FLAT - TREND STUDY NO. 16C-34-09

Vegetation Type: Black Sagebrush-Grass
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,650 ft (1,932 m)
Aspect: East
Slope: 1%
Transect bearing: 203 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

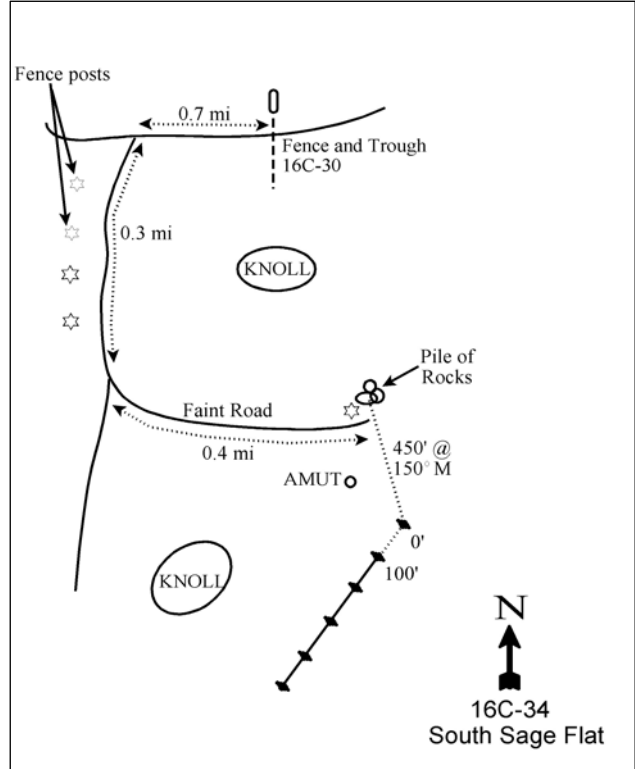
From the fence and trough at site # 16C-30 (Upper Hole Trail), proceed west 0.7 miles. Turn left and travel along a road with fenceposts marking a water line for 0.3 miles. Turn left on a faint road and travel 0.4 miles to a fencepost and a pile of rocks on the left. From the rock pile, walk 450 ft at 150° magnetic to the 0 ft baseline stake.

Map Name: Flagstaff Peak



Township: 21S, Range: 6E, Section: 5

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 476821 E 4319646 N

SOUTH SAGE FLAT - TREND STUDY NO. 16C-34

Site Information

Site Description: The study is located on South Sage Flat in a black sagebrush (*Artemisia nova*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass community south-west of Little Nelson Mountain. The area is managed by the Forest Service as part of the Ferron grazing allotment. There is a water trough about one-quarter of a mile to the north of the site. Pellet group data has indicated heavy use by elk and light use by deer and cattle since 1999 (Table - Pellet Group Data).

Browse: The key browse species on the site consist of a dense population of relatively small statured black sagebrush with a mixture of mountain big sagebrush. There was a large die-off of both species of sagebrush between the 1999 and 2004 sample years attributed to drought conditions in the years prior to 2004. The black sagebrush population is mostly healthy with moderate decadence, good vigor, and good recruitment of young plants over the sample years. Utilization of black sagebrush has been mostly light with some moderate use over the sample years. The mountain big sagebrush population was healthy prior to 2004, but has been mostly decadent with a large number of plants displaying poor vigor since 2004. There has been no new recruitment of young mountain big sagebrush plants sampled since 2004. Mountain big sagebrush displayed light to moderate use prior to 2004, but has had heavy use since. The only other abundant shrub on the site consists of a dense stand of low growing stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*). Palatability of this shrub is poor and most individuals are not utilized (Table - Browse Characteristics). Several other species of shrubs occur on the site, although none were very abundant.

Herbaceous Understory: Grasses on the site are fairly abundant and diverse. The dominant grass is crested wheatgrass (*Agropyron cristatum*) which was seeded in the past and comprises most of the grass cover. Other common grasses include letterman needlegrass (*Stipa lettermani*) and western wheatgrass (*Agropyron smithii*). Most other grass species are rare. Forbs are diverse and fairly abundant, but no one species provided more than 1% cover in 2009. The most common species include redroot eriogonum (*Eriogonum racemosum*) and pingue hymenoxys (*Hymenoxys richardsonii*).

Soil: The soil texture is a sandy clay loam with a neutral pH (Table - Soil Analysis Data). Pavement sized rock is common on the surface with a few larger rocks scattered on the surface. Many of the rocks have a calcium carbonate coating. There is quite a bit of bare ground cover on the site (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1994 to 1999 - stable (0):** There was little change in either of the sagebrush species populations.
- **1999 to 2004 - down (-2):** Black sagebrush density decreased by 54% from 14,120 plants/acre to 6,440 plants/acre, and mountain big sagebrush density decreased by 86% from 1,680 plants/acre to 240 plants/acre. Cover of black sagebrush decreased from 12% to 6% and the cover of mountain big sagebrush decreased from 4% to less than 1%. Decadence of mountain big sagebrush increased from 8% to 50% and poor vigor increased from 1% to 50% of the population. Recruitment of both sagebrush species decreased with no new recruitment of young mountain big sagebrush plants.
- **2004 to 2009 - slightly up (+1):** The density of black sagebrush increased by 33% to 8,620 plants/acre, but cover decreased slightly. Much of the increase in density was due to a large increase in the recruitment of young black sagebrush plants. The mountain big sagebrush population changed little in density and high decadence with no new recruitment of young plants, though poor vigor decreased to 25%.

Grass:

- **1994 to 1999 - stable (0):** Perennial grass sum of nested frequency changed little, though cover increased from 7% to 10%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 13%, but cover increased to 16%. Letterman needlegrass decreased significantly in nested frequency.
- **2004 to 2009 - slightly up (+1):** There was a 15% increase in the sum of nested frequency of perennial grasses, but cover decreased to 11%. There was a significant increase in the nested frequency of Letterman needlegrass and western wheatgrass.

Forb:

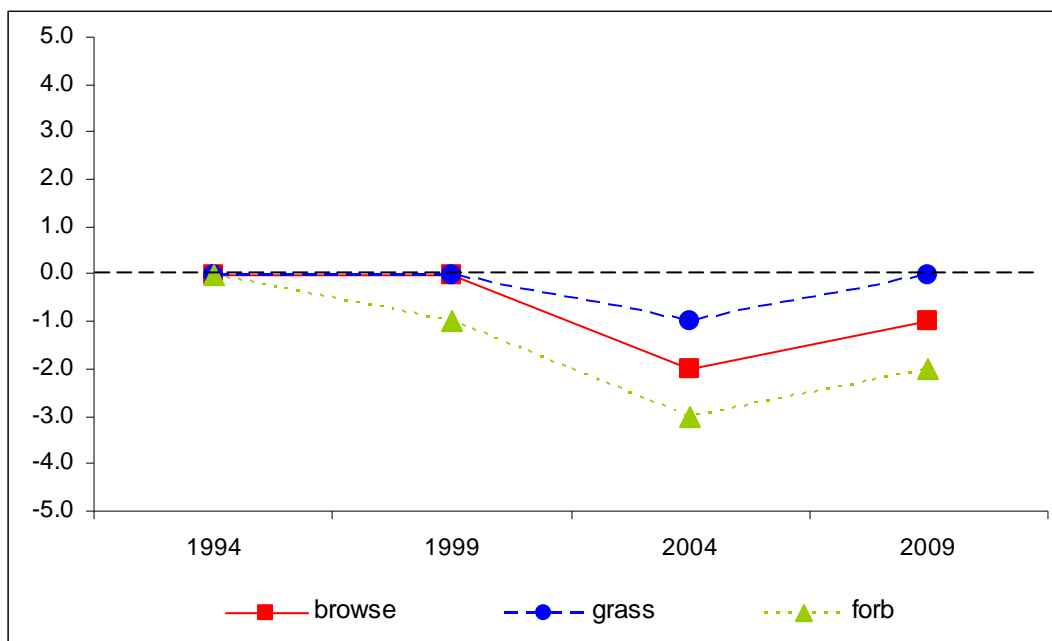
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 13%, but cover increased slightly.
- **1999 to 2004 - down (-2):** Perennial forb sum of nested frequency decreased by 36% and cover decreased from 4% to 2%.
- **2004 to 2009 - slightly up (+1):** There was a 12% increase in the sum of nested frequency of perennial forbs, but there was little change in cover.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 16C, study no: 34

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	16.2	11.0	5.1	16.0	0.0	6.4	0.0	54.7	Fair
99	20.1	9.9	9.8	20.7	0.0	8.2	0.0	68.8	Good
04	8.0	7.7	2.8	30.0	0.0	4.2	0.0	52.7	Fair
09	7.6	7.9	7.3	21.7	0.0	4.1	0.0	48.5	Poor-Fair

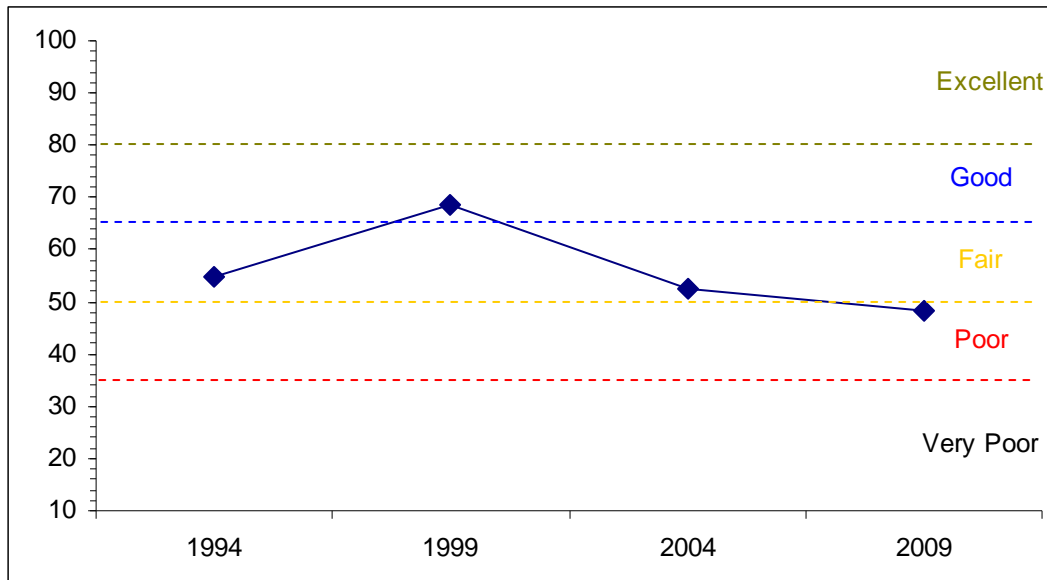
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 34



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL

Management unit 16C, Study no:34



HERBACEOUS TRENDS--

Management unit 16C, Study no: 34

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	233	254	234	246	4.23	6.86	13.96	7.88
G	Agropyron dasystachyum	a ⁻	a ⁻	b ²²	a ⁻	-	-	.40	-
G	Agropyron smithii	a ¹	a ⁶	a ²⁰	b ⁷²	.00	.15	.19	.77
G	Bromus inermis	8	3	-	-	.01	.06	-	-
G	Elymus salina	ab ¹⁵	b ⁴¹	a ⁶	a ³	.11	.21	.06	.15
G	Festuca ovina	-	-	-	3	-	-	-	.03
G	Oryzopsis hymenoides	-	-	1	2	-	-	.03	.00
G	Poa fendleriana	64	40	63	55	1.03	.50	.75	.58
G	Sitanion hystrix	2	2	9	-	.03	.06	.10	-
G	Stipa lettermani	c ¹³³	c ¹²⁰	a ⁵¹	b ⁸⁴	1.95	2.49	.45	1.42
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		456	466	406	465	7.38	10.36	15.96	10.84
Total for Grasses		456	466	406	465	7.38	10.36	15.96	10.84
F	Agoseris glauca	-	-	-	4	-	-	-	.00
F	Androsace septentrionalis (a)	a ⁻	b ²⁸	a ⁻	a ⁻	-	.14	-	-
F	Arabis sp.	3	3	2	-	.00	.01	.01	-
F	Aster sp.	a ⁻	b ¹⁴	a ⁻	a ⁻	-	.05	-	-
F	Astragalus convallarius	6	-	1	4	.03	-	.03	.01
F	Astragalus miser	3	3	2	5	.15	.03	.00	.06
F	Calochortus nuttallii	-	-	7	11	-	-	.02	.02
F	Castilleja linariaefolia	3	2	-	-	.01	.01	-	-
F	Chaenactis douglasii	-	4	-	3	-	.00	-	.00
F	Chenopodium leptophyllum(a)	a ⁻	a ⁻	c ⁵⁰	b ¹⁸	-	-	.23	.09
F	Cryptantha sp.	2	-	-	-	.00	-	-	-

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
F	<i>Erigeron eatonii</i>	c128	b49	a3	a25	1.05	.36	.03	.19
F	<i>Erigeron flagellaris</i>	-	-	3	-	-	-	.03	-
F	<i>Erigeron pumilus</i>	b15	a2	a4	ab12	.04	.03	.01	.05
F	<i>Eriogonum alatum</i>	3	-	-	4	.03	-	-	.01
F	<i>Eriogonum racemosum</i>	a25	b65	b52	ab41	.16	.56	.43	.41
F	<i>Gayophytum ramosissimum(a)</i>	-	-	2	-	-	-	.01	-
F	<i>Hymenoxys acaulis</i>	b16	ab4	a3	a4	.10	.01	.00	.00
F	<i>Hymenoxys richardsonii</i>	51	55	32	55	.78	1.23	.67	.95
F	<i>Ipomopsis aggregata</i>	-	2	-	-	-	.03	-	-
F	<i>Linum lewisii</i>	2	1	-	-	.03	.03	.03	-
F	<i>Lupinus argenteus</i>	b10	ab3	a-	a-	.07	.09	-	-
F	<i>Machaeranthera canescens</i>	3	3	6	10	.01	.01	.02	.04
F	<i>Machaeranthera grindelioides</i>	12	10	6	11	.08	.10	.09	.06
F	<i>Penstemon caespitosus</i>	b59	b55	a-	a4	.35	1.17	-	.01
F	<i>Penstemon sp.</i>	5	-	3	-	.01	-	.03	-
F	<i>Petradoria pumila</i>	5	2	2	1	.03	.03	.03	.03
F	<i>Phlox longifolia</i>	-	-	2	4	-	-	.00	.01
F	<i>Polygonum douglasii (a)</i>	-	-	7	-	-	-	.01	-
F	<i>Potentilla gracilis</i>	ab3	b9	a-	ab8	.03	.07	.00	.02
F	<i>Senecio multilobatus</i>	a4	ab22	b29	a4	.00	.07	.20	.01
F	<i>Sphaeralcea coccinea</i>	a3	ab7	ab9	b14	.01	.07	.21	.08
F	<i>Trifolium sp.</i>	ab36	ab43	b62	a31	.16	.09	.21	.06
Total for Annual Forbs		0	28	59	18	0	0.14	0.26	0.08
Total for Perennial Forbs		397	358	228	255	3.20	4.08	2.09	2.04
Total for Forbs		397	386	287	273	3.20	4.23	2.35	2.13

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

BROWSE TRENDS--

Management unit 16C, Study no: 34

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia frigida	0	0	0	1	-	-	-	.00
B	Artemisia nova	98	100	91	95	9.90	11.98	6.00	5.17
B	Artemisia tridentata vaseyana	29	37	7	7	3.06	3.95	.38	.59
B	Chrysothamnus depressus	0	4	3	13	-	.15	.03	.28
B	Chrysothamnus viscidiflorus viscidiflorus	92	93	87	95	3.55	7.03	8.10	6.79
B	Eriogonum corymbosum	13	13	12	12	.36	.34	.33	.23
B	Gutierrezia sarothrae	14	14	24	11	.03	.09	.48	.12
B	Leptodactylon pungens	1	2	1	0	.00	.00	.00	-
B	Opuntia sp.	1	1	1	2	.00	.00	.00	.00
B	Pediocactus simpsonii	0	0	1	1	-	-	.00	.00
B	Symphoricarpos oreophilus	1	1	1	1	.00	.00	.00	.00
B	Tetradymia canescens	0	0	0	2	-	-	-	.00
Total for Browse		249	265	228	240	16.92	23.55	15.34	13.21

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 34

Species	Percent Cover	
	'04	'09
Artemisia nova	6.56	6.58
Artemisia tridentata vaseyana	.21	.30
Chrysothamnus depressus	-	.50
Chrysothamnus viscidiflorus viscidiflorus	10.56	8.41
Eriogonum corymbosum	.81	1.06
Gutierrezia sarothrae	.33	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 34

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

BASIC COVER--

Management unit 16C, Study no: 34

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	29.04	33.97	34.65	30.32
Rock	4.80	1.56	1.79	1.70
Pavement	1.41	8.42	8.31	5.03
Litter	20.91	27.77	28.44	34.18
Cryptogams	0	.04	.03	.09
Bare Ground	40.17	38.25	38.18	40.62

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 34, Study Name: South Sage Flat

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.2	6.9	62	15.4	22.6	1.9	10.5	115.2	0.6

PELLET GROUP DATA--

Management unit 16C, Study no: 34

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	10	15	3	6	-	-	-
Elk	48	59	42	61	85 (210)	58 (144)	127 (312)
Deer	12	8	3	1	1 (2)	9 (22)	-
Cattle	4	8	4	3	31 (77)	14 (34)	20 (48)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 34

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
94	0	0	0	-	-	0	0	0	11/11
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	24/36
Artemisia frigida									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	40	0	100	-	-	0	0	0	-/-
Artemisia nova									
94	13900	10	74	16	200	17	5	2	6/16
99	14120	19	61	20	700	16	4	5	6/15
04	6440	6	71	23	9020	0	0	16	6/11
09	8620	17	62	21	6280	24	3	15	6/11
Artemisia tridentata vaseyana									
94	1600	11	84	5	-	30	0	3	14/30
99	1680	21	70	8	140	13	20	1	14/27
04	240	0	50	50	-	50	42	50	13/23
09	240	0	42	58	20	25	33	25	9/13
Chrysothamnus depressus									
94	0	0	0	0	-	0	0	0	-/-
99	100	40	60	0	-	0	0	0	2/5
04	60	0	100	0	-	0	0	0	-/-
09	800	0	98	3	40	0	0	3	3/8

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
94	9560	5	94	1	20	.20	0	0	4/8
99	12480	11	88	1	220	1	0	0	3/8
04	10420	5	95	0	18740	0	0	0	5/10
09	14040	12	88	0	3360	6	.99	0	4/9
<i>Eriogonum corymbosum</i>									
94	320	0	88	13	-	6	0	6	9/19
99	340	12	88	0	-	24	6	0	12/21
04	280	0	86	14	40	7	7	7	9/20
09	360	0	89	11	20	0	0	0	9/24
<i>Eriogonum microthecum</i>									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	9/17
09	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
94	640	6	88	6	-	0	0	6	5/7
99	540	19	81	0	-	0	0	0	5/6
04	1500	0	100	0	60	0	0	0	7/7
09	600	3	93	3	-	0	10	10	5/9
<i>Leptodactylon pungens</i>									
94	20	0	100	0	-	0	0	0	-/-
99	60	0	67	33	-	0	0	33	2/6
04	20	0	100	0	-	0	0	0	5/6
09	0	0	0	0	-	0	0	0	-/-
<i>Opuntia sp.</i>									
94	40	0	100	0	-	0	0	0	2/5
99	40	0	50	50	-	0	0	0	-/-
04	20	0	100	0	-	0	0	0	3/9
09	60	0	33	67	-	0	0	67	-/-
<i>Pediocactus simpsonii</i>									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	20	0	100	-	-	0	0	0	-/-
09	20	0	100	-	-	0	0	0	3/3
<i>Symphoricarpos oreophilus</i>									
94	20	0	100	-	-	0	0	0	14/38
99	20	0	100	-	-	0	0	0	13/27
04	40	0	100	-	-	0	0	0	9/22
09	20	0	100	-	-	0	0	0	7/16

		Age class distribution			Utilization				
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Tetradymia canescens									
94	0	0	0	0	-	0	0	0	4/8
99	0	0	0	0	-	0	0	0	-/-
04	0	0	0	0	-	0	0	0	4/9
09	40	0	50	50	-	50	0	0	5/8

WILDCAT KNOLL - TREND STUDY NO. 16C-35-09

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,700 ft (2,652 m)

Aspect: South

Slope: 3%-5%

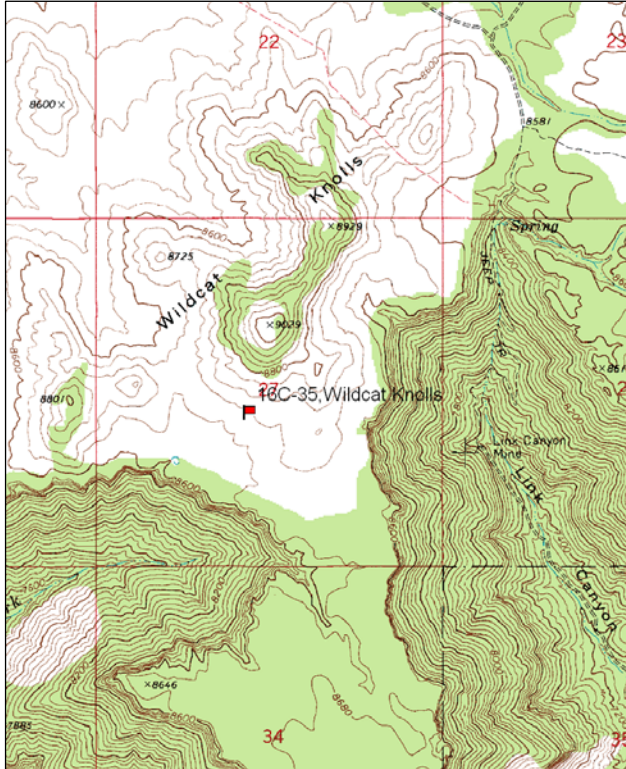
Transect bearing: 95 degrees magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

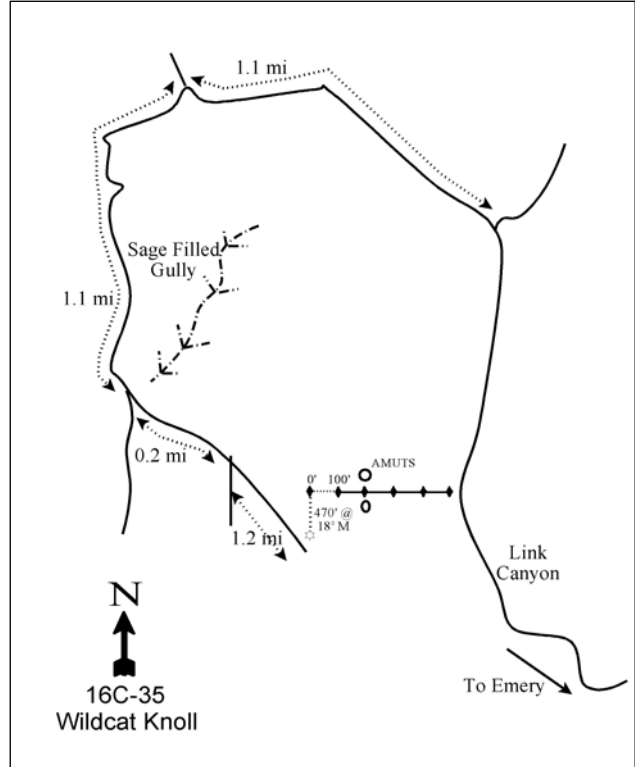
From Center St. in Emery, travel west 1.2 miles. Turn right onto a dirt road and proceed for 0.6 miles. Turn left and travel 8.7 miles (1.7 miles from turnoff to site 16C-31). Bear left at the fork and travel 1.1 miles to another fork. Stay left on F.S. #344 for 1.1 miles to another fork (at 0.1 miles on F.S. #344, go left at the fork). At the fork, bear left and travel 0.2 miles to another fork. At the fork, go left and travel 1.2 miles to the witness post. From the witness post to the 0 ft baseline stake, walk 470 ft at a bearing of 18°M. The 0 ft stake has browse tag #485 attached.

Map Name: Emery West



Township: 21S, Range: 5E, Section: 27

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 470033 E 4312361 N

WILDCAT KNOLL - TREND STUDY NO. 16C-35

Site Information

Site Description: The study samples a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), black sagebrush (*A. nova*) and grass community which is considered important for elk. There is little escape or thermal cover on the site, but about half mile away there is good cover provided by Ponderosa pine (*Pinus ponderosa*) trees. This area is managed by the Forest Service as part of the Emery allotment. Water is limited here with guzzlers about three-quarters of a mile from the site. Pellet group data has indicated very heavy use by elk and light use by deer since 1999. Estimated cattle use has been light to moderate since 1999 (Table - Pellet Group Data).

Browse: There are several species of palatable browse on the site including Utah serviceberry (*Amelanchier utahensis*), black sagebrush, and mountain big sagebrush. Individual serviceberry plants are large, highlined, and mostly unavailable to browsing. Utilization of serviceberry has been mostly moderate over the study years. Mountain big sagebrush dominates the drainage corridors while black sagebrush, dwarf rabbitbrush (*Chrysothamnus depressus*), and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) dominate the drier areas. It appears that there have been problems identifying dwarf rabbitbrush and stickyleaf low rabbitbrush. Because of the identification problems, dwarf rabbitbrush was not included in the Desirable Components Index. Data since 1999 has classified most of the rabbitbrush as stickyleaf low rabbitbrush. There was a slight die-off of black and mountain big sagebrush between the 1999 and 2004 sample years that is attributed to drought conditions in the years prior to 2004. Even with the decrease in density over those years, both sagebrush populations have remained healthy with low decadence, good vigor, and good recruitment of young plants. Utilization of the two sagebrush species was moderate in 1994 and 1999, but has been mostly light since 2004. Other browse species that occur infrequently include antelope bitterbrush (*Purshia tridentata*), Wood's rose (*Rosa woodsii*), and snowberry (*Symphoricarpos oreophilus*) (Table - Browse Characteristics).

Herbaceous Understory: Grasses are diverse and abundant on the site providing an average cover of 15% since 1994. The dominant species are mutton bluegrass (*Poa fendleriana*), Letterman needlegrass (*Stipa lettermani*), and Salina wildrye (*Elymus salina*). Forbs are diverse, but have steadily decreased in sum of nested frequency since 1994. However, perennial forb cover has remained fairly high and has averaged about 3% since 1994 (Table - Herbaceous Trends).

Soil: The soil has a sandy clay loam texture with a slightly acid pH (Table - Soil Analysis Data). The parent material is limestone. Bare ground cover has fluctuated over the sample years with shifts in litter and vegetation cover, but has been mostly moderately low (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1994 to 1999 - slightly up (+1):** There was a 69% increase in the density of black sagebrush from 4,740 plant/acre to 8,020 plants/acre. Most of the increase in density was due to a large increase in the recruitment of young black sagebrush plants from 1% to 30% of the population. There was little change in the mountain big sagebrush density, but recruitment of young plants increased from 1% to 33% of the population. The density of mature mountain big sagebrush plants actually decreased substantially.
- **1999 to 2004 - down (-2):** The density of both black and mountain big sagebrush decreased by more than 50% with large decreases in cover. Recruitment of young plants decreased to 3% of the population for black sagebrush and to 19% for mountain big sagebrush.

- **2004 to 2009 - up (+2):** There was nearly a three-fold increase in the density of both black and mountain big sagebrush. Almost all of the increase came from an increase in the density of young plants. Cover of both species increased, but did not return to 1999 levels.

Grass:

- **1994 to 1999 - slightly down (-1):** Perennial grass sum of nested frequency decreased by 15%, but cover increased from 11% to 16%. Letterman needlegrass decreased significantly in nested frequency.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 19% and cover decreased to 13%. Mutton bluegrass decreased significantly in nested frequency.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, but cover increased to 20%.

Forb:

- **1994 to 1999 - down (-2):** Perennial forb sum of nested frequency decreased by 22%, but cover increased from 2% to 4%.
- **1999 to 2004 - down (-2):** Perennial forb sum of nested frequency decreased by 20% and annual forb sum of nested frequency increased substantially. The increase in annual forbs was due primarily to a large increase in frequency and cover of a goosefoot (*Chenopodium sp.*)
- **2004 to 2009 - down (-2):** The sum of nested frequency decreased by 52% and forbs were fairly rare on the site. Cover of perennial forbs decreased, but stayed fairly high at near 2%. Annual forbs also decreased in sum of nested frequency and cover.

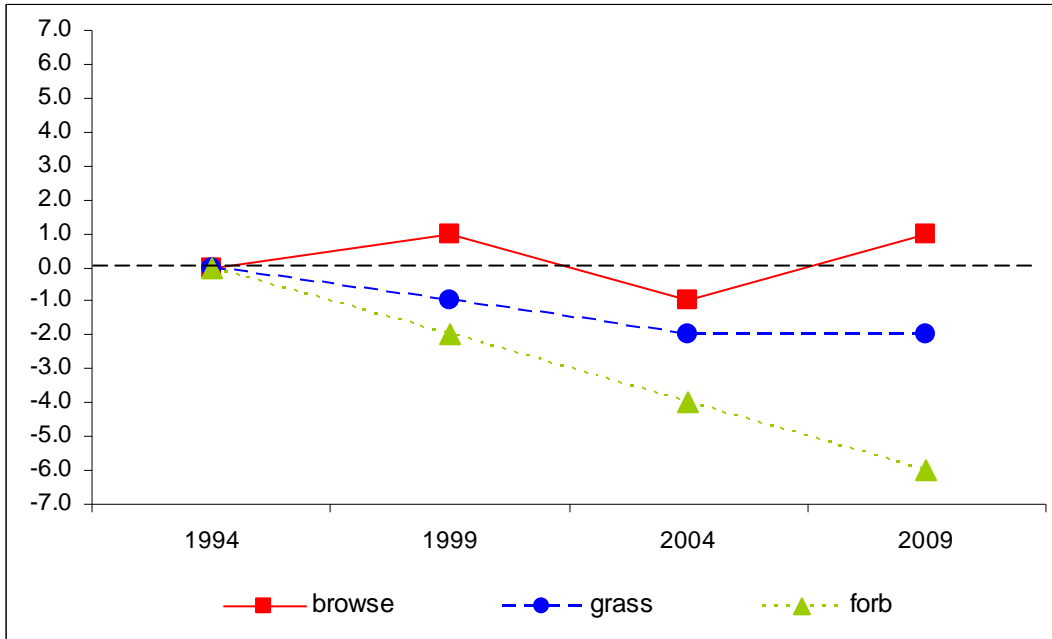
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 35

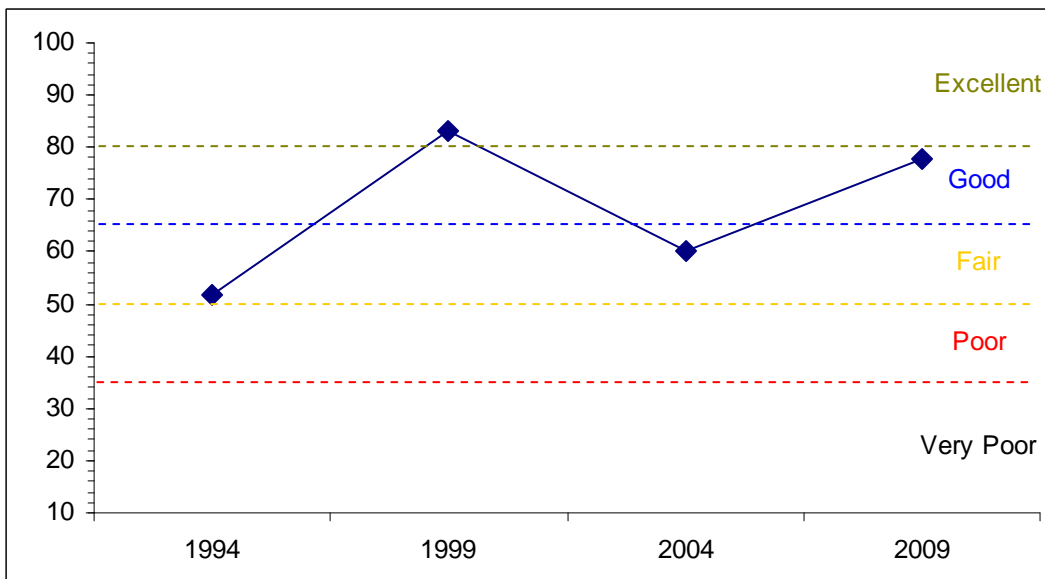
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	13.0	12.5	0.4	22.1	0.0	4.0	0.0	51.9	Poor-Fair
99	20.5	11.4	13.3	30.0	0.0	7.8	0.0	83.1	Excellent
04	11.3	13.4	3.9	26.6	0.0	5.1	0.0	60.2	Fair
09	16.1	13.5	15.0	30.0	0.0	3.2	0.0	77.8	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 16C Study no: 35



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 16C, Study no: 35



HERBACEOUS TRENDS--

Management unit 16C, Study no: 35

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	a42	ab36	bc74	c103	.13	.34	1.91	3.80
G	Agropyron spicatum	a3	a4	b26	ab15	.03	.03	.32	.48
G	Carex sp.	b99	b105	b91	a16	.21	.67	.94	.18
G	Elymus salina	b253	a144	a116	a154	4.10	5.76	4.52	9.26
G	Oryzopsis hymenoides	ab20	a11	b23	a8	.25	.04	.19	.30
G	Poa fendleriana	bc177	c231	a111	ab157	1.85	5.41	2.23	3.68
G	Sitanion hystrix	11	3	12	3	.02	.04	.16	.01
G	Stipa comata	a-	b23	a8	a5	-	.56	.36	.00
G	Stipa lettermani	b225	a145	a111	a109	4.43	3.38	2.62	2.57
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		830	702	572	570	11.04	16.26	13.28	20.31
Total for Grasses		830	702	572	570	11.04	16.26	13.28	20.31
F	Agoseris glauca	-	8	2	2	-	.09	.00	.03
F	Antennaria rosea	4	11	-	5	.06	.36	-	.03
F	Astragalus convallarius	b17	a8	a-	a1	.12	.01	.25	.03
F	Astragalus miser	b35	b38	a9	a1	.57	.93	.19	.03
F	Astragalus sp.	5	9	9	3	.16	.66	.51	.15
F	Calochortus nuttallii	a2	a6	b29	a-	.00	.01	.09	-
F	Castilleja linariaefolia	b38	b24	a1	a3	.10	.14	.00	.03
F	Chaenactis douglasii	3	-	4	-	.00	-	.00	-
F	Chenopodium sp. (a)	a-	a-	c267	b13	-	-	5.41	.10
F	Cirsium sp.	1	-	-	-	.00	-	-	-
F	Crepis acuminata	b40	a-	ab17	a6	.14	-	.21	.01
F	Erigeron eatonii	b44	a16	a8	a8	.12	.09	.04	.04
F	Eriogonum alatum	-	3	-	-	-	.03	-	-
F	Eriogonum racemosum	44	38	32	26	.14	.41	.47	.26
F	Eriogonum umbellatum	38	23	28	19	.40	.51	.26	.63
F	Gayophytum ramosissimum(a)	-	-	5	-	-	-	.01	-
F	Lappula occidentalis (a)	a-	a-	b16	a-	-	-	.20	-
F	Linum lewisii	-	6	4	-	-	.04	.01	-
F	Lomatium sp.	-	1	-	-	-	.00	-	-
F	Lupinus argenteus	1	10	-	-	.01	.25	-	-
F	Lygodesmia sp.	-	1	6	-	-	.03	.06	-
F	Machaeranthera canescens	6	9	3	-	.03	.04	.01	-
F	Machaeranthera grindelioides	-	1	-	-	-	.03	-	-
F	Mertensia sp.	8	-	-	-	.09	-	-	-
F	Penstemon carnosus	1	1	-	-	.03	.01	-	-
F	Penstemon sp.	-	8	5	8	-	.19	.31	.33
F	Polygonum douglasii (a)	a-	a-	b59	a9	-	-	.12	.04
F	Senecio multilobatus	-	2	2	-	-	.03	.00	-
F	Taraxacum officinale	-	3	3	-	-	.01	.00	-
F	Townsendia sp.	-	-	3	-	-	-	.00	-
F	Zigadenus paniculatus	a4	a-	b17	a5	.00	.00	.06	.01

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
	Total for Annual Forbs	0	0	347	22	0	0	5.74	0.14
	Total for Perennial Forbs	291	226	182	87	2.00	3.91	2.53	1.58
	Total for Forbs	291	226	529	109	2.00	3.91	8.27	1.73

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

BROWSE TRENDS--

Management unit 16C, Study no: 35

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	1	2	2	1	1.76	2.29	2.96	2.97
B	Artemisia frigida	1	1	1	0				
B	Artemisia nova	58	67	56	60	3.20	6.18	2.37	4.69
B	Artemisia tridentata vaseyana	56	55	42	56	4.34	6.98	2.93	4.64
B	Chrysothamnus depressus	80	5	1	0	2.73	-	-	-
B	Chrysothamnus nauseosus hololeucus	2	0	4	5	-	-	.03	.01
B	Chrysothamnus viscidiflorus viscidiflorus	13	88	82	88	.41	3.90	7.35	4.64
B	Eriogonum corymbosum	4	5	5	7	.03	-	.06	.18
B	Leptodactylon pungens	0	0	0	1				
B	Opuntia sp.	3	0	1	2	.18	.00	.01	.01
B	Purshia tridentata	1	0	2	0	.63	.38	.15	-
B	Rosa woodsii	0	2	1	0	.00	.06	.03	-
B	Symphoricarpos oreophilus	6	1	1	4	.60	.15	.03	.16
B	Tetradymia canescens	4	4	3	5	.03	-	.03	.03
	Total for Browse	229	230	201	229	13.94	19.96	15.98	17.34

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 35

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	3.20	2.79	3.83
Artemisia nova	-	4.00	4.84
Artemisia tridentata vaseyana	-	4.28	5.61
Chrysothamnus viscidiflorus viscidiflorus	-	9.05	5.31
Eriogonum corymbosum	-	.18	.38
Tetradymia canescens	-	.13	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 35

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	3.0	1.7
Artemisia tridentata vaseyana	2.2	1.0
Purshia tridentata	4.3	1.5

BASIC COVER--

Management unit 16C, Study no: 35

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	33.81	43.76	37.09	43.60
Rock	.26	.04	.03	.00
Pavement	.12	.13	.80	.23
Litter	47.01	45.68	34.76	43.19
Cryptogams	.00	0	0	0
Bare Ground	30.31	24.97	44.07	27.50

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 35, Study Name: Wildcat Knolls

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.4	6.4	60	15.4	24.6	2.7	10.9	182.4	0.5

PELLET GROUP DATA--

Management unit 16C, Study no: 35

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	10	4	5	7
Elk	65	51	51	55
Deer	24	5	2	2
Cattle	7	3	6	11

Days use per acre (ha)		
'99	'04	'09
-	-	-
109 (269)	97 (240)	46 (112)
9 (22)	6 (15)	3 (8)
29 (72)	30 (73)	16 (39)

BROWSE CHARACTERISTICS--
Management unit 16C, Study no: 35

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Amelanchier utahensis									
94	20	0	100	-	-	100	0	0	74/88
99	40	0	100	-	60	0	50	0	93/115
04	40	0	100	-	-	50	0	0	62/67
09	20	100	0	-	120	0	0	0	59/79
Artemisia frigida									
94	80	0	100	-	-	0	0	0	-/-
99	40	0	100	-	-	0	0	0	-/-
04	40	0	100	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
Artemisia nova									
94	4740	1	86	14	680	58	0	6	10/16
99	8020	30	53	17	100	53	23	1	8/15
04	3660	3	89	8	600	5	.54	4	7/11
09	10200	60	37	3	6780	2	2	14	6/15
Artemisia tridentata vaseyana									
94	4520	1	90	9	-	77	0	1	34/36
99	4560	33	55	12	400	46	2	4	19/29
04	2140	19	72	9	1660	7	7	5	21/26
09	6140	53	36	10	3420	13	9	14	16/23
Chrysothamnus depressus									
94	11160	0	98	2	60	0	0	0	3/7
99	120	17	83	0	-	0	0	0	4/7
04	20	0	100	0	-	0	0	0	-/-
09	0	0	0	0	-	0	0	0	-/-
Chrysothamnus nauseosus hololeucus									
94	60	0	100	0	-	0	0	0	18/18
99	0	0	0	0	-	0	0	0	-/-
04	120	0	83	17	-	33	0	17	18/19
09	140	14	71	14	-	0	0	14	18/20
Chrysothamnus viscidiflorus viscidiflorus									
94	1260	0	98	2	-	0	0	0	7/8
99	13400	14	85	2	180	15	0	0	5/9
04	13400	6	93	1	240	0	0	.14	7/11
09	14780	12	70	19	-	1	0	26	5/9

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Eriogonum corymbosum</i>										
94	100	0	100	0	-	0	0	0	11/16	
99	160	38	50	13	-	13	0	0	14/18	
04	140	0	100	0	-	86	0	0	10/14	
09	140	29	71	0	20	0	0	0	10/19	
<i>Leptodactylon pungens</i>										
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	-/-	
<i>Opuntia sp.</i>										
94	100	20	80	-	-	0	0	0	3/10	
99	0	0	0	-	20	0	0	0	-/-	
04	60	0	100	-	-	0	0	0	2/4	
09	60	0	100	-	-	0	0	0	3/9	
<i>Purshia tridentata</i>										
94	20	0	0	100	-	100	0	0	23/26	
99	0	0	0	0	-	0	0	0	26/69	
04	40	0	100	0	-	0	0	0	25/55	
09	0	0	0	0	-	0	0	0	22/55	
<i>Rosa woodsii</i>										
94	0	0	0	-	-	0	0	0	-/-	
99	120	100	0	-	40	0	0	0	-/-	
04	60	100	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	9/4	
<i>Symphoricarpos oreophilus</i>										
94	300	0	100	-	-	27	0	0	13/23	
99	20	0	100	-	-	0	0	0	20/39	
04	20	0	100	-	-	0	0	0	16/29	
09	80	25	75	-	-	0	25	0	18/38	
<i>Tetradymia canescens</i>										
94	140	14	86	0	-	0	0	0	7/9	
99	120	67	33	0	-	0	33	0	6/7	
04	100	0	100	0	-	0	0	0	7/11	
09	100	20	60	20	-	20	0	20	7/9	

DANISH BENCH - TREND STUDY NO. 16C-36-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Semidesert Bouldery Loam (Shadscale), R034XY202UT

Land Ownership: SITLA

Elevation: 6,530 ft (1,990 m)

Aspect: Southeast

Slope: 4%-5%

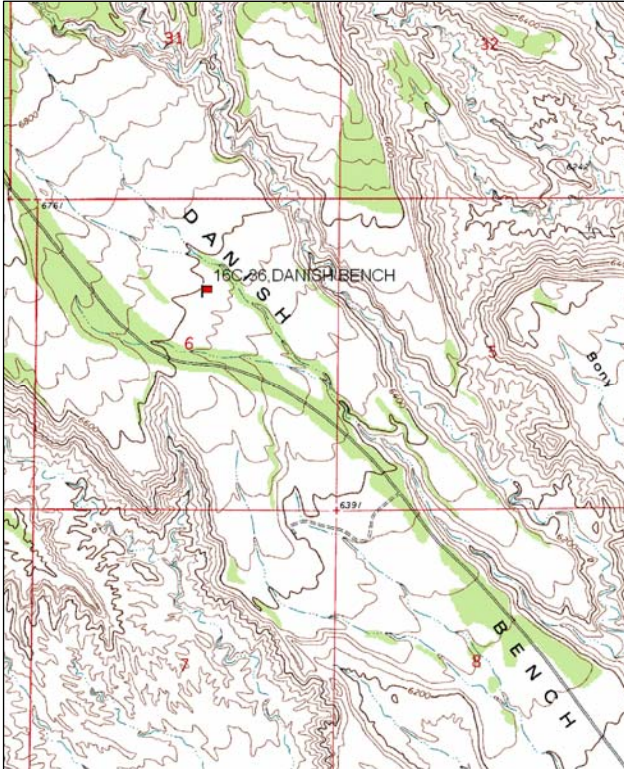
Transect bearing: 95 degrees magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

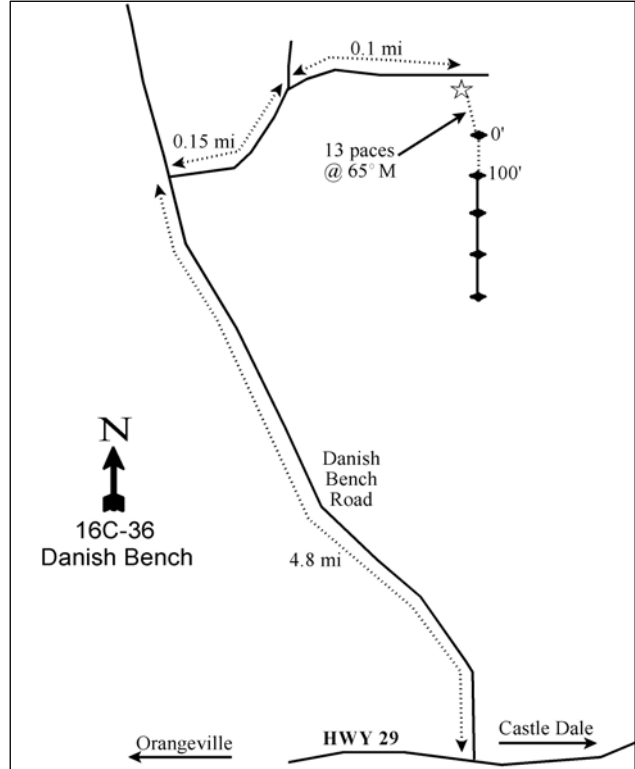
From Highway 29 between Orangeville and Castle Dale, travel up Danish Bench Road (550 West) 4.8 miles. Turn right and proceed 0.15 miles to a fork in the road. Take the right fork and travel 0.1 mile to a witness post on the right hand side of the road. From the witness post to the 0-foot baseline stake, walk 13 paces at 65°M.

Map Name: Red Point



Township: 18S, Range: 8E, Section: 6

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 494321 E 4348806 N

DANISH BENCH - TREND STUDY NO. 16C-36

Site Information

Site Description: This study samples a seeded pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) chaining representative of important big game winter range in the area. The area is on land administered by the BLM and lies within the Wilberg grazing allotment. The area was retreated as part of the Danish Bench Lop and Scatter Watershed Restoration Initiative project ([project # 1390](#)) in 2009, prior to the sample, to remove pinyon and juniper trees that had reestablished on the site. Pellet group data estimated heavy elk use in 1999 and 2009, with more moderate use in 2004. Estimated deer use was light in 1999 and 2004, but was more moderate in 2009. Estimated cattle use has been very light since 1999 (Table - Pellet Group Data).

Browse: The dominant browse on the site consists of a small statured population of black sagebrush (*Artemisia nova*) that occurs at moderately low density. Density has generally increased since 1994, with slight increases in cover. The black sagebrush population is healthy with low decadence, good vigor, and good recruitment over the sample years. Utilization of black sagebrush was light in 1994, but has been moderate to heavy since 1999. Small numbers of other desirable shrubs also occur on the site. These include true mountain mahogany (*Cercocarpus montanus*), green ephedra (*Ephedra veridis*), Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*), and antelope bitterbrush (*Purshia tridentata*). Mahogany and bitterbrush are heavily browsed, while use of cliffrose and ephedra has been moderate to heavy (Table - Browse Characteristics).

Juniper and pinyon trees had reestablished at moderate densities prior to the lop and scatter treatment in 2009. Following the treatment, the densities of pinyon and juniper did not decrease much, but the average diameter of the trees had decreased (Table - Point-Quarter Tree Data). Most of the trees sampled in 2009, following the treatment, were cut trees that still had live branches that will likely survive.

Herbaceous Understory: Grasses are comprised primarily by three species, crested wheatgrass (*Agropyron cristatum*), Salina wildrye (*Elymus salina*), and Indian ricegrass (*Oryzopsis hymenoides*), none of which is abundant. Crested wheatgrass dominated the site early in the study, but decreased significantly between 1999 and 2004 and is not overly common. Forbs are rare, though perennial species such as golden cryptantha (*Cryptantha confertiflora*) and hoary townsendia (*Townsendia incana*) have provided some cover in past sample years (Table - Herbaceous Trends).

Soil: The soil texture is a sandy clay loam with a slightly alkaline pH. Organic matter is limited at only 1.8% (Table - Soil Analysis Data). Litter cover and vegetation cover are relatively low and there is a considerable amount of unprotected bare ground cover on the site (Table - Basic Cover). There is some localized soil movement noticeable and the soil erosion condition was classified as slight in 2004, but was stable in 2009.

Trend Assessments

Browse:

- **1994 to 1999 - slightly up (+1):** The density of black sagebrush increased by 10% from 1,540 plants/acre to 1,700 plants/acre, and the density of green ephedra increased substantially from 60 plants/acre to 340 plants/acre. Cover remained similar for both species. Recruitment of young black sagebrush plants increased from 14% to 22%.
- **1999 to 2004 - slightly up (+1):** Black sagebrush density increased 9% to 1,860 plants/acre and green ephedra density increased 70% to 580 plants/acre. Cover of black sagebrush also increased slightly, however, recruitment of young sagebrush plants decreased.
- **2004 to 2009 - up (+2):** Black sagebrush density increased by 61% to 3,000 plants/acre with a large increase in the recruitment of young plants. There was little change in the ephedra population.

Grass:

- **1994 to 1999 - stable (0):** Perennial grass sum of nested frequency changed little, though cover decreased slightly.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 67% with a significant decrease in the nested frequency of the dominant grass, crested wheatgrass. Indian ricegrass increased significantly in nested frequency. Cover of perennial grasses decreased from 7% to 4%.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses.

Forb:

- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial forbs increased by 43%, but there was little change in cover.
- **1999 to 2004 - up (+2):** Perennial forb sum of nested frequency increased by 37% and cover increased from 1% to 4%. Most of the increase was due to an increase in hoary townsendia.
- **2004 to 2009 - down (-2):** There was a 69% decrease in the sum of nested frequency of perennial forbs and cover decreased to less than 1%. Forbs are now rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

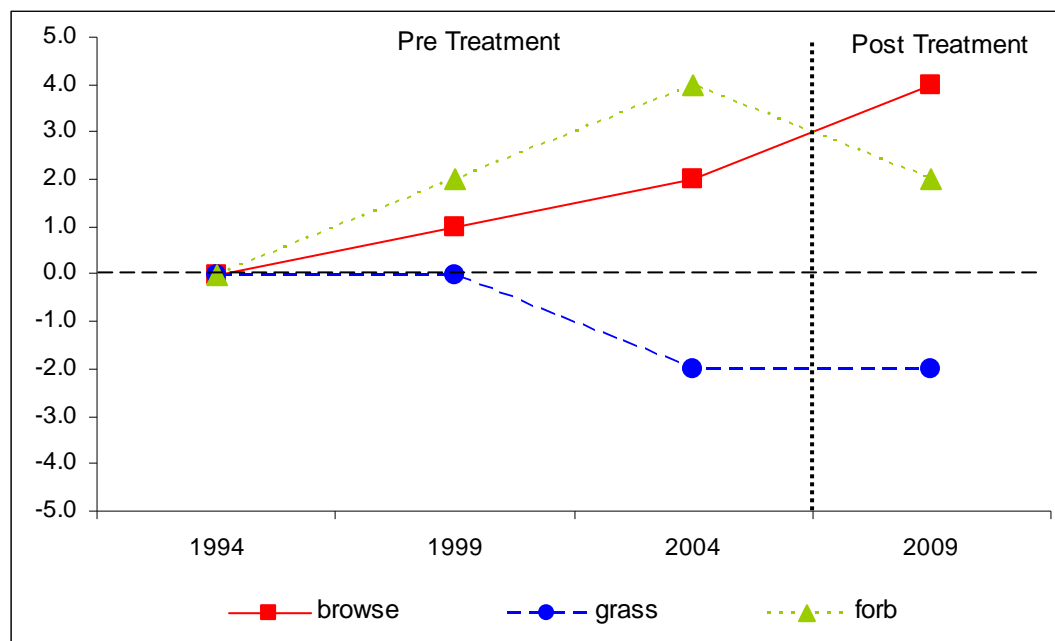
Management unit 16C, study no: 36

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	5.7	0.0	0.0	16.3	0.0	3.0	0.0	24.9	Poor-Fair
99	5.9	0.0	0.0	14.6	0.0	2.6	0.0	23.1	Poor-Fair
04	9.3	9.5	6.9	7.7	0.0	7.5	0.0	40.8	Fair
09	8.0	2.0	6.6	7.2	0.0	1.4	0.0	25.2	Poor-Fair

Trend Summary

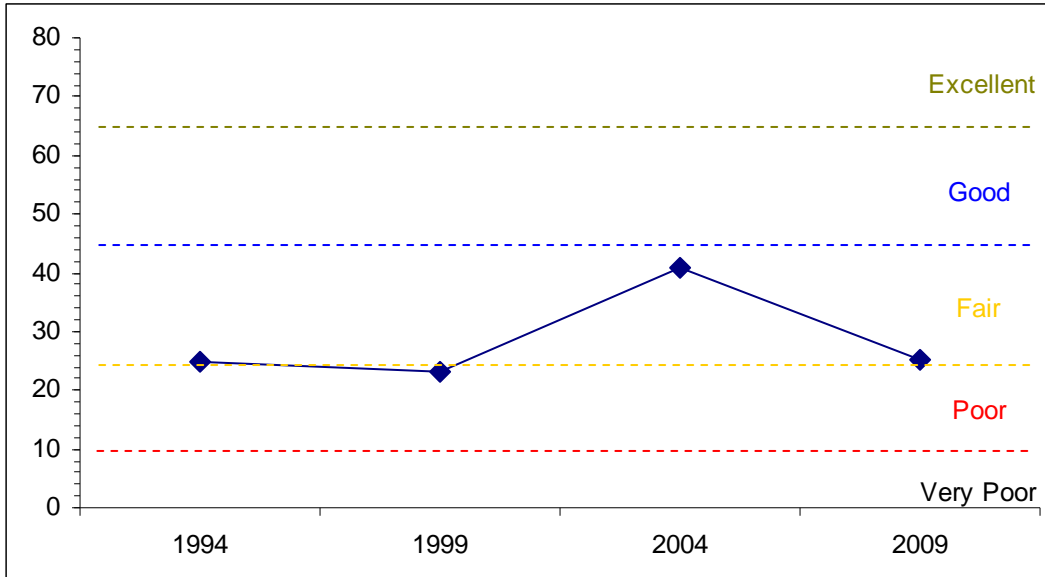
CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 16C Study no: 36



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 16C, Study no: 36



HERBACEOUS TRENDS--

Management unit 16C, Study no: 36

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	b ²⁷ 9	b ²⁹ 9	a ³³ 3	a ⁵³ 3	5.41	6.72	.68	1.12
G	Agropyron intermedium	3	-	-	-	.00	-	-	-
G	Elymus junceus	5	3	6	4	.00	.15	.06	.03
G	Elymus salina	a ² 2	a ⁻ -	ab ⁴ 4	b ⁷ 7	.06	-	1.00	.94
G	Oryzopsis hymenoides	ab ⁵⁴ 54	a ²⁹ 29	b ⁶⁷ 67	ab ⁴⁸ 48	2.64	.41	2.08	1.52
G	Sitanion hystrix	5	-	-	-	.01	-	.00	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		348	331	110	112	8.14	7.28	3.84	3.62
Total for Grasses		348	331	110	112	8.14	7.28	3.84	3.62
F	Caulanthus crassicaulis	12	2	1	5	.04	.01	.03	.01
F	Chenopodium fremontii (a)	a ⁻ -	a ⁻ -	b ²⁵ 25	a ² 2	-	-	.05	.00
F	Cryptantha confertiflora	b ⁵³ 53	a ¹⁵ 15	b ³⁸ 38	ab ³⁶ 36	1.23	.28	.52	.44
F	Descurainia pinnata (a)	a ⁻ -	a ⁻ -	b ²⁰ 20	a ⁻ -	-	-	.09	-
F	Eriogonum alatum	b ⁹ 9	b ¹¹ 11	b ¹⁸ 18	a ⁻ -	.03	.12	.11	-
F	Euphorbia fendleri	21	15	27	16	.04	.04	.35	.07
F	Gilia sp. (a)	a ⁻ -	a ¹ 1	b ⁴² 42	a ⁻ -	-	.00	.40	-
F	Hymenoxys acaulis	a ²³ 23	b ³⁵ 35	a ²⁰ 20	a ¹⁶ 16	.08	.32	.08	.08
F	Leucelene ericoides	-	4	-	-	-	.06	-	-
F	Machaeranthera grindelioides	-	3	-	2	-	.03	-	.00
F	Medicago sativa	-	-	2	-	-	-	.03	-
F	Penstemon pachyphyllus	8	2	10	7	.03	.00	.03	.05
F	Penstemon sp.	a ⁻ -	b ²⁰ 20	a ⁻ -	a ⁻ -	-	.07	-	-
F	Schoenocrambe linifolia	-	2	-	-	-	.00	.00	-
F	Thelesperma subnudum	a ⁷ 7	ab ¹⁶ 16	b ²⁷ 27	a ² 2	.01	.08	.18	.03

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
F	<i>Thlaspi montanum</i>	-	3	-	-	-	.00	-	-
F	<i>Townsendia incana</i>	a-	b68	c122	a-	-	.26	2.24	-
F	Unknown forb-perennial	4	-	4	-	.01	-	.18	-
Total for Annual Forbs		0	1	87	2	0	0.00	0.55	0.00
Total for Perennial Forbs		137	196	269	84	1.48	1.30	3.76	0.68
Total for Forbs		137	197	356	86	1.48	1.30	4.32	0.69

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

BROWSE TRENDS--

Management unit 16C, Study no: 36

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	<i>Artemisia nova</i>	18	21	22	37	1.16	1.79	3.58	3.51
B	<i>Cercocarpus montanus</i>	1	1	1	3	1.08	.78	.63	.33
B	<i>Chrysothamnus viscidiflorus</i>	0	0	1	8	-	-	.00	.04
B	<i>Cowania mexicana stansburiana</i>	0	0	1	0	-	-	.15	-
B	<i>Ephedra viridis</i>	2	9	9	13	2.01	1.77	2.29	3.10
B	<i>Eriogonum microthecum</i>	29	26	40	26	.09	.07	.60	.24
B	<i>Gutierrezia sarothrae</i>	0	5	31	15	-	.04	.71	.22
B	<i>Juniperus osteosperma</i>	0	5	4	2	2.76	2.77	3.57	.83
B	<i>Opuntia sp.</i>	0	0	1	0	-	-	.00	-
B	<i>Pinus edulis</i>	0	2	2	1	.15	.38	.38	.15
B	<i>Purshia tridentata</i>	3	1	0	1	.00	.15	-	.15
B	<i>Yucca harrimaniae</i>	2	2	2	2	.63	.00	.03	.00
Total for Browse		55	72	114	108	7.92	7.77	11.97	8.60

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 36

Species	Percent Cover		
	'99	'04	'09
<i>Artemisia nova</i>	-	2.46	3.45
<i>Cercocarpus montanus</i>	-	1.13	1.54
<i>Cowania mexicana stansburiana</i>	-	.15	-
<i>Ephedra viridis</i>	-	1.89	3.88
<i>Eriogonum microthecum</i>	-	.18	.08
<i>Gutierrezia sarothrae</i>	-	1.83	.10
<i>Juniperus osteosperma</i>	.80	3.18	.31
<i>Pinus edulis</i>	-	.55	-
<i>Purshia tridentata</i>	-	-	.13

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 36

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	1.5	0.6
Cercocarpus montanus	4.4	1.8

POINT-QUARTER TREE DATA--

Management unit 16C, Study no: 36

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	110	110	95	2.6	2.4	1.3
Pinus edulis	56	54	38	2.0	2.6	1.1

BASIC COVER--

Management unit 16C, Study no: 36

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	16.53	17.78	18.81	13.06
Rock	16.90	13.17	13.60	12.05
Pavement	7.61	16.29	30.38	12.47
Litter	23.86	20.95	17.67	29.06
Cryptogams	.06	1.53	.01	.11
Bare Ground	29.31	30.11	29.64	34.95

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 36, Study Name: Danish Bench

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.8	7.5	56	21.4	22.6	1.8	7.8	140.8	0.9

PELLET GROUP DATA--

Management unit 16C, Study no: 36

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	36	29	24	64	-	-	-
Elk	22	57	41	24	76 (188)	43 (106)	93 (230)
Deer	19	10	16	16	17 (42)	5 (12)	31 (76)
Cattle	-	3	-	1	12 (30)	2 (5)	2 (4)

BROWSE CHARACTERISTICS--
Management unit 16C, Study no: 36

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
94	1540	14	86	0	20	3	0	0	11/19
99	1700	22	65	13	-	42	12	1	6/16
04	1860	5	85	10	560	68	10	8	7/18
09	3000	32	56	12	140	24	27	7	6/18
<i>Cercocarpus montanus</i>									
94	20	0	100	0	-	0	100	0	46/55
99	20	0	100	0	20	100	0	0	50/55
04	20	0	0	100	-	0	100	100	46/50
09	60	0	0	100	-	0	100	100	63/70
<i>Chrysothamnus viscidiflorus</i>									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	20	0	100	-	-	0	0	0	6/9
09	340	76	24	-	-	0	0	0	5/7
<i>Cowania mexicana stansburiana</i>									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	11/23
04	20	0	100	-	-	100	0	0	19/25
09	0	0	0	-	-	0	0	0	23/41
<i>Echinocereus sp.</i>									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	6/17
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Ephedra viridis</i>									
94	60	0	100	0	-	0	0	0	31/46
99	340	12	76	12	-	29	29	35	32/42
04	580	34	52	14	-	38	21	14	33/43
09	520	0	38	62	-	0	54	15	32/44
<i>Eriogonum microthecum</i>									
94	1880	5	93	2	60	0	0	0	2/4
99	1160	12	84	3	40	7	7	2	1/3
04	2320	6	92	2	280	29	9	0	2/3
09	940	13	70	17	440	2	32	9	2/5
<i>Gutierrezia sarothrae</i>									
94	0	0	0	0	-	0	0	0	7/9
99	460	74	26	0	140	0	0	0	4/4
04	5080	9	91	0	-	1	0	0	6/9
09	1100	0	67	33	-	0	0	44	4/6

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Juniperus osteosperma</i>										
94	0	0	0	0	-	0	0	0	-/-	
99	120	67	33	0	-	0	0	0	-/-	
04	80	50	50	0	-	0	0	0	-/-	
09	40	0	0	100	-	0	0	50	-/-	
<i>Leptodactylon pungens</i>										
94	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	6/10	
09	0	0	0	-	-	0	0	0	-/-	
<i>Opuntia sp.</i>										
94	0	0	0	-	-	0	0	0	4/12	
99	0	0	0	-	-	0	0	0	4/16	
04	20	0	100	-	-	0	0	0	4/17	
09	0	0	0	-	-	0	0	0	-/-	
<i>Pediocactus simpsonii</i>										
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	4/12	
<i>Pinus edulis</i>										
94	0	0	0	0	-	0	0	0	-/-	
99	40	100	0	0	20	0	0	50	-/-	
04	40	50	50	0	-	0	0	0	-/-	
09	20	0	0	100	-	0	0	100	-/-	
<i>Purshia tridentata</i>										
94	60	0	100	0	-	0	0	0	19/22	
99	20	0	100	0	-	0	100	0	19/22	
04	0	0	0	0	-	0	0	0	4/16	
09	20	0	0	100	-	0	100	0	19/27	
<i>Yucca harrimaniae</i>										
94	80	0	100	-	-	0	0	0	14/25	
99	40	0	100	-	-	0	0	0	9/12	
04	100	100	0	-	-	0	0	0	-/-	
09	60	100	0	-	-	0	0	0	8/12	

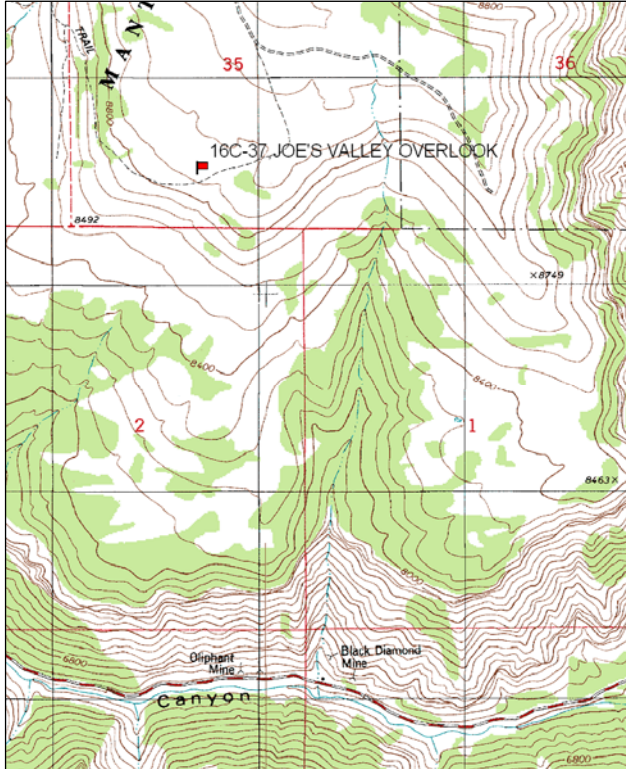
JOE'S VALLEY OVERLOOK- TREND STUDY NO. 16C-37-09

Vegetation Type: Mixed Mountain Brush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,950 ft (2,728 m)
Aspect: South
Slope: 7%-13%
Transect bearing: 285 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

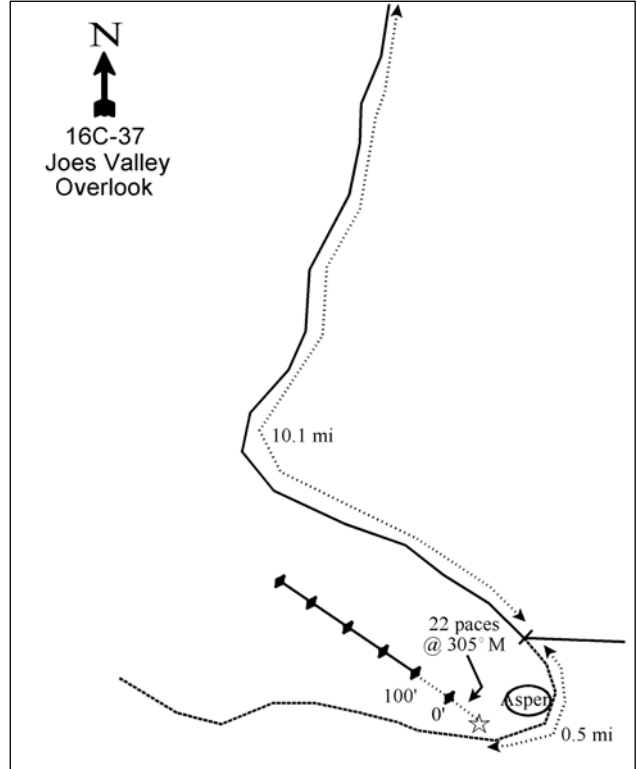
From the intersection of Cottonwood Canyon (#040) road and Trail Mountain road, travel south 10.1 miles to a cattleguard. From the cattleguard continue 0.5 miles to a witness post. From the witness post to the 0-foot baseline stake, walk 22 paces at a bearing of 305°M. The stake has browse tag #28 attached. The witness post is a tall post on a dirt mound near the end of a contour trench.

Map Name: Mahogany Point



Township: 17S, Range: 6E, Section: 35

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 481645 E 4349737 N

Site Information

Site Description: The study monitors a mixed mountain brush community on a ridge east of Joe's Valley Reservoir and above Cottonwood Creek. The area has been contour trenched in the past and seeded. The area has been closed to cattle grazing since the contour treatment, but some trespass is occurring. Pellet group data has indicated heavy use by elk and light use by deer since 1999. Estimated cattle use has been somewhat moderate since 1999 (Table - Pellet Group Data).

Browse: A variety of palatable browse species occur on the site including Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and dwarf rabbitbrush (*Chrysothamnus depressus*). The dominant browse species on the site consists of a moderately dense stand of mountain big sagebrush. This mostly mature population has displayed moderate decadence in the past, but decadence was low in 2009. Vigor and recruitment of mountain big sagebrush have been good over the length of the study. Utilization of mountain big sagebrush has been moderate to heavy since 1994. The serviceberry on the site consists of a small population of three foot tall heavily hedged plants. Snowberry (*Symphoricarpos oreophilus*) is abundant on the site and is the second most dominant shrub, after mountain big sagebrush (Table - Browse Characteristics).

Herbaceous Understory: Due to the elevation and heavy elk and cattle use, the herbaceous understory is considered the key element of this site. Grasses are diverse and abundant on the site and are comprised of a mixture of native and seeded perennial species. The dominant grass species is Salina wildrye (*Elymus salina*) with other common species including bluebunch wheatgrass (*Agropyron spicatum*), smooth brome (*Bromus inermis*), and mutton bluegrass (*Poa fendleriana*). Smooth brome is the most common seeded species and grows in thick patches along the contoured trenches on the site. Use of the grasses is heavy in places, especially within the contoured trenches. Forbs are diverse and contain several desirable species, yet many of the common forbs are low growing species like mat penstemon (*Penstemon caespitosus*). Alfalfa (*Medicago sativa*), a seeded forb, was found in small numbers during all readings.

Soil: The soil texture is clay with a slightly alkaline pH. Phosphorus has a limited availability for plant growth and development at only 5.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Rock and pavement cover are fairly abundant, but bare ground cover has been relatively high over the sample years (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1994 to 1999 - slightly up (+1):** The density of the primary browse species, mountain big sagebrush, increased by 20% from 2,460 plants/acre to 2,960 plants/acre, though there was little change in cover. There was a large increase in the recruitment of young mountain big sagebrush plants from 3% to 16% of the population.
- **1999 to 2004 - stable (0):** There was little change in the density of mountain big sagebrush, but cover increased from 9% to 12%. Decadence of sagebrush also increased slightly from 25% to 31%.
- **2004 to 2009 - up (+2):** The density of mountain big sagebrush increased by 44% to 4,460 plants/acre and cover increased to 14%. Mountain big sagebrush decadence decreased to 14% and recruitment of young plants increased to 30% of the population with an abundance of seedlings.

Grass:

- **1994 to 1999 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses.

- **1999 to 2004 - down (-2):** Perennial grass sum of nested frequency decreased by 20% and cover decreased from 12% to 10%.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 18% with a slight increase in cover.

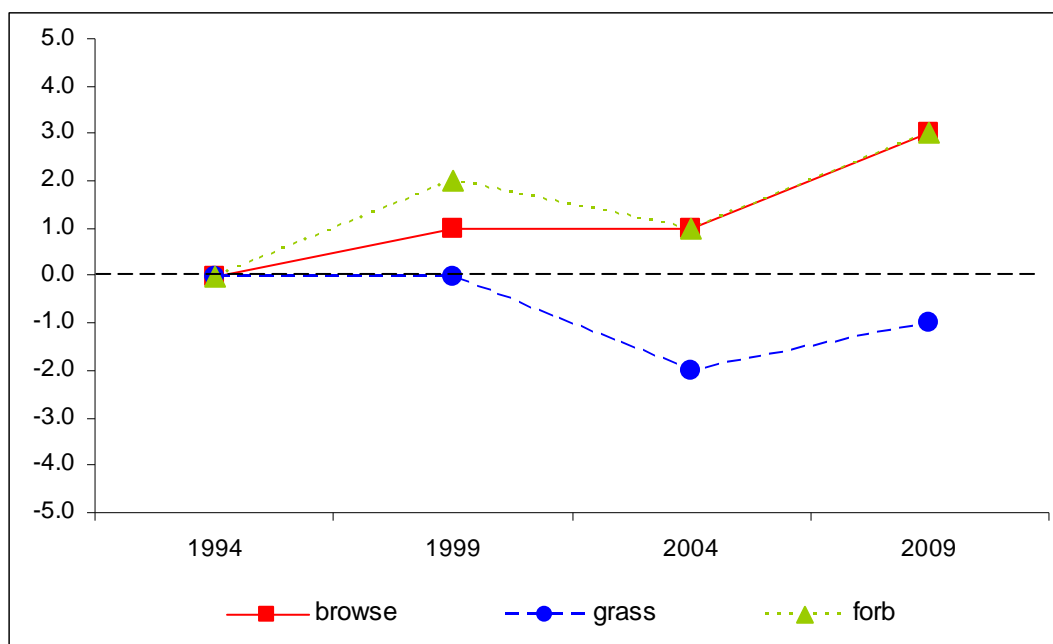
Forb:

- **1994 to 1999 - up (+2):** Perennial forb sum of nested frequency increased by 27% and cover increased from 3% to 5%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 16% and cover decreased to 4%.
- **2004 to 2009 - up (+2):** There was a 34% increase in the sum of nested frequency and cover increased to 5%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 16C Study no: 37



HERBACEOUS TRENDS--

Management unit 16C, Study no: 37

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	a31	b59	a32	a20	.46	.81	.45	.13
G	Agropyron intermedium	a5	ab11	b27	ab12	.02	.04	.24	.10
G	Agropyron smithii	a-	a-	a-	b18	-	-	-	.30
G	Agropyron spicatum	a16	a22	b97	b74	.40	.31	2.29	.89
G	Bromus inermis	a49	ab83	ab74	b93	.93	2.54	1.80	2.02
G	Carex sp.	9	7	3	15	.21	.33	.15	.08
G	Elymus cinereus	6	5	-	-	.15	.15	-	-
G	Elymus salina	b239	a185	a158	a166	8.26	5.36	4.14	5.44

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	<i>Poa fendleriana</i>	c114	bc96	a16	b65	1.50	1.75	.19	1.04
G	<i>Poa secunda</i>	5	-	-	6	.04	-	-	.06
G	<i>Stipa pinetorum</i>	a24	b58	a16	a30	.34	.86	.21	.16
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		498	526	423	499	12.35	12.18	9.51	10.25
Total for Grasses		498	526	423	499	12.35	12.18	9.51	10.25
F	<i>Androsace septentrionalis</i> (a)	a-	b38	a7	a5	-	.11	.06	.00
F	<i>Arenaria fendleri</i>	ab24	b31	a8	a11	.15	.44	.13	.07
F	<i>Astragalus convallarius</i>	a3	a-	ab7	b11	.00	-	.39	.21
F	<i>Astragalus miser</i>	10	11	7	5	.31	.33	.21	.07
F	<i>Astragalus</i> sp.	-	3	-	10	-	.15	-	.06
F	<i>Astragalus tenellus</i>	8	6	2	1	.04	.15	.03	.00
F	<i>Astragalus utahensis</i>	-	-	3	3	-	-	.03	.03
F	<i>Chaenactis douglasii</i>	-	7	2	12	-	.04	.03	.02
F	<i>Collinsia parviflora</i> (a)	-	-	-	1	-	-	-	.00
F	<i>Comandra pallida</i>	-	-	-	3	-	-	-	.00
F	<i>Erigeron eatonii</i>	2	3	-	1	.00	.01	-	.00
F	<i>Eriogonum racemosum</i>	-	-	-	1	-	-	-	.00
F	<i>Eriogonum umbellatum</i>	12	17	8	19	.12	.25	.13	.41
F	<i>Gilia</i> sp. (a)	-	-	-	2	-	-	-	.03
F	<i>Hymenoxys richardsonii</i>	33	41	55	51	.58	.78	.82	1.16
F	<i>Lesquerella</i> sp.	-	4	5	-	-	.03	.03	-
F	<i>Lomatium</i> sp.	-	4	-	-	-	.01	-	-
F	<i>Lupinus argenteus</i>	8	5	3	-	.15	.15	.38	-
F	<i>Machaeranthera canescens</i>	-	-	4	4	-	-	.06	.01
F	<i>Medicago sativa</i>	13	7	6	5	.02	.18	.18	.04
F	<i>Penstemon caespitosus</i>	a41	bc79	ab55	c80	.52	2.25	1.22	1.98
F	<i>Penstemon</i> sp.	3	-	-	6	.03	-	-	.06
F	<i>Phlox austromontana</i>	a48	a41	a54	b75	.51	.27	.60	1.27
F	<i>Polygonum douglasii</i> (a)	-	-	-	1	-	-	-	.00
F	<i>Potentilla</i> sp.	a3	b11	a4	ab5	.00	.11	.01	.01
F	<i>Schoenocrambe linifolia</i>	-	2	3	3	-	.00	.00	.03
F	<i>Senecio multilobatus</i>	-	2	3	1	-	.00	.03	.00
F	Unknown forb-annual (a)	1	-	-	-	.03	-	-	-
F	Unknown forb-perennial	7	-	-	-	.04	-	-	-
Total for Annual Forbs		1	38	7	9	0.03	0.11	0.06	0.04
Total for Perennial Forbs		215	274	229	307	2.51	5.20	4.32	5.49
Total for Forbs		216	312	236	316	2.54	5.32	4.38	5.53

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

BROWSE TRENDS--

Management unit 16C, Study no: 37

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	11	8	9	10	.56	.67	.63	1.08
B	Artemisia nova	0	2	2	4	-	.38	.30	.38
B	Artemisia tridentata vaseyana	65	69	72	80	8.76	8.75	12.26	13.75
B	Chrysothamnus depressus	20	14	23	30	.07	.39	.72	.55
B	Chrysothamnus parryi	0	0	0	2	-	-	-	.00
B	Chrysothamnus viscidiflorus viscidiflorus	26	33	39	39	.43	.29	.58	.53
B	Gutierrezia sarothrae	0	1	11	8	-	.01	.06	.03
B	Pinus flexilis	0	0	0	0	-	.38	-	-
B	Symphoricarpos oreophilus	51	50	55	55	3.55	5.61	7.31	5.88
B	Tetradymia canescens	2	3	4	1	.03	.15	.01	.03
Total for Browse		175	180	215	229	13.42	16.64	21.88	22.24

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 37

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	1.64	1.23
Artemisia tridentata vaseyana	-	13.36	11.05
Chrysothamnus depressus	-	.50	.46
Chrysothamnus viscidiflorus viscidiflorus	-	2.18	.68
Gutierrezia sarothrae	-	.15	-
Pinus flexilis	3.00	2.59	3.43
Symphoricarpos oreophilus	-	7.84	6.33

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 37

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	4.1	2.0
Artemisia tridentata vaseyana	2.5	1.1

BASIC COVER--

Management unit 16C, Study no: 37

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	28.10	35.87	35.57	35.47
Rock	4.41	1.75	2.28	1.71
Pavement	.48	7.40	8.17	7.10
Litter	31.17	35.45	34.20	36.65
Cryptogams	0	.00	0	.63
Bare Ground	25.37	32.34	40.47	30.73

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 37, Study Name: Joes Valley Overlook

Effective rooting depth (in)	pH	clay			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.2	7.4	26	29.4	44.6	2.8	5.5	108.8	0.6

PELLET GROUP DATA--

Management unit 16C, Study no: 37

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	25	14	17	15	-	-	-
Elk	40	40	54	29	83 (205)	72 (177)	68 (169)
Deer	19	7	11	6	9 (22)	5 (12)	1 (3)
Cattle	1	3	4	13	20 (49)	22 (54)	40 (99)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 37

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
94	280	14	86	0	-	36	21	0	31/39
99	180	0	100	0	-	78	22	0	30/35
04	180	22	78	0	-	11	78	0	28/39
09	200	0	80	20	-	10	80	10	37/47
Artemisia nova									
94	0	0	0	0	-	0	0	0	-/-
99	40	0	100	0	-	50	0	0	7/15
04	40	0	50	50	-	0	0	0	9/24
09	100	0	100	0	-	20	0	0	8/21
Artemisia tridentata vaseyana									
94	2460	3	76	20	20	30	0	3	17/32
99	2960	16	59	25	260	39	24	5	17/29
04	3080	13	56	31	20	50	29	10	14/27
09	4460	30	56	14	5040	35	32	14	16/29
Ceratoides lanata									
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	-	40	0	0	0	-/-
Chrysothamnus depressus									
94	800	5	90	5	-	3	0	0	4/8
99	560	4	82	14	-	32	29	7	2/7
04	1100	0	100	0	-	47	27	0	4/11
09	1180	2	88	10	-	2	3	8	3/10

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Chrysothamnus parryi									
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	100	0	100	-	-	0	100	0	5/10
Chrysothamnus viscidiflorus viscidiflorus									
94	1240	2	95	3	-	8	6	2	6/10
99	1300	6	86	8	-	18	5	3	7/10
04	1640	0	100	0	-	16	2	0	7/13
09	1680	2	90	7	20	13	1	8	5/10
Gutierrezia sarothrae									
94	0	0	0	-	-	0	0	0	-/-
99	40	0	100	-	-	0	0	0	-/-
04	300	0	100	-	-	0	0	0	7/10
09	380	0	100	-	-	0	0	0	6/7
Symphoricarpos oreophilus									
94	3120	1	98	1	-	41	3	0	13/25
99	2300	10	90	0	100	4	0	3	13/28
04	2840	6	94	0	-	15	2	0	10/23
09	3820	16	73	11	60	24	30	19	11/24
Tetradymia canescens									
94	40	50	50	0	-	0	0	0	9/7
99	60	33	67	0	-	33	0	0	4/7
04	120	33	67	0	-	0	17	0	8/10
09	20	0	0	100	-	0	100	100	8/9

CEDAR MOUNTAIN - TREND STUDY NO. 16C-40-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 6,800 ft (2,073 m)

Aspect: Northwest

Slope: 15%

Transect bearing: 180 degrees magnetic

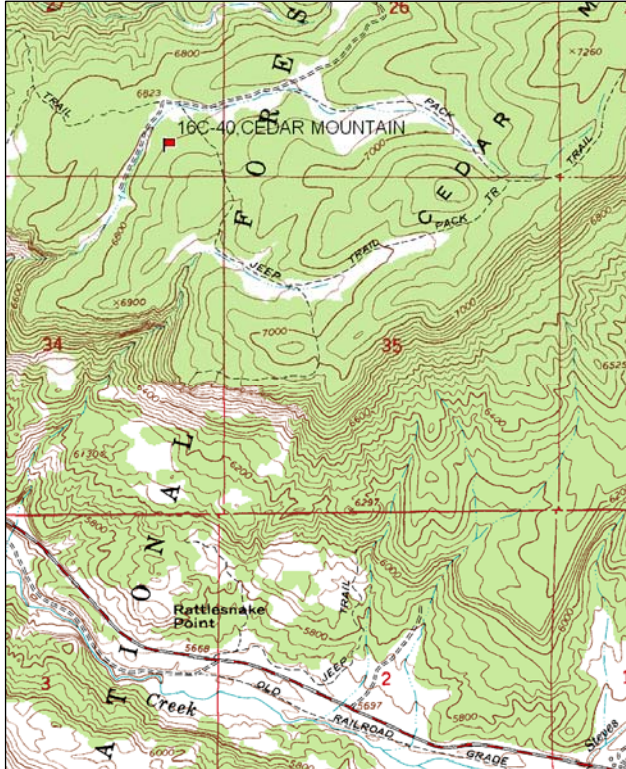
Belt placement: line 1 (11 & 95), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Site Notes: Rebar needed on belt 4

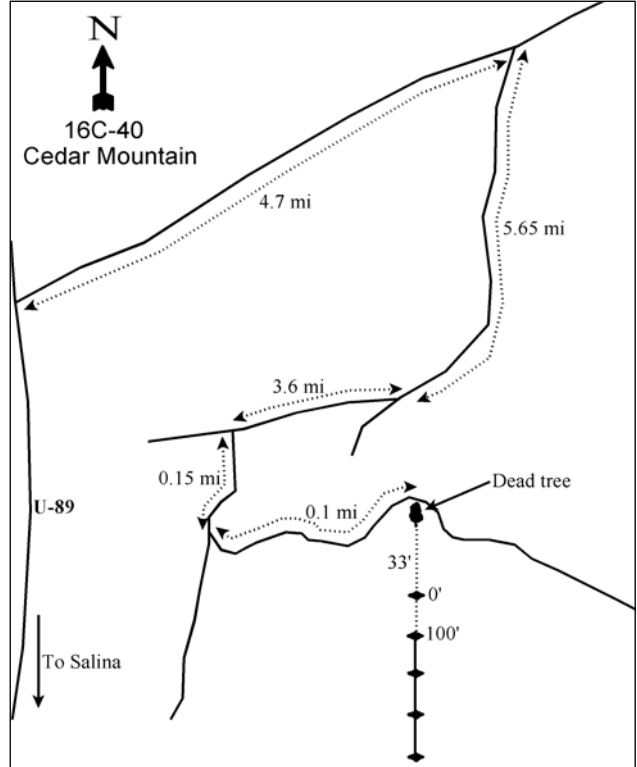
Directions:

From mile marker 198 on U-89 north of Salina, take the Willow Creek Road east for 4.7 miles to a fork near a reservoir. Turn right and go south along the dike. Continue on this road for 5.65 miles up switchbacks to the top of the hill and southwest along the top until the road forks. Take the right fork through some oak and juniper and across a chained area, staying on the main road for 3.6 miles until coming to a fork. Turn left and proceed down the bottom of the draw 0.15 miles southwest to another fork. Turn left and go uphill 0.1 miles to the second bend to the right. The frequency baseline starts 33 feet south of the road beyond a large dead tree. The transect is marked by rebar approximately 2 feet tall. The 0-foot baseline stake has a red browse tag number 7039 attached.

Map Name: Salina, Utah



Diagrammatic Sketch:



Township: 21S, Range: 1E, Section: 27

GPS: NAD 83, UTM 12S 432517 E 4311188 N

CEDAR MOUNTAIN - TREND STUDY NO. 16C-40

Site Information

Site Description: The study is located on a high plateau east of Salina in an area that was chained in 1979-80 and seeded with a mixture of grasses, forbs, and browse species by the Forest Service. These Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*) slopes were heavily grazed by domestic sheep in the past. The area was retreated with a dixie harrow in 2004-2005 and again with a brush saw in 2005 and 2008 to remove any surviving pinyon and juniper trees. Pellet group data estimated moderate elk use in 1999 and 2004, but use was lighter in 2009. Estimated deer use has been light since 1999. Sign of light sheep use was also sampled in 2009 (Table - Pellet Group Data).

Browse: Browse species are limited on the site. Mature juniper and pinyon averaging 8 to 12 feet in height had reestablished on the site in 2004, prior to the treatment. Pinyon and juniper trees dominated the site in moderate density, but decreased substantially in 2009, following the treatments (Table - Point-Quarter Tree Data). There are a few black sagebrush (*Artemisia nova*), rabbitbrush (*Chrysothamnus spp.*), and Gambel oak (*Quercus gambelii*) on the site, but no species provides notable cover (Table - Browse Trends). Big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), and fourwing saltbush (*Atriplex canescens*) were supposedly seeded following the first chaining, but have not been sampled on the site.

Herbaceous Understory: Grasses are abundant on the site but are dominated by three seeded species; intermediate wheatgrass (*Agropyron intermedium*), crested wheatgrass (*A. cristatum*), and smooth brome (*Bromus inermis*). These three species provide almost all of the grass cover on the site. Forbs are rare, but increased somewhat following the juniper and pinyon removal. The site is a mixture of annual and perennial forbs (Table - Herbaceous Trends).

Soil: The soil texture is a clay loam with a slightly alkaline pH. Organic matter is relatively high at 5.4%, but phosphorus has limited availability for plant growth and development at only 5.1 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is low due to a vigorous stand of sod-forming perennial grasses and an abundance of litter cover from the chaining and other treatments (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 - stable (0):** There is little preferred browse and the site is dominated by pinyon and juniper trees.
- **1991 to 1999 - stable (0):** Browse remains sparse on the site.
- **1999 to 2004 - stable (0):** Browse changed little and remains rare on the site.
- **2004 to 2009 - slightly up (+1):** Preferred browse remains scarce on the site, but a treatment decreased the density of pinyon and juniper trees on the site.

Grass:

- **1985 to 1991 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 19%.
- **1991 to 1999 - stable (0):** Perennial grass sum of nested frequency changed little.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 25%, though cover increased from 12% to 13%. The nested frequency of crested wheatgrass and smooth brome decreased by two degrees of significance.
- **2004 to 2009 - slightly up (+1):** There was a 16% increase in the sum of nested frequency of perennial grasses and cover increased to 29%. Smooth brome increased significantly in nested frequency.

Forb:

- **1985 to 1991 - up (+2):** There was a three-fold increase in the sum of nested frequency of perennial forbs.
- **1991 to 1999 - down (-2):** Perennial forb sum of nested frequency decreased to 1985 levels.
- **1999 to 2004 - slightly up (+1):** The sum of nested frequency of perennial forbs increased 27%, but forbs are extremely rare and provide less than 1% cover.
- **2004 to 2009 - slightly up (+1):** There was a 24% increase in the sum of nested frequency of perennial forbs and cover increased to just over 1%. Annual forbs increased substantially on the site and provided more cover than perennial forbs. Forbs remain rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

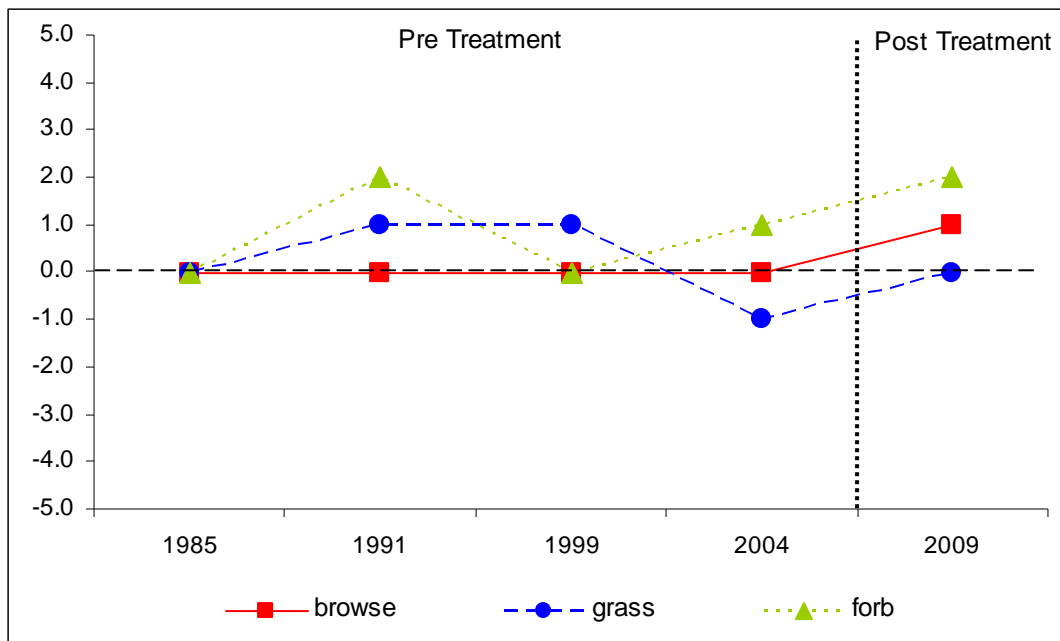
Management unit 16C, study no: 40

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	0.0	0.0	0.0	25.0	0.0	1.5	0.0	26.5	Poor-Fair
04	0.0	0.0	0.0	28.5	0.0	1.0	0.0	29.5	Fair
09	0.0	0.0	0.0	30.0	0.0	2.2	0.0	32.2	Fair

Trend Summary

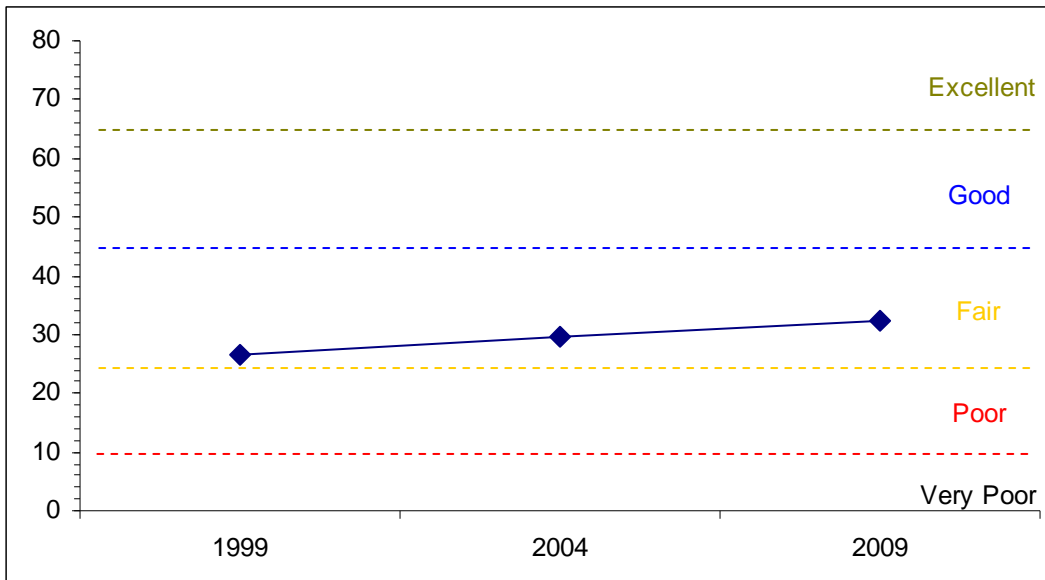
CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 16C Study no: 40



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 16C, Study no: 40



HERBACEOUS TRENDS--

Management unit 16C, Study no: 40

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	bc111	bc116	c144	a63	ab95	3.20	2.65	5.96
G	Agropyron intermedium	248	274	235	255	223	7.69	9.14	16.48
G	Agropyron spicatum	-	34	8	2	7	.21	.38	.53
G	Bromus inermis	ab113	abc137	c161	a90	bc148	1.31	1.72	5.96
G	Elymus junceus	-	1	2	-	-	.03	.00	-
G	Elymus salina	3	-	-	-	-	-	-	-
G	Festuca ovina	4	-	-	-	-	-	-	-
G	Hordeum jubatum jubatum	6	-	-	-	-	-	-	-
G	Koeleria cristata	7	-	-	-	1	.00	-	.03
G	Oryzopsis hymenoides	6	6	-	-	-	-	-	-
G	Poa fendleriana	-	2	7	5	3	.02	.18	.15
G	Poa secunda	-	1	6	7	11	.02	.16	.10
G	Sitanion hystrix	a-	b22	a1	a-	a-	.00	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		498	593	564	422	488	12.51	14.26	29.22
Total for Grasses		498	593	564	422	488	12.51	14.26	29.22
F	Alyssum alyssoides (a)	-	-	b49	a-	c226	.09	-	1.97
F	Arabis sp.	5	2	-	3	-	-	.00	-
F	Astragalus marianus	3	5	-	1	-	-	.00	-
F	Calochortus nuttallii	-	9	-	-	-	-	-	-
F	Carduus nutans (a)	1	2	-	-	-	-	-	-
F	Castilleja chromosa	a-	b9	a-	a-	a-	-	-	-
F	Chaenactis douglasii	a-	b13	a1	a1	ab5	.00	.00	.01
F	Cirsium sp.	-	-	-	5	3	-	.04	.03

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
F	<i>Crepis acuminata</i>	-	1	-	-	-	-	-	-
F	<i>Cryptantha</i> sp.	_a 7	_{bc} 30	_{ab} 9	_{ab} 24	_c 43	.04	.21	.76
F	<i>Cynoglossum officinale</i>	-	3	3	-	-	.03	-	-
F	<i>Erigeron pumilus</i>	-	3	-	-	-	-	-	-
F	<i>Eriogonum umbellatum</i>	11	-	6	-	-	.01	-	-
F	<i>Gilia</i> sp. (a)	_a 1	_b 30	_a 3	_a -	_a -	.01	-	-
F	<i>Lepidium</i> sp. (a)	-	-	_a -	_b 96	_a -	-	.33	-
F	<i>Lomatium</i> sp.	-	2	-	-	8	-	-	.04
F	<i>Medicago sativa</i>	-	-	7	-	-	.53	-	-
F	<i>Penstemon humilis</i>	-	-	-	2	-	-	.00	-
F	<i>Penstemon pachyphyllus</i>	_a 3	_b 9	_a -	_a -	_a -	-	-	-
F	<i>Phlox austromontana</i>	19	23	11	15	8	.05	.16	.07
F	<i>Physaria acutifolia</i>	_a -	_b 36	_b 12	_b 14	_b 11	.06	.04	.02
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	4	12	-	.01	.02
F	<i>Senecio multilobatus</i>	_a -	_b 12	_a -	_a -	_a -	-	-	-
F	<i>Taraxacum officinale</i>	-	4	-	-	-	-	-	-
F	<i>Tragopogon dubius</i>	4	-	3	1	3	.01	.00	.00
F	Unknown forb-perennial	-	3	-	-	-	-	-	-
F	<i>Wyethia amplexicaulis</i>	-	-	-	-	1	-	-	.15
Total for Annual Forbs		2	32	52	100	238	0.10	0.33	1.99
Total for Perennial Forbs		52	164	52	66	82	0.75	0.50	1.10
Total for Forbs		54	196	104	166	320	0.86	0.84	3.09

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

BROWSE TRENDS--

Management unit 16C, Study no: 40

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	<i>Artemisia nova</i>	1	4	1	.00	.01	.00
B	<i>Gutierrezia sarothrae</i>	0	0	1	-	-	.00
B	<i>Juniperus osteosperma</i>	11	6	2	2.36	1.94	.71
B	<i>Pinus edulis</i>	2	3	0	1.87	3.82	-
B	<i>Quercus gambelii</i>	1	0	0	.00	-	-
Total for Browse		15	13	4	4.24	5.77	0.71

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 40

Species	Percent Cover		
	'99	'04	'09
<i>Artemisia nova</i>	-	-	.21
<i>Juniperus osteosperma</i>	1.39	7.58	1.00
<i>Pinus edulis</i>	-	2.75	-

POINT-QUARTER TREE DATA--
Management unit 16C, Study no: 40

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	90	84	31	4.8	4.5	3.3
Pinus edulis	44	46	19	3.7	3.4	6.5

BASIC COVER--
Management unit 16C, Study no: 40

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	7.25	7.25	22.26	20.77	37.15
Rock	5.50	6.75	6.38	9.62	4.37
Pavement	9.25	6.75	6.41	13.06	4.95
Litter	63.25	61.00	49.76	37.80	55.45
Cryptogams	.25	0	.19	.03	0
Bare Ground	14.50	18.25	9.80	32.28	11.05

SOIL ANALYSIS DATA --
Management unit 16C, Study no: 40, Study Name: Cedar Mountain

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.2	n/a	31.3	32.2	36.6	5.4	5.1	217.6	0.7

PELLET GROUP DATA--
Management unit 16C, Study no: 40

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	27	62	16	-	-	-
Elk	15	40	7	34 (84)	37 (93)	16 (40)
Deer	18	4	3	10 (25)	4 (10)	1 (2)
Cattle	1	-	-	-	-	-
Sheep	-	-	-	-	-	10 (25)

BROWSE CHARACTERISTICS--
Management unit 16C, Study no: 40

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
99	60	33	67	0	20	0	0	0	6/14
04	120	0	33	67	-	67	0	0	13/31
09	20	0	100	0	-	0	0	0	14/23
<i>Artemisia tridentata vaseyana</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	11/10
09	0	0	0	-	-	0	0	0	31/40
<i>Chrysothamnus viscidiflorus</i>									
85	0	0	0	-	-	0	0	0	-/-
91	66	0	100	-	-	0	0	0	9/11
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	9/7
<i>Gutierrezia sarothrae</i>									
85	0	0	0	-	-	0	0	0	-/-
91	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	9/12
<i>Juniperus osteosperma</i>									
85	132	0	50	50	-	0	0	0	47/43
91	132	50	50	0	-	0	0	0	69/67
99	300	33	67	0	-	0	0	0	-/-
04	120	17	83	0	-	0	0	0	-/-
09	60	0	67	33	-	0	33	33	-/-
<i>Pinus edulis</i>									
85	0	0	0	-	-	0	0	0	-/-
91	66	100	0	-	-	0	0	0	-/-
99	40	50	50	-	-	0	0	0	-/-
04	60	33	67	-	-	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)	
<i>Purshia tridentata</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	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	33/57	
<i>Quercus gambelii</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	40	100	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	42/13	
09	0	0	0	-	-	0	0	0	51/48	
<i>Sambucus sp.</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	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	15/16	

TROUGH HOLLOW - TREND STUDY NO. 16C-41-09

Vegetation Type: Mixed Mountain Brush
Range Type: Crucial Deer Spring/Fall/Summer, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,200 ft (2,499 m)
Aspect: South
Slope: 2%
Transect bearing: 180 degrees magnetic
Belt placement: line 1 (11 & 95), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

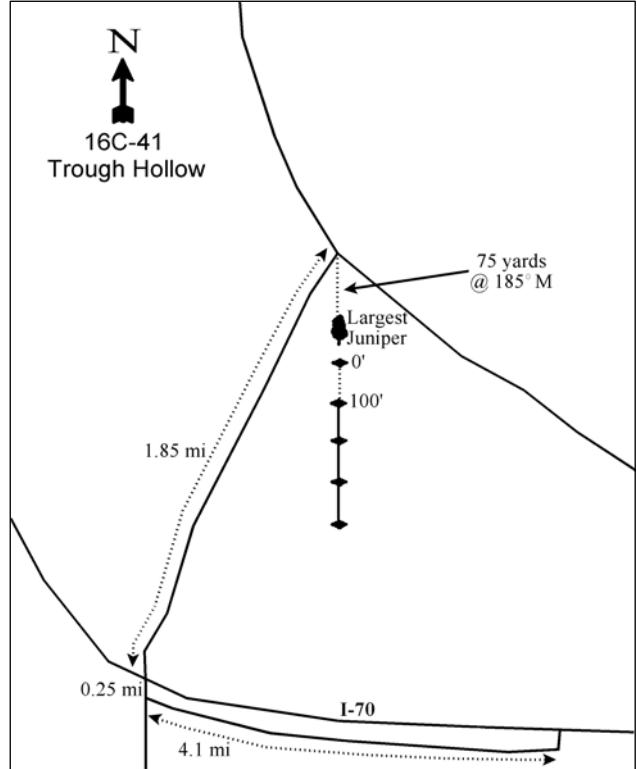
From Salina drive about 37.5 miles east on I-70 to a rest area exit. From the exit turn right and come back west on the frontage road paralleling the freeway for 4.1 miles to an intersection. Turn right on F.S. Road #011 and drive 0.25 miles to cross under the freeway. From the tunnel proceed 1.85 miles up and around a hill, then on to a major intersection. Stop here and look back at a bearing of 185 degrees magnetic to the largest juniper close to the road. It is about 75 yards from the intersection. Go back to this juniper to find the 0-foot baseline stake, 10 feet south of the tree out in the sagebrush flat. The stake is marked with browse tag #7192.

Map Name: Old Woman Plateau, Utah



Township: 23S, Range: 4E, Section: 21

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 459750 E 4293535 N

TROUGH HOLLOW - TREND STUDY NO. 16C-41

Site Information

Site Description: The study is located on the south end of the Old Woman Plateau in an open area dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). The community is described as mixed mountain brush because of the great variety of desirable browse species present on the site. The area is quite popular for deer hunting and access is good on this part of the plateau. The area is managed by the Forest Service as part of the Beavers Dam allotment. The area provides good year long habitat for deer, especially in spring and fall. Pellet group data estimated moderate use by deer and elk in 1999 and 2009, but lighter use by both species in 2004. Estimated cattle use has been mostly moderate since 1999 (Table - Pellet Group Data).

Browse: Mountain big sagebrush and antelope bitterbrush (*Purshia tridentata*) are the key browse species on the site and account for most of the browse cover (Table - Browse Trends). The mountain big sagebrush population is somewhat dense with moderate decadence, good vigor, and good recruitment of young plants over the sample years. Mountain big sagebrush plants have displayed mostly light to moderate use over the length of the study. Bitterbrush has shown consistent moderate to heavy use since 1985. Most of the population was classified as decadent in 1991, but decadence was low and vigor was good in all other sample years (Table - Browse Characteristics). The bitterbrush plants display a spreading prostrate growth form, forming a secondary cover under the sagebrush. Additional browse species include small numbers of Utah serviceberry (*Amelanchier utahensis*), sticky leaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), Wood's rose (*Rosa woodsii*), snowberry (*Symphoricarpos oreophilus*), and gray horsebrush (*Tetradymia canescens*).

Herbaceous Understory: There are many species of perennial grasses growing under and between the sagebrush, creating a fairly dense ground cover that has averaged 17% since 1999. The most common grasses are mutton bluegrass and Kentucky bluegrass (*Poa fendleriana* and *P. pratensis*). Letterman needlegrass (*Stipa lettermani*) and western wheatgrass (*Agropyron smithii*) have also been common over the sample years. Sheep fescue (*Festuca ovina*) has increased substantially since 2004. Perennial forbs are diverse and have a moderate abundance, providing an average of 4% cover since 1999 (Table - Herbaceous Trends). Some provide highly palatable and preferred forage for deer and elk, such as redroot eriogonum (*Eriogonum racemosum*), penstemon's (*Penstemon spp.*), and fleabanes (*Erigeron spp.*).

Soil: The soil texture is a sandy clay loam with a neutral pH (Table - Soil Analysis Data). The ground is covered with a high percent of litter and vegetation with little bare ground cover exposed (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 - stable (0):** There was little change the density of either of the key browse species, mountain big sagebrush and bitterbrush. Decadence of mountain big sagebrush decreased from 45% to 22%, and recruitment of young plants increased from 9% to 19% of the population. Decadence of bitterbrush increased from 3% to 62% and poor vigor increased from 0% to 23%.
- **1991 to 1999 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Decadence of bitterbrush decreased to 1% and poor vigor returned to 1985 levels. Recruitment of both mountain big sagebrush and bitterbrush increased slightly.
- **1999 to 2004 - stable (0):** Density of both mountain big sagebrush and bitterbrush decreased slightly, but the main decrease was in the density of the abundant young class. Recruitment of young plants was still good for both species.

- **2004 to 2009 - slightly up (+1):** There was a slight decrease in the density of mountain big sagebrush, but bitterbrush density increased by 22%. Cover remained similar for bitterbrush, but decreased slightly for mountain big sagebrush.

Grass:

- **1985 to 1991 - slightly up (+1):** Perennial grass sum of nested frequency increased by 12%.
- **1991 to 1999 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 13%.
- **1999 to 2004 - slightly down (-1):** There was a 13% decrease in the sum of nested frequency of perennial grasses and cover decreased from 19% to 14%.
- **2004 to 2009 - slightly down (-1):** Perennial grass sum of nested frequency decreased by 10%, though cover increased to 18%.

Forb:

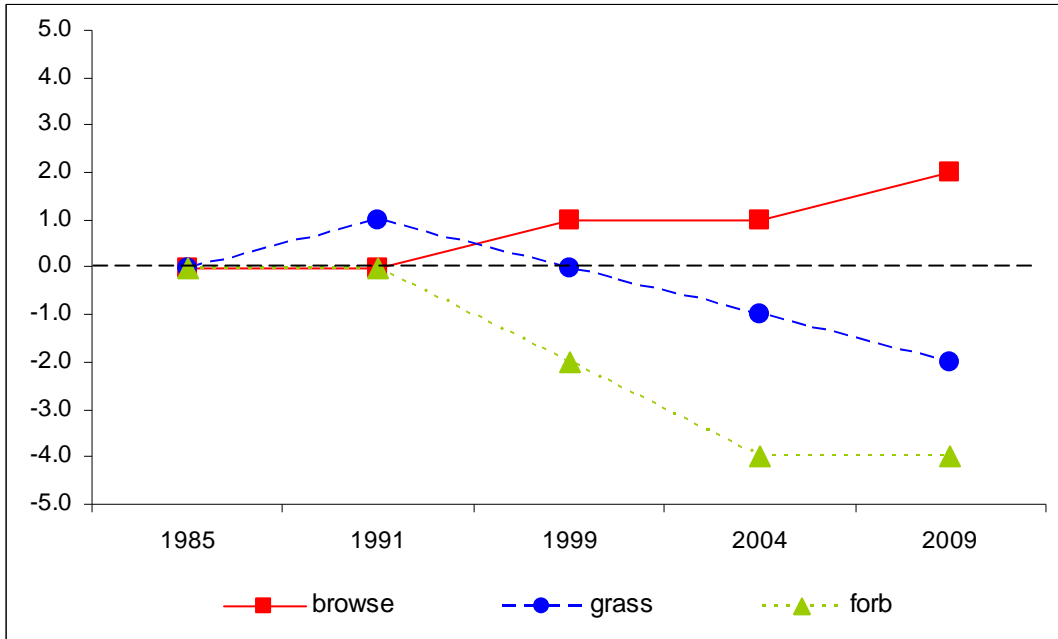
- **1985 to 1991 - stable (0):** There was little change in the perennial forb sum of nested frequency.
- **1991 to 1999 - down (-2):** Perennial forb sum of nested frequency decreased by 56%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 23% and cover decreased from 5% to 4%.
- **2004 to 2009 - stable (0):** There was little change in the perennial forb sum of nested frequency or cover.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 16C, study no: 41

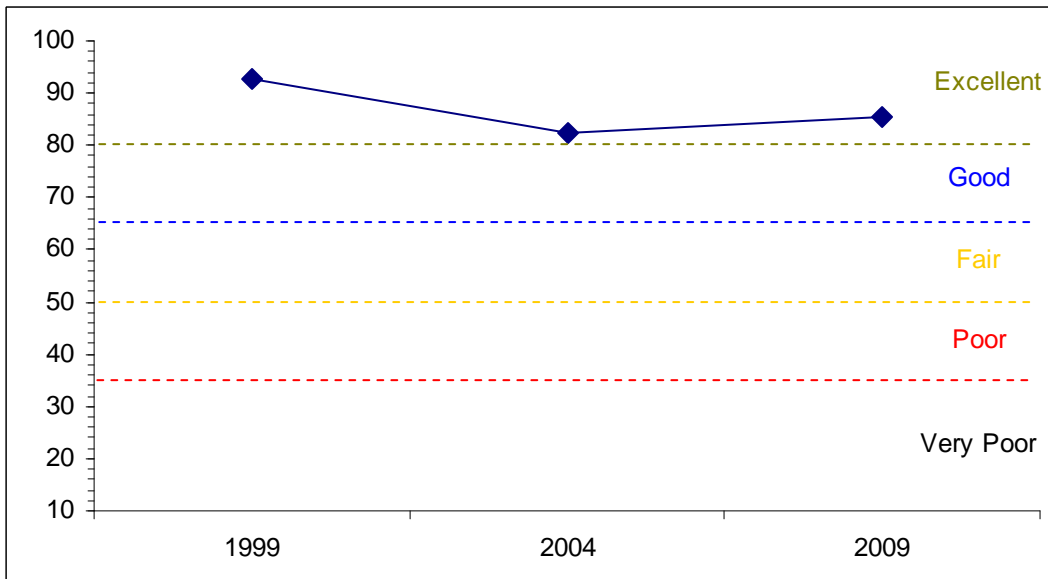
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	30.0	11.3	11.6	30.0	0.0	9.7	0.0	92.7	Excellent
04	30.0	10.0	5.7	28.8	0.0	7.9	0.0	82.4	Excellent
09	30.0	11.2	5.4	30.0	0.0	9.0	0.0	85.6	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 41



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 16C, Study no: 41



HERBACEOUS TRENDS--

Management unit 16C, Study no: 41

T y p e	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron smithii	a ⁹⁹	b ²¹⁵	a ⁹¹	a ⁷⁰	a ⁷⁸	1.06	.94	.73
G	Agropyron spicatum	-	-	-	1	-	-	.00	-
G	Agropyron trachycaulum	a ⁻	b ³⁴	ab ²⁵	a ⁵	a ⁻	.92	.06	-
G	Bouteloua gracilis	ab ¹²	b ¹⁴	a ⁻	a ⁻	a ⁻	-	-	-
G	Bromus ciliatus	b ¹⁶	a ⁻	c ⁶⁶	b ¹²	a ⁻	.71	.10	-
G	Bromus inermis	5	-	8	-	-	.04	-	-
G	Carex sp.	5	12	14	3	6	.24	.00	.04
G	Festuca ovina	ab ¹³	a ⁻	a ⁻	a ¹	b ²⁵	-	.03	1.01
G	Poa fendleriana	227	214	175	202	204	7.59	6.55	8.02
G	Poa pratensis	a ¹³	b ¹¹⁶	c ¹⁶⁶	d ²³⁴	b ¹²⁰	6.27	6.21	4.07
G	Poa secunda	a ⁻	ab ⁴	a ⁻	ab ³	b ¹⁴	-	.15	.48
G	Sitanion hystrix	c ¹⁶²	b ³⁸	a ¹³	a ²	a ⁵	.20	.02	.01
G	Stipa columbiana	2	3	6	-	-	.18	-	-
G	Stipa lettermani	c ¹¹⁹	c ¹⁰⁵	bc ⁹⁵	a ³⁸	ab ⁶⁰	2.16	.30	3.52
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		673	755	659	571	512	19.41	14.39	17.91
Total for Grasses		673	755	659	571	512	19.41	14.39	17.91
F	Agoseris glauca	a ⁻	b ⁷⁶	a ⁻	a ¹	a ⁻	-	.00	-
F	Androsace septentrionalis (a)	-	-	c ⁶⁴	b ²⁹	a ⁴	.41	.18	.00
F	Antennaria rosea	a ¹⁴	ab ²⁹	a ¹²	ab ²⁶	b ³⁹	.62	1.35	1.38
F	Arabis sp.	-	4	13	-	2	.05	-	.03
F	Aster sp.	4	-	-	-	2	-	-	.03
F	Astragalus convallarius	b ¹¹³	a ³⁵	a ¹⁸	a ¹⁰	a ¹⁶	.16	.05	.03
F	Astragalus sp.	4	8	12	1	3	.22	.00	.00
F	Calochortus nuttallii	b ⁹⁰	c ¹⁴⁸	a ⁻	a ²	a ⁻	-	.01	-
F	Castilleja chromosa	5	10	3	-	-	.06	-	-
F	Chaenactis douglasii	-	-	2	-	-	.00	-	-
F	Cirsium wheeleri	3	4	2	3	-	.03	.03	-
F	Collinsia parviflora (a)	-	-	a ³	c ¹⁴⁴	b ⁶⁰	.01	.61	.12
F	Crepis acuminata	12	6	-	-	9	-	-	.06
F	Erigeron caespitosus	10	-	-	-	-	-	-	-
F	Erigeron eatonii	b ¹⁰⁵	b ⁹⁶	a ²³	a ²⁵	a ¹⁷	.31	.15	.14
F	Erigeron flagellaris	ab ¹⁶	ab ⁷	ab ¹⁶	a ⁷	b ²¹	.13	.01	.13
F	Erigeron pumilus	a ⁵	ab ¹⁴	ab ¹⁸	b ²⁰	a ⁻	.50	.08	-
F	Eriogonum racemosum	112	122	88	99	74	1.36	1.33	.82
F	Eriogonum umbellatum	9	6	19	13	16	.24	.80	.88
F	Ipomopsis aggregata	5	-	1	-	-	.00	-	-
F	Lithospermum ruderales	-	3	-	-	-	-	-	-
F	Lupinus argenteus	8	2	8	1	9	.54	.03	.16
F	Lychnis drummondii	-	-	3	-	-	.00	-	-
F	Machaeranthera canescens	-	-	2	-	2	.03	-	.03
F	Microsteris gracilis (a)	-	-	a ⁻	a ⁷	b ³⁷	-	.02	.07
F	Oxybaphus linearis	b ¹²	a ⁻	a ⁻	a ⁻	a ⁻	-	-	-

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
F	<i>Penstemon pachyphyllus</i>	5	11	1	-	1	.15	.00	.00
F	<i>Penstemon palmeri</i>	2	-	-	-	-	-	-	-
F	<i>Penstemon watsonii</i>	a5	b29	ab21	a4	ab17	.31	.04	.75
F	<i>Petradoria pumila</i>	-	-	2	-	-	.00	-	-
F	<i>Polygonum douglasii</i> (a)	-	-	a18	b44	a14	.04	.11	.03
F	<i>Senecio multilobatus</i>	-	-	1	-	-	.00	-	-
F	<i>Taraxacum officinale</i>	b23	ab15	ab26	ab11	a6	.08	.03	.01
F	<i>Tragopogon dubius</i>	-	3	-	-	-	-	-	-
F	<i>Trifolium</i> sp.	6	5	-	-	-	-	-	-
F	Unknown forb-perennial	b34	a-	a-	a-	a-	-	-	-
F	<i>Vicia americana</i>	b18	ab11	a-	a2	a-	-	.00	-
F	<i>Zigadenus paniculatus</i>	ab6	b12	a-	a-	a-	-	-	-
Total for Annual Forbs		0	0	85	224	115	0.46	0.92	0.22
Total for Perennial Forbs		626	656	291	225	234	4.86	3.97	4.49
Total for Forbs		626	656	376	449	349	5.32	4.89	4.72

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

BROWSE TRENDS--

Management unit 16C, Study no: 41

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	<i>Amelanchier utahensis</i>	25	19	18	.66	.66	.24
B	<i>Artemisia tridentata vaseyana</i>	96	92	90	19.40	18.44	16.27
B	<i>Chrysothamnus nauseosus hololeucus</i>	0	4	14	-	.03	.45
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	37	50	40	1.11	1.74	.97
B	<i>Gutierrezia sarothrae</i>	0	2	0	-	.18	.33
B	<i>Juniperus osteosperma</i>	2	2	2	.38	.38	.63
B	<i>Mahonia repens</i>	13	14	14	.18	.31	.52
B	<i>Purshia tridentata</i>	71	72	80	10.40	11.54	11.49
B	<i>Rosa woodsii</i>	7	6	8	.49	.52	.39
B	<i>Symphoricarpos oreophilus</i>	11	15	17	.45	.52	.69
B	<i>Tetradymia canescens</i>	5	12	14	.06	.36	.19
Total for Browse		267	288	297	33.16	34.69	32.19

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 41

Species	Percent Cover		
	'99	'04	'09
<i>Amelanchier utahensis</i>	-	.36	.73
<i>Artemisia tridentata vaseyana</i>	-	24.01	17.11
<i>Chrysothamnus nauseosus hololeucus</i>	-	.23	.21
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	-	2.88	1.56
<i>Gutierrezia sarothrae</i>	-	-	.10
<i>Juniperus osteosperma</i>	1.00	1.83	2.01
<i>Mahonia repens</i>	-	.40	.75
<i>Purshia tridentata</i>	-	19.28	20.04
<i>Rosa woodsii</i>	-	.30	.03
<i>Symphoricarpos oreophilus</i>	-	1.06	1.60
<i>Tetradymia canescens</i>	-	.35	.05

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 41

Species	Average leader growth (in)	
	'04	'09
<i>Amelanchier utahensis</i>	3.9	1.6
<i>Artemisia tridentata vaseyana</i>	2.4	1.4
<i>Purshia tridentata</i>	5.0	2.2

BASIC COVER--

Management unit 16C, Study no: 41

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	13.25	21.25	56.79	51.33	47.65
Rock	0	.50	0	.01	.01
Pavement	0	.25	.21	.14	.02
Litter	73.00	63.25	59.30	61.34	63.54
Cryptogams	.75	.25	.21	0	.06
Bare Ground	13.00	14.50	13.29	11.04	15.16

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 41, Study Name: Trough Hollow

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.9	n/a	48	25.4	26.6	2.3	8.5	163.2	0.6

PELLET GROUP DATA--

Management unit 16C, Study no: 41

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	5	24	22	-	-	-
Elk	11	10	14	53 (131)	9 (23)	27 (66)
Deer	13	32	18	31 (77)	19 (48)	24 (60)
Cattle	7	10	10	38 (94)	27 (66)	32 (79)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 41

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
85	599	89	11	0	66	33	0	0	10/15
91	598	67	11	22	-	33	11	0	21/13
99	600	47	53	0	-	27	33	3	20/18
04	480	8	58	33	-	17	50	8	16/17
09	480	25	75	0	80	42	8	38	17/17
<i>Artemisia tridentata vaseyana</i>									
85	4331	9	46	45	666	40	0	14	26/25
91	4198	19	59	22	133	14	0	5	26/32
99	5260	21	60	19	520	4	1	3	35/42
04	4540	8	68	24	240	16	.44	8	29/32
09	4280	11	70	20	120	32	5	14	32/34
<i>Cercocarpus ledifolius</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	33/27
09	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus nauseosus hololeucus</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
99	0	0	0	0	-	0	0	0	-/-
04	220	18	82	0	20	0	0	0	14/25
09	340	6	88	6	-	12	0	6	12/16
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
85	1798	33	67	0	-	0	0	0	5/8
91	2265	79	21	0	-	21	0	3	4/9
99	2120	6	94	0	-	0	0	0	8/11
04	2280	1	98	1	20	0	0	0	9/13
09	2520	7	93	0	-	0	0	0	10/12

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Gutierrezia sarothrae										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	60	0	100	-	-	0	0	0	7/9	
09	0	0	0	-	-	0	0	0	10/13	
Juniperus osteosperma										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	40	100	0	-	-	0	0	0	-/-	
04	40	50	50	-	-	0	0	0	-/-	
09	40	50	50	-	-	0	0	0	-/-	
Mahonia repens										
85	1665	16	84	-	-	0	0	0	3/3	
91	333	100	0	-	533	0	0	0	-/-	
99	2080	25	75	-	-	0	0	0	2/4	
04	1420	14	86	-	20	0	0	0	2/4	
09	2180	11	89	-	-	0	0	0	4/6	
Purshia tridentata										
85	1931	21	76	3	199	45	21	0	19/28	
91	1731	23	15	62	-	23	23	23	9/19	
99	2680	25	74	1	80	14	68	0	21/38	
04	2560	15	80	5	120	13	66	.78	19/40	
09	3140	10	87	3	20	31	43	4	20/38	
Rosa woodsii										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	620	45	55	-	-	0	0	0	11/8	
04	580	52	48	-	-	0	0	0	8/8	
09	760	16	84	-	-	0	0	0	12/15	
Symphoricarpos oreophilus										
85	732	73	27	0	199	0	0	0	9/10	
91	931	43	50	7	-	36	0	0	9/14	
99	580	48	52	0	20	3	0	0	18/22	
04	520	15	69	15	-	0	0	4	14/18	
09	760	39	61	0	-	42	0	3	16/20	
Tetradymia canescens										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	120	0	83	17	-	0	0	0	8/7	
04	280	29	64	7	-	0	7	7	8/12	
09	320	19	81	0	-	13	0	0	13/11	

BOX CANYON SAGE GROUSE - TREND STUDY NO. 16C-42-09

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Substantial Elk Winter, Crucial Sage Grouse

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,400 ft (2,560 m)

Aspect: North

Slope: 5%

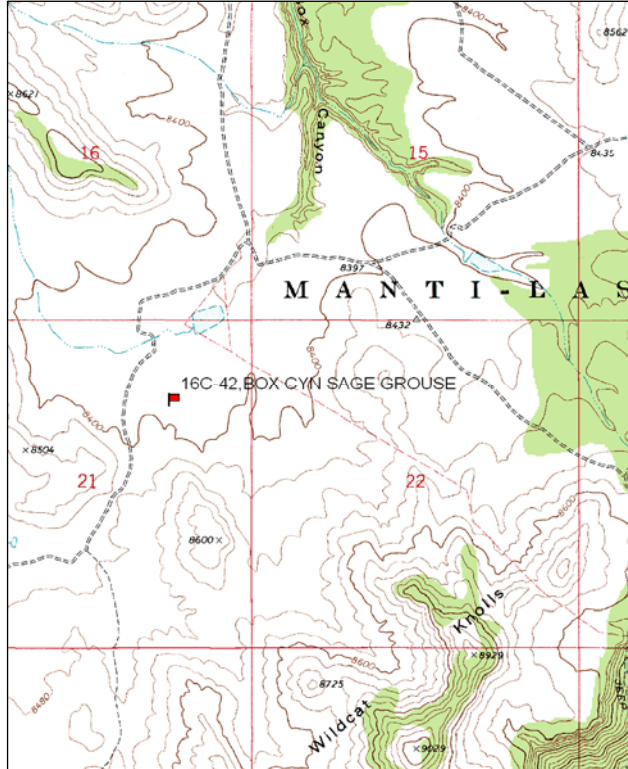
Transect bearing: 185 degrees magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

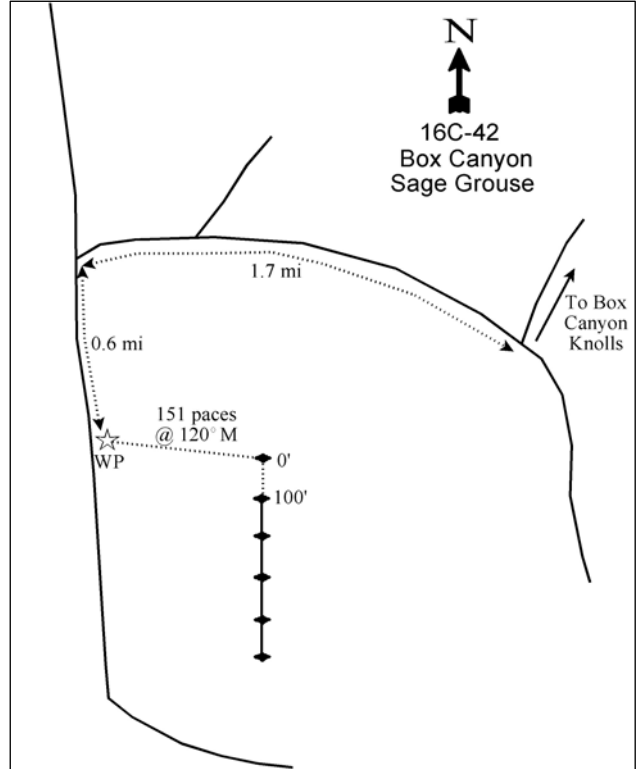
From Center Street in the town of Emery, continue south on Highway 10 for 1.2 miles. Turn right onto a dirt road and go 0.6 miles. Turn left and travel up Link Canyon 7 miles (4WD road) to the top. Stay left at the fork. Continue west for 1.7 miles to another fork. Turn left and head south for 0.6 miles to a witness post on the left hand side of the road. The 0-foot post is 151 paces from the witness post at 120°M and is marked with a blue browse tag, #49.

Map Name: Emery West



Township: 21S, Range: 5E, Section: 21

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 468949 E 4314470 N

BOX CANYON SAGE GROUSE - TREND STUDY NO. 16C-42

Site Information

Site Description: The study was established to monitor sage grouse nesting and brooding habitat. There is an active lek just south of this site. The study samples a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community that sits in a large basin northwest of the Wildcat Knolls. This area is managed by the Forest Service as part of the Emery allotment. The area was treated in Phase I of the Wildcat Knolls Habitat Improvement project ([WRI Project# 1161](#)) in 2008. There were 400 acres of the area that were Dixie harrowed and seeded to enhance sage grouse habitat by increasing forbs throughout the project area, reduce the amount of crested wheat grass (*Agropyron cristatum*) and smooth brome (*Bromus inermis*) monocultures which does not provide species diversity for sage grouse, and to create a diverse age class within sagebrush stands. The Dixie harrow was used in stands of sagebrush that were greater than 20% canopy cover. The seeding and harrowing occurred at the same time. Pellet group data has estimated mostly light use by deer, elk, and cattle since 2004, and sage grouse pellets have been prevalent on the site (Table - Pellet Group Data).

Browse: Mountain big sagebrush is the key browse species on this site. Mountain big sagebrush had a mostly mature stand consisting of fairly large plants at the outset of the study in 2004, but the density and size of mature sagebrush plants was reduced in 2009, after the treatment. The sagebrush population has displayed moderate decadence and moderate poor vigor over the sample years. Utilization of sagebrush was mostly light since 2004 (Table - Browse Characteristics). Other preferred browse that is less abundant includes black sagebrush (*Artemisia nova*) and dwarf rabbitbrush (*Chrysothamnus depressus*).

Herbaceous Understory: The herbaceous understory is dominated by perennial grasses creating a fairly dense ground cover between the sagebrush that has averaged 23% since 2004. Smooth brome is the dominant grass providing over half of the grass cover since 2004. Mutton bluegrass (*Poa fendleriana*), sedge (*Carex sp.*), crested wheatgrass, and Letterman needlegrass (*Stipa lettermani*) are also common. Forbs are very diverse and are moderately abundant on the site. Forb cover increased substantially in 2009 following the treatment, but there was little change in the sum of nested frequency. Several species that are important to sage grouse are located on this site such as common dandelion (*Taraxacum officinale*), hawksbeard (*Crepis acuminata*), penstemon (*Penstemon spp.*), lupine (*Lupinus argenteus*), and milkvetch (*Astragalus spp.*) (Beck and Mitchell 1997) (Table - Herbaceous Trends).

Soil: The soil texture is a sandy clay loam with a neutral pH (Table - Soil Analysis Data). The ground is covered with a high percent of litter and vegetation cover with little bare ground cover exposed (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 treatment that helped to rejuvenate the mountain big sagebrush stand by increasing the age class structure in the population. The treatment reduced mountain big sagebrush canopy cover from 16% to 9%. The treatment also reduced the density of mature sagebrush plants, but the total density of sagebrush increased 15% due to a large increase in the recruitment of young sagebrush plants.

Grass:

- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses. There was a slight change in composition with a significant decrease in the nested frequency of sedge and a significant increase in mutton bluegrass.

Forb:

- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, but cover increased from 4% to 8%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
 Management unit 16C, study no: 42

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	21.1	8.0	5.0	30.0	0.0	7.9	0.0	72.0	Good
09	8.3	9.5	15.0	30.0	0.0	10.0	0.0	72.8	Good

SEED MIX

Management unit 16C, study no: 42

Project name: Wildcat Knolls Habitat Improvement

WRI Database #: 1161

Mix lot #: ser-de-wkhi-09 Size (acre): 1000

Seed type	lbs in mix	lbs/acre
Blue Flax 'Appar'	1000	1.00
Bottlebrush Squirreltail 'Toe Jam'	500	0.50
Cicer Milkvetch 'Lutana'	1000	1.00
Great Basin Wildrye 'Trailhead'	1000	1.00
Rocky Mountain Penstemon 'Bandera'	71	0.07
Prickly Lettuce	137	0.14
Sagebrush, Mountain	500	0.50
Sandberg Bluegrass	1000	1.00
Showy Goldeneye	25	0.03
Slender Wheatgrass 'San Luis'	2027	2.03
Small Burnet 'Delar'	1500	1.50
Utah Sweetvech	249	0.25
Western Wheatgrass 'Arriba'	1000	1.00
Western Yarrow	100	0.10
TOTAL:	10109	10.11

Trend Summary

HERBACEOUS TRENDS--

Management unit 16C, Study no: 42

Type	Species	Nested Frequency		Average Cover %	
		'04	'09	'04	'09
G	Agropyron cristatum	47	76	1.00	1.33
G	Agropyron spicatum	7	8	.07	.04
G	Bromus anomalus	3	-	.03	-
G	Bromus inermis	333	337	12.10	13.48
G	Carex sp.	_b 160	_a 41	2.19	.54
G	Festuca ovina	50	57	.77	.58
G	Poa fendleriana	_a 147	_b 199	4.22	7.12
G	Sitanion hystrix	8	-	.05	-
G	Stipa lettermani	37	73	.87	1.27

Type	Species	Nested Frequency		Average Cover %	
		'04	'09	'04	'09
G	<i>Stipa pinetorum</i>	-	3	-	.15
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		792	794	21.32	24.53
Total for Grasses		792	794	21.32	24.53
F	<i>Androsace septentrionalis</i> (a)	4	-	.04	-
F	<i>Antennaria rosea</i>	58	55	.74	1.91
F	<i>Arabis</i> sp.	6	1	.02	.00
F	<i>Astragalus convallarius</i>	25	34	.20	.36
F	<i>Astragalus</i> sp.	_a 7	_b 26	.07	.43
F	<i>Castilleja linariaefolia</i>	_a 4	_b 23	.04	.19
F	<i>Chaenactis douglasii</i>	6	12	.06	.19
F	<i>Chenopodium</i> sp. (a)	7	11	.01	.02
F	<i>Collinsia parviflora</i> (a)	-	1	-	.03
F	<i>Comandra pallida</i>	6	5	.04	.07
F	<i>Crepis acuminata</i>	4	1	.03	.00
F	<i>Erigeron eatonii</i>	_a 17	_b 46	.07	.76
F	<i>Erigeron pumilus</i>	10	-	.04	-
F	<i>Eriogonum racemosum</i>	61	43	.52	.86
F	<i>Eriogonum umbellatum</i>	14	19	.16	.36
F	<i>Gayophytum ramosissimum</i> (a)	-	1	-	.00
F	<i>Hedysarum boreale</i>	3	1	.06	.03
F	<i>Lupinus argenteus</i>	_a 12	_b 31	.37	1.85
F	<i>Lychnis drummondii</i>	_b 21	_a 1	.14	.00
F	<i>Machaeranthera canescens</i>	2	7	.03	.18
F	<i>Machaeranthera grindelioides</i>	-	6	-	.01
F	<i>Oenothera pallida</i>	11	-	.02	-
F	<i>Orthocarpus luteus</i> (a)	_b 16	_a -	.12	-
F	<i>Penstemon comarrhenus</i>	12	11	.11	.31
F	<i>Penstemon watsonii</i>	_b 12	_a 3	.25	.03
F	<i>Polygonum douglasii</i> (a)	33	17	.06	.03
F	<i>Potentilla</i> sp.	48	39	.81	.24
F	<i>Senecio multilobatus</i>	5	9	.04	.06
F	<i>Sisymbrium altissimum</i> (a)	-	-	-	.00
F	<i>Taraxacum officinale</i>	_b 17	_a -	.10	-
Total for Annual Forbs		60	30	0.24	0.10
Total for Perennial Forbs		361	373	3.97	7.89
Total for Forbs		421	403	4.21	7.99

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

BROWSE TRENDS--

Management unit 16C, Study no: 42

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Artemisia nova	5	1	1.06	.21
B	Artemisia tridentata vaseyana	80	65	15.85	6.41
B	Chrysothamnus depressus	0	0	-	.03
B	Chrysothamnus nauseosus	7	1	.21	.00
B	Chrysothamnus viscidiflorus viscidiflorus	24	31	.81	1.71
B	Symphoricarpos oreophilus	2	0	.03	.03
B	Tetradymia canescens	1	2	.03	.03
Total for Browse		119	100	18.00	8.42

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 42

Species	Percent Cover	
	'04	'09
Artemisia nova	.65	.38
Artemisia tridentata vaseyana	15.98	9.31
Chrysothamnus nauseosus	.35	-
Chrysothamnus viscidiflorus viscidiflorus	.18	.68

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 42

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	1.9	1.1

BASIC COVER--

Management unit 16C, Study no: 42

Cover Type	Average Cover %	
	'04	'09
Vegetation	45.07	44.34
Pavement	.01	0
Litter	55.27	47.02
Cryptogams	.23	.21
Bare Ground	22.39	23.51

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 42, Study Name: Box Canyon Sage Grouse

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.5	6.8	55.4	18.8	25.8	3.1	21	304	1

PELLET GROUP DATA--

Management unit 16C, Study no: 42

Type	Quadrat Frequency		Days use per acre (ha)	
	'04	'09	'04	'09
Rabbit	6	21	-	-
Grouse	4	6	-	139 pellets/acre
Elk	11	10	29 (73)	13 (31)
Deer	8	2	5 (12)	2 (5)
Cattle	8	17	28 (70)	14 (34)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 42

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
04	420	24	48	29	780	0	0	14	15/20
09	40	0	100	0	-	0	100	100	6/10
<i>Artemisia tridentata vaseyana</i>									
04	3580	9	68	23	3680	9	.55	15	30/40
09	4140	40	41	19	500	24	9	16	20/26
<i>Atriplex confertifolia</i>									
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus nauseosus</i>									
04	220	9	91	-	-	0	0	0	16/18
09	20	0	100	-	-	0	0	0	19/17
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
04	1180	5	95	0	180	5	0	0	9/14
09	1520	5	88	7	40	0	0	43	9/12
<i>Symphoricarpos oreophilus</i>									
04	40	100	0	-	-	0	0	0	5/6
09	0	0	0	-	-	0	0	0	17/28
<i>Tetradymia canescens</i>									
04	20	100	0	0	-	0	0	0	7/7
09	60	33	33	33	-	0	33	33	5/6

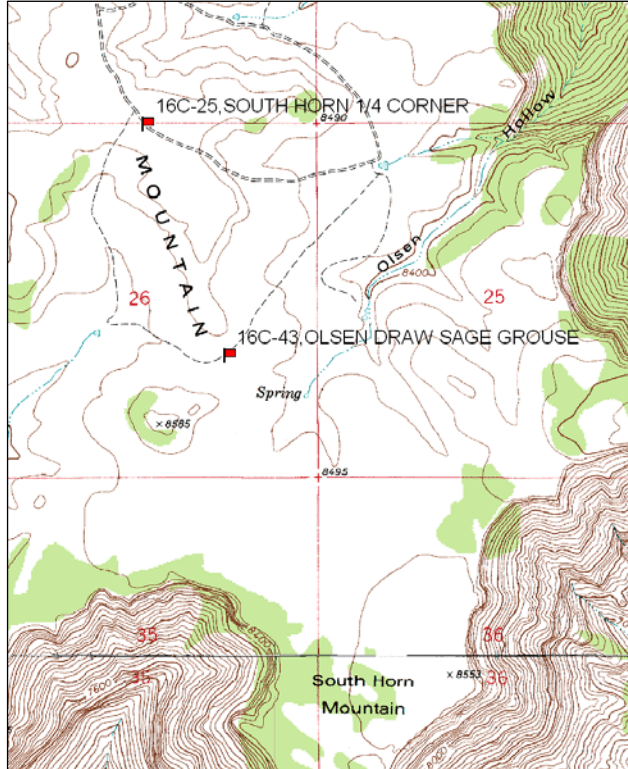
OLSON DRAW SAGE GROUSE - TREND STUDY NO. 16C-43-09

Vegetation Type: Mountain Big Sagebrush-Grass
Range Type: Crucial Deer Winter, Substantial Elk Winter, Crucial Sage Grouse
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,400 ft (2,560 m)
Aspect: Northeast
Slope: 3%-10%
Transect bearing: 200 degrees magnetic
Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

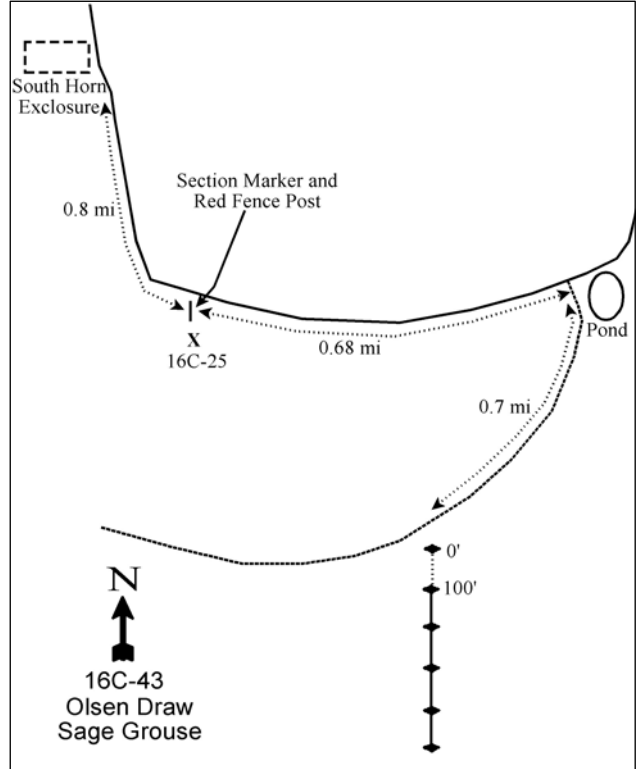
From the South Horn enclosure (by study #16C-24), continue south on the main USGS road for 0.8 miles to a USGS landline marker by a tall red fencepost on the right side of the road. Continue 0.68 miles and turn right before the pond on a two track. There may be a faint road going off to the left, but stay right for 0.7 miles. The site is on the left hand side of the road. Use a GPS unit to get to the beginning of the baseline.

Map Name: The Cap



Township: 19S, Range: 6E, Section: 26

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 481705 E 4331995 N

OLSON DRAW SAGE GROUSE - TREND STUDY NO. 16C-43

Site Information

Site Description: The study was established to monitor sage grouse nesting and brooding habitat that also provides a good area for wintering elk. There is an active lek just southeast of the study site. The study samples a mountain big sagebrush community (*Artemisia tridentata* ssp. *vaseyana*) on South Horn Mountain. This area is part of the Horn Mountain grazing allotment managed by the Forest Service. Pellet group data estimated very heavy elk use in 2004, but more moderate use in 2009. Estimated deer and cattle use has been light since 2004. There has been a moderate number of sage grouse pellet groups encountered on the site since 2004 (Table - Pellet Group Data). Sage grouse pellet groups may have a higher rate of occurrence than pellet group data suggests as many sage grouse pellets occurred in concentrated areas outside of the sample area.

Browse: Mountain big sagebrush is the key browse on this site and provides most of the canopy cover. The only other browse that has any cover of note is stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) (Table - Canopy Cover). The sagebrush population is mostly mature with high amounts of decadence and poor vigor. Recruitment of young sagebrush plants was poor at the outset of the study in 2004, but was good in 2009. Utilization of mountain big sagebrush has been moderate to heavy since 2004. A few Utah serviceberry (*Amelanchier utahensis*) are also on the site in very low numbers (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory has several native perennial grasses creating a fairly dense ground cover between the sagebrush that has averaged 12% since 2004. Salina wildrye (*Elymus salina*) is the dominant grass species providing most of the grass cover with mutton bluegrass (*Poa fendleriana*), western wheatgrass (*Agropyron smithii*), and Indian rice grass (*Oryzopsis hymenoides*) also being common. Forbs are very diverse and fairly abundant accounting for 4% cover since 2004. Several species that are important to sage grouse are located on this site such as Watson's penstemon (*Penstemon watsonii*), hawksbeard (*Crepis acuminata*), clover (*Trifolium sp.*), and milkvetch (*Astragalus spp.*) (Beck and Mitchell 1997) (Table - Herbaceous Trends).

Soil: The soil texture is a sandy clay loam with a neutral pH (Table - Soil Analysis Data). The ground is covered with a moderate amount of litter and vegetation cover, but bare ground cover is also moderately high (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **2004 to 2009 - up (+2):** The density of mountain big sagebrush increased by 27% from 3,480 plants/acre to 4,420 plants/acre, though canopy cover decreased from 17% to 12%. Most of the increase in density was due to a large increase in the recruitment of young plants, though the density of mature plants increased 11% from 1,740 plants/acre to 1,940 plants/acre.

Grass:

- **2004 to 2009 - up (+2):** Perennial grass sum of nested frequency increased by 23% and cover increased from 12% to 14%. There was a significant increase in the nested frequency of the three most prevalent grasses, Salina wildrye, mutton bluegrass, and western wheatgrass.

Forb:

- **2004 to 2009 - down (-2):** Perennial forb sum of nested frequency decreased by 21% and cover decreased from 5% to 3%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 16C, study no: 43

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	20.1	0.6	1.0	23.7	0.0	10.0	0.0	55.4	Fair
09	15.3	3.6	9.5	27.6	0.0	5.9	0.0	61.8	Fair

Trend Summary

HERBACEOUS TRENDS--

Management unit 16C, Study no: 43

Type	Species	Nested Frequency		Average Cover %	
		'04	'09	'04	'09
G	Agropyron smithii	a92	b126	1.27	1.45
G	Agropyron spicatum	7	6	.04	.04
G	Elymus salina	a132	b193	5.01	8.11
G	Koeleria cristata	1	-	.03	-
G	Oryzopsis hymenoides	19	12	.79	.81
G	Poa fendleriana	a106	b150	3.51	3.29
G	Sitanion hystrix	b28	a5	.67	.04
G	Stipa comata	5	3	.04	.03
G	Stipa sp.	b12	a-	.45	-
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		402	495	11.84	13.78
Total for Grasses		402	495	11.84	13.78
F	Arabis sp.	b9	a-	.02	-
F	Astragalus convallarius	12	10	.13	.04
F	Astragalus sp.	5	1	.15	.00
F	Astragalus tenellus	b16	a2	.52	.03
F	Chenopodium album (a)	b69	a-	.20	-
F	Chenopodium leptophyllum(a)	a-	b13	-	.02
F	Collinsia parviflora (a)	1	-	.00	-
F	Comandra pallida	4	3	.03	.03
F	Crepis acuminata	43	30	.80	.18
F	Cryptantha sp.	6	-	.01	-
F	Erigeron eatonii	17	17	.27	.08
F	Erigeron pumilus	1	10	.00	.04
F	Eriogonum racemosum	a10	b17	.29	.16
F	Eriogonum umbellatum	a15	b23	.16	.83
F	Gayophytum ramosissimum(a)	2	-	.01	-
F	Lappula occidentalis (a)	3	-	.01	-
F	Machaeranthera canescens	1	3	.03	.01
F	Penstemon caespitosus	b11	a10	.21	.31
F	Penstemon watsonii	24	26	1.24	.35
F	Phlox austromontana	22	26	.21	.40
F	Polygonum douglasii (a)	b27	a-	.10	-

Type	Species	Nested Frequency		Average Cover %	
		'04	'09	'04	'09
F	Potentilla sp.	12	16	.16	.24
F	Schoenocrambe linifolia	36	30	.18	.10
F	Senecio multilobatus	2	-	.01	-
F	Trifolium sp.	_b 62	_a 21	.64	.10
Total for Annual Forbs		102	13	0.33	0.02
Total for Perennial Forbs		308	245	5.11	2.94
Total for Forbs		410	258	5.45	2.96

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

BROWSE TRENDS--

Management unit 16C, Study no: 43

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Amelanchier utahensis	0	1	-	.00
B	Artemisia tridentata vaseyana	88	90	16.10	12.23
B	Chrysothamnus depressus	1	4	.00	.00
B	Chrysothamnus viscidiflorus viscidiflorus	64	80	3.93	3.25
B	Gutierrezia sarothrae	14	1	.09	.00
B	Pediocactus simpsonii	1	1	.00	.00
B	Symphoricarpos oreophilus	1	1	.00	.00
B	Tetradymia canescens	1	1	.00	.00
Total for Browse		170	179	20.12	15.49

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 43

Species	Percent Cover	
	'04	'09
Artemisia tridentata vaseyana	16.56	12.39
Chrysothamnus depressus	-	.13
Chrysothamnus viscidiflorus viscidiflorus	5.05	4.15

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 43

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	1.9	0.9

BASIC COVER--

Management unit 16C, Study no: 43

Cover Type	Average Cover %	
	'04	'09
Vegetation	33.25	30.86
Rock	.14	.49
Pavement	1.16	.63
Litter	44.95	46.07
Cryptogams	.22	.46
Bare Ground	35.24	34.84

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 43, Study Name: Olsen Draw Sage Grouse

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10.4	7.1	61.3	15.2	23.6	2	14.3	249.6	0.8

PELLET GROUP DATA--

Management unit 16C, Study no: 43

Type	Quadrat Frequency		Days use per acre (ha)	
	'04	'09	'04	'09
Rabbit	5	20	-	-
Grouse	-	2	-	44 pellets/acre
Elk	42	59	137 (337)	29 (71)
Deer	4	7	4 (10)	5 (13)
Cattle	1	7	4 (11)	1 (2)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 43

		Age class distribution					Utilization		
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
04	0	0	0	-	-	0	0	0	4/11
09	20	0	100	-	-	0	0	100	23/27
Artemisia tridentata vaseyana									
04	3480	2	50	48	15700	35	37	24	24/34
09	4420	19	44	38	1740	31	36	26	20/32
Chrysothamnus depressus									
04	20	0	100	-	-	0	0	0	5/9
09	400	0	100	-	-	25	20	15	7/12
Chrysothamnus viscidiflorus viscidiflorus									
04	3800	1	99	0	80	0	0	0	9/13
09	5540	10	86	5	20	2	0	8	6/11

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Gutierrezia sarothrae</i>										
04	720	0	100	-	60	0	0	0	6/10	
09	20	0	100	-	-	0	0	0	7/16	
<i>Pediocactus simpsonii</i>										
04	20	0	100	-	-	0	0	0	2/3	
09	20	0	100	-	-	0	0	0	2/3	
<i>Symphoricarpos oreophilus</i>										
04	20	0	100	-	-	0	0	0	-/-	
09	20	0	100	-	-	0	0	0	17/22	
<i>Tetradymia canescens</i>										
04	20	0	100	-	-	0	0	0	5/8	
09	20	0	100	-	-	0	0	0	5/7	

NORTH HORN - TREND STUDY NO. 16C-44-09

Vegetation Type: True Mountain Mahogany

Range Type: Crucial Deer Summer, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,770 ft (2,673 m)

Aspect: Southwest

Slope: 15%

Transect bearing: 0'-100' (196°M), 100'-200' (279°M), 200'-300' (300°M), 300'-400' (319°M), and 400'-500' (299°M)

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

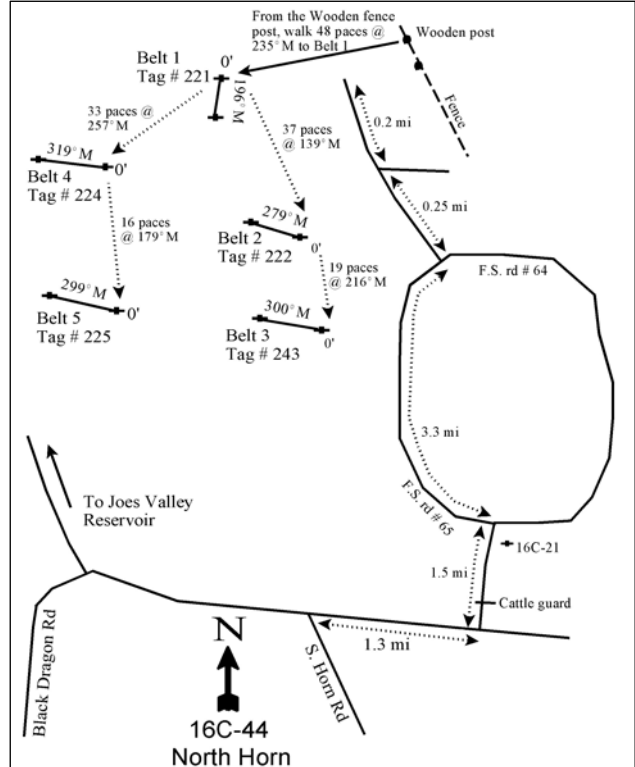
Directions:

Starting on the southwest side of Joes Valley Reservoir, follow the main road up North Dragon Creek to a three-way fork at the upper end. Bear left and follow the main road about 4.0 miles to an intersection. From the intersection of the North Horn and South Horn roads, continue on the North Horn road towards the Emery County TV towers for 1.3 miles to a fork. Turn left (north) towards The Cap and go 1.5 miles to an intersection. Turn left and drive 3.3 miles to a fork on the left (NW). Turn left and drive 0.25 miles to a fork on the right. Stay left and drive 0.2 miles to the top of the hill. The fence line on the east has a 20 foot section of wooden posts. From the wooden posts, walk 48 feet at 235°M to the 0' stake for belt 1. Belt 1 is marked with browse tag# 221.

Map Name: Ferron Canyon



Diagrammatic Sketch:



Township: 18S, Range: 6E, Section: 21

GPS: NAD 83, UTM 12S 478339 E 4343611 N

NORTH HORN - TREND STUDY NO. 16C-44

Site Information

Site Description: The study is located southeast of Joe's Valley Reservoir on the Manti-LaSal Forest. The area is managed by the Forest Service as part of the Horn Mountain allotment. The site and surrounding area were contour trenched in the past to slow down erosion and encourage establishment of herbaceous species within the contours. This study was established to monitor true mountain mahogany (*Cercocarpus montanus*) health and the possibility of declining vigor due to heavy use. Elk tend to use this area for as long as possible before snowfall pushes them to lower elevations. All five transect belts were placed in the most dense mahogany patches and each patch was about one acre in size. Pellet group data has estimated light use by elk, deer, and cattle since 2005 (Table - Pellet Group Data).

Browse: The key browse is true mountain mahogany which provides most of the canopy cover on the study area with an average cover of 33% since 2005 (Table - Canopy Cover). The mountain mahogany population is comprised mostly of three foot tall mature plants with low decadence and good recruitment of young plants. Mahogany plants displaying poor vigor were low in 2005, but increased to moderate rates in 2009. Utilization of true mountain mahogany has been heavy since 2005. Other important browse species, but less abundant are: Utah serviceberry (*Amelanchier utahensis*), black sagebrush (*Artemisia nova*), mountain big sagebrush (*A. tridentata* ssp. *vaseyana*), and winterfat (*Ceratoides lanata*) (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is dominated by perennial grasses and forbs. Perennial grasses have averaged 13% cover and forbs have averaged 3% since 2005. The two grasses that dominated the understory are Salina wildrye (*Elymus salina*) and a sedge (*Carex* sp.). Other grasses include: crested wheatgrass (*Agropyron cristatum*), smooth brome (*Elymus salina*), Indian ricegrass (*Oryzopsis hymenoides*), and Sandberg bluegrass (*Poa secunda*). The most common forbs are fineleaf hymenopappus (*Hymenopappus filifolius*) and gumweed aster (*Machaeranthera grindelioides*) (Table - Herbaceous Trends).

Soil: The light-brown soil becomes lighter in color with increasing depths and correspondingly larger amounts of calcium carbonate. The soils are clay with a neutral pH. Phosphorus has a limited availability for plant growth and development at 2.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Large boulders, stones, and gravel are common on the soil surface and throughout the profile. There is a high amount of rock and pavement cover and bare ground cover is low on the site (Table - Basic Cover). The soil erosion condition was classified as stable in 2009.

Trend Assessments

Browse:

- **2005 to 2009 - stable (0):** There was little change in the density or cover of true mountain mahogany. Decadence of mahogany increased from 5% to 18% and poor vigor increased from 0% to 21%. Recruitment of young mahogany plants decreased from 30% to 12%, but is still considered good.

Grass:

- **2005 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, but cover increased from 12% to 13%.

Forb:

- **2005 to 2009 - stable (0):** Perennial forbs sum of nested frequency changed little, though cover decreased from 4% to 3%.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --

Management unit 16C, study no: 44

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
05	30.0	13.5	15.0	23.2	0.0	8.3	0.0	90.1	Good-Excellent
09	30.0	9.6	6.0	26.9	0.0	5.4	0.0	77.9	Good

Trend Summary

HERBACEOUS TRENDS--

Management unit 16C, Study no: 44

Type	Species	Nested Frequency		Average Cover %	
		'05	'09	'05	'09
G	Agropyron cristatum	3	3	.03	.03
G	Bromus inermis	4	5	.15	.03
G	Carex sp.	99	79	2.99	1.82
G	Elymus salina	196	205	8.25	11.38
G	Oryzopsis hymenoides	10	5	.19	.18
G	Poa secunda	2	2	.00	.01
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		314	299	11.62	13.46
Total for Grasses		314	299	11.62	13.46
F	Arabis sp.	6	-	.01	-
F	Arenaria sp.	67	59	.64	.54
F	Comandra pallida	_b 27	_a 18	.22	.05
F	Draba sp. (a)	1	-	.00	-
F	Eriogonum alatum	_b 14	_a 13	.12	.02
F	Hedysarum boreale	4	13	.45	.22
F	Hymenopappus filifolius	_b 82	_a 76	1.23	.49
F	Hymenoxys acaulis	2	-	.03	-
F	Lesquerella sp.	12	18	.03	.03
F	Leucelene ericoides	2	-	.03	-
F	Linum lewisii	1	-	.00	-
F	Machaeranthera grindelioides	78	82	1.05	.89
F	Pedicularis centranthera	1	-	.00	-
F	Penstemon caespitosus	19	31	.16	.30
F	Phlox hoodii	25	18	.18	.09
F	Phlox longifolia	-	1	-	.03
Total for Annual Forbs		1	0	0.00	0
Total for Perennial Forbs		340	329	4.17	2.68
Total for Forbs		341	329	4.18	2.68

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

BROWSE TRENDS--

Management unit 16C, Study no: 44

Type	Species	Strip Frequency		Average Cover %	
		'05	'09	'05	'09
B	Amelanchier utahensis	1	1	.00	.00
B	Artemisia nova	4	2	.00	-.00
B	Ceratoides lanata	0	0	.03	-
B	Cercocarpus montanus	77	76	26.14	23.25
B	Chrysothamnus depressus	1	0	.00	-
B	Chrysothamnus nauseosus	2	8	.15	.04
B	Chrysothamnus parryi	25	17	1.32	.80
B	Chrysothamnus viscidiflorus viscidiflorus	3	6	.00	.01
B	Eriogonum corymbosum	43	46	.42	.64
B	Gutierrezia sarothrae	54	53	.48	.41
B	Mahonia repens	2	1	.00	.00
B	Pinus flexilis	3	4	.18	.39
B	Pseudotsuga menziesii	1	0	.15	-
B	Symphoricarpos oreophilus	6	5	.45	.21
B	Tetradymia canescens	9	9	.18	.07
Total for Browse		231	228	29.54	25.84

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 44

Species	Percent Cover	
	'05	'09
Artemisia nova	-	.16
Cercocarpus montanus	33.16	33.61
Chrysothamnus nauseosus	.11	.05
Chrysothamnus parryi	.81	.61
Chrysothamnus viscidiflorus viscidiflorus	-	.05
Eriogonum corymbosum	1.36	1.06
Gutierrezia sarothrae	1.31	1.16
Mahonia repens	.03	-
Pinus flexilis	.36	.60
Symphoricarpos oreophilus	.25	.21
Tetradymia canescens	.01	.05

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16C, Study no: 44

Species	Average leader growth (in)	
	'05	'09
Cercocarpus montanus	8.2	3.9

BASIC COVER--

Management unit 16C, Study no: 44

Cover Type	Average Cover %	
	'05	'09
Vegetation	38.55	39.93
Rock	9.71	7.80
Pavement	14.63	8.75
Litter	28.38	36.04
Cryptogams	.02	.01
Bare Ground	24.32	24.85

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 44, Study Name: North Horn

Effective rooting depth (in)	pH	clay			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.4	7.4	26	30.2	43.8	1.9	2.5	67.2	0.5

PELLET GROUP DATA--

Management unit 16C, Study no: 44

Type	Quadrat Frequency		Days use per acre (ha)	
	'05	'09	'05	'09
Rabbit	8	10	-	-
Elk	4	4	17 (41)	17 (43)
Deer	7	1	17 (43)	9 (23)
Cattle	3	4	2 (5)	9 (23)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 44

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
05	20	0	100	-	40	100	0	0	53/54
09	20	0	100	-	-	0	0	0	50/54
Artemisia nova									
05	100	0	100	-	-	0	0	0	11/20
09	60	0	100	-	20	0	0	0	11/18
Artemisia tridentata vaseyana									
05	0	0	0	-	-	0	0	0	16/26
09	0	0	0	-	-	0	0	0	17/23
Atriplex confertifolia									
05	0	0	0	-	-	0	0	0	4/7
09	0	0	0	-	-	0	0	0	-/-
Ceratoides lanata									
05	0	0	0	-	-	0	0	0	4/4
09	0	0	0	-	-	0	0	0	4/7

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Cercocarpus montanus									
05	3120	30	65	5	800	32	47	0	37/48
09	3020	12	70	18	160	30	42	21	32/46
Chrysothamnus depressus									
05	40	0	100	-	-	0	100	0	2/6
09	0	0	0	-	-	0	0	0	-/-
Chrysothamnus nauseosus									
05	40	0	100	-	-	0	0	0	9/12
09	220	9	91	-	-	0	0	0	4/10
Chrysothamnus parryi									
05	1340	9	91	-	-	24	12	0	8/13
09	880	0	100	-	-	5	0	0	6/12
Chrysothamnus viscidiflorus viscidiflorus									
05	80	0	100	0	-	0	25	0	4/6
09	160	25	63	13	-	0	0	38	3/8
Eriogonum corymbosum									
05	1440	29	71	0	20	21	4	0	8/12
09	1520	5	92	3	20	14	3	1	6/11
Gutierrezia sarothrae									
05	3080	8	92	-	120	0	0	0	7/7
09	3180	1	99	-	-	0	0	1	5/6
Mahonia repens									
05	460	0	100	-	-	0	0	0	1/2
09	20	100	0	-	240	0	0	0	-/-
Pinus flexilis									
05	60	67	33	-	20	0	0	0	-/-
09	80	25	75	-	-	0	0	0	-/-
Pseudotsuga menziesii									
05	20	100	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
Rosa woodsii									
05	0	0	0	-	-	0	0	0	10/13
09	0	0	0	-	-	0	0	0	-/-
Symphoricarpos oreophilus									
05	160	13	88	-	-	0	0	0	9/17
09	160	25	75	-	-	0	0	25	11/24
Tetradymia canescens									
05	480	25	71	4	-	8	21	0	7/12
09	340	0	88	12	-	0	0	29	6/8

SCAD VALLEY - TREND STUDY NO. 16R-5-09

Vegetation Type: Wet Meadow

Range Type: Crucial Deer Summer, Substantial Elk Summer

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,700 ft (2,652 m)

Aspect: East

Slope: 3%

Transect bearing: 190 degrees magnetic

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

Directions:

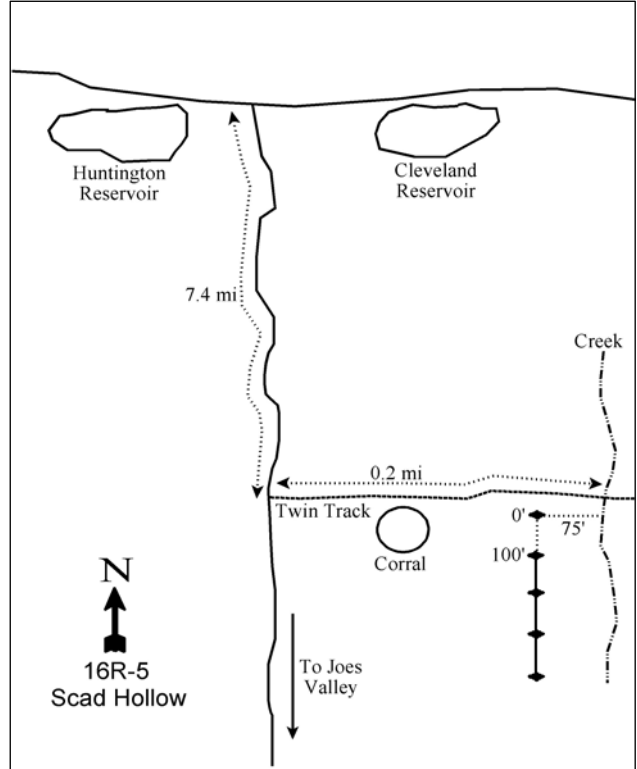
On State Route 31 turn south between Huntington Reservoir and Cleveland Reservoir. Travel 7.4 miles toward Joe's Valley. There will be a twin track on the left hand side. Turn onto this and drive 0.2 miles to the creek. Walk 75 feet west of the creek to the beginning of the frequency baseline. The 0-foot stake is marked with browse tag #455.

Map Name: Rilda Canyon



Township: 15S, Range: 6E, Section: 22

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 4795508 E 4372085 N

SCAD VALLEY - TREND STUDY NO. 16R-5

Site Information

Site Description: The study was established to monitor sheep use where old sheep corrals were removed by the Forest Service and new corrals were built away from the riparian area. This area is part of the Horse Creek grazing allotment managed by the Forest Service. The study samples a meadow community approximately 75 feet from Scad Valley Creek. Pellet group data estimated light use by sheep in 1998 and 2009, with more moderate use in 2004. Sheep were located on the site during the 2004 data collection. Light use by elk, deer and horses was also sampled in 2009 (Table - Pellet Group Data).

Browse: Browse species are not particularly abundant on this riparian site. Silver sagebrush (*Artemisia cana*) is the key browse on this site and represents almost all of the browse cover (Table - Browse Trends). The silver sagebrush population has had a steady increase in density since 1998. The sagebrush plants in the population are mostly mature with low decadence and good vigor. Recruitment of young sagebrush plants has steadily decreased since 1998 as the population has matured. Utilization of the sagebrush has been mostly light since 1998. A few mountain big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) are on the site, although in very low numbers (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory account for the majority of the vegetation cover. Perennial grasses have provided an average of 27% cover since 1998, and perennial forbs have provided an average of 41% cover over the same period. Kentucky bluegrass (*Poa pratensis*) is the dominant grass providing over half of the grass cover since 1998. Other common perennial grasses and grass-like plants include sedge (*Carex* spp.), tufted hair-grass (*Deschampsia caespitosa*), and Baltic rush (*Juncus balticus*). Forbs are diverse with some of the common species being cinquefoil (*Potentilla* spp.), common dandelion (*Taraxacum officinale*), aster (*Aster* sp.), a thistle (*Cirsium* sp.), orange sneezeweed (*Helenium hoopesii*), yarrow (*Achillea millefolium*), and false dandelion (*Agoseris* sp.) (Table - Herbaceous Trends).

Soil: The soil texture is a loam with a slightly acidic pH. Phosphorus and potassium have limited availability for plant growth and development at 5.9 ppm and 3.2 ppm, respectively (Tiedemann and Lopez 2004). Organic matter is fairly high at 5.1% (Table - Soil Analysis Data). The ground is covered with a high amount vegetation cover with little bare ground cover exposed (Table - Basic Cover). Bare ground that is exposed is mostly due to gopher activity. The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1998 to 2004 - up (+2):** Density of silver sagebrush increased by 44% from 2,980 plants/acre to 4,300 plants/acre, though cover decreased slightly. The population is maturing with a decrease in the recruitment of young plants from 44% of the population to 10%.
- **2004 to 2009 - up (+2):** Silver sagebrush density increased by 33% to 5,720 plants/acre and cover increased from 3% to 6%. Recruitment of young plants continued to decrease to just 2% of the population.

Grass:

- **1998 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 11%, but cover increased from 24% to 28%.
- **2004 to 2009 - up (+2):** Perennial grass sum of nested frequency increased by 24% and cover increased to 29%.

Forb:

- **1998 to 2004 - stable (0):** Perennial forb sum of nested frequency and cover changed little.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs.

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 5

T y P e	Species	Nested Frequency			Average Cover %		
		'98	'04	'09	'98	'04	'09
G	Agropyron trachycaulum	a11	a13	b42	.08	.18	.42
G	Bromus tectorum (a)	-	-	2	-	-	.00
G	Carex sp.	b140	a77	b179	3.26	3.29	6.65
G	Deschampsia caespitosa	b114	a80	ab83	.93	2.69	2.05
G	Festuca ovina	ab19	a3	b33	1.97	.03	.48
G	Hordeum brachyantherum	-	5	6	-	.15	.01
G	Juncus balticus	109	105	135	1.20	2.87	2.65
G	Koeleria cristata	-	-	3	-	-	.00
G	Muhlenbergia sp.	8	-	9	.30	-	.09
G	Phleum alpinum	-	6	-	-	.06	-
G	Phleum pratense	b16	a3	a-	.06	.03	-
G	Poa pratensis	389	425	370	16.33	17.96	15.46
G	Stipa columbiana	a10	a7	b38	.10	.24	.68
Total for Annual Grasses		0	0	2	0	0	0.00
Total for Perennial Grasses		816	724	898	24.27	27.53	28.53
Total for Grasses		816	724	900	24.27	27.53	28.53
F	Achillea millefolium	254	225	235	3.13	3.57	3.51
F	Agoseris sp.	a-	b94	b108	-	2.62	6.04
F	Antennaria rosea	11	11	14	.56	.33	.20
F	Arabis sp.	-	3	-	-	.00	-
F	Aster sp.	b181	b196	a84	3.42	5.24	1.40
F	Cirsium sp.	b159	a110	b169	6.72	5.94	7.77
F	Erigeron pumilus	-	1	11	-	.00	.16
F	Erigeron sp.	-	-	26	-	-	.72
F	Fragaria virginiana	a-	a5	b87	-	.06	3.02
F	Helenium hoopesii	90	73	90	5.19	2.82	2.11
F	Polygonum douglasii (a)	-	4	5	-	.00	.01
F	Potentilla gracilis	a-	b52	a-	-	1.66	-
F	Potentilla sp.	210	200	197	11.37	11.27	10.14
F	Taraxacum officinale	307	236	225	7.90	6.70	5.84
F	Trifolium sp.	b97	a91	a95	1.12	.75	.39
F	Viola sp.	-	-	2	-	-	.03
Total for Annual Forbs		0	4	5	0	0.00	0.00
Total for Perennial Forbs		1309	1297	1343	39.44	40.99	41.38
Total for Forbs		1309	1301	1348	39.44	41.00	41.38

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

BROWSE TRENDS--

Management unit 16R, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'98	'04	'09	'98	'04	'09
B	Artemisia cana	29	36	37	3.74	2.54	6.32
B	Artemisia tridentata vaseyana	0	0	1	-	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	3	-	.00	.03
Total for Browse		29	37	41	3.74	2.54	6.38

CANOPY COVER, LINE INTERCEPT--

Management unit 16R, Study no: 5

Species	Percent Cover	
	'04	'09
Artemisia cana	6.05	9.36
Artemisia tridentata vaseyana	-	.23

BASIC COVER--

Management unit 16R, Study no: 5

Cover Type	Average Cover %		
	'98	'04	'09
Vegetation	81.47	72.86	68.49
Rock	0	.01	.00
Pavement	.03	.00	.02
Litter	2.58	7.30	14.51
Cryptogams	6.65	4.98	.41
Bare Ground	7.73	21.65	21.63

SOIL ANALYSIS DATA --

Management unit 16R, Study no: 5, Study Name: Scad Valley

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
33.5	6.3	44.7	28.7	26.6	5.1	5.9	3.2	0.5

PELLET GROUP DATA--

Management unit 16R, Study no: 5

Type	Quadrat Frequency			Days use per acre (ha)		
	'98	'04	'09	'98	'04	'09
Sheep	6	10	2	11 (28)	33 (81)	16 (40)
Horse	-	-	2	-	-	4 (10)
Deer	-	-	1	-	-	3 (7)
Cattle	-	1	-	-	-	-

BROWSE CHARACTERISTICS--
 Management unit 16R, 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)	
<i>Artemisia cana</i>										
98	2980	44	56	0	820	0	0	0	14/16	
04	4300	10	87	3	-	3	0	0	13/20	
09	5720	2	84	14	20	5	0	2	14/19	
<i>Artemisia tridentata vaseyana</i>										
98	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	16/34	
09	20	0	100	-	-	0	0	0	15/23	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
98	0	0	0	-	-	0	0	0	-/-	
04	20	0	100	-	-	0	0	0	-/-	
09	60	0	100	-	-	0	0	0	10/14	
<i>Potentilla fruticosa</i>										
98	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	12/41	
09	0	0	0	-	-	0	0	0	11/27	

SUMMARY
WILDLIFE MANAGEMENT UNIT 16C - CENTRAL MOUNTAINS, MANTI SOUTH

Community Types

There were twenty nine Range Trend studies sampled in WMU 16C during the summer of 2009. Eight studies [Red Point (16C-14), Howard FS Chaining (16C-15), Middle Mountain (16C-17), Dry Mountain (16C-26), Birch Creek Chaining (16C-27), South of Dry Wash (16C-28), Danish Bench (16C-36) and Cedar Mountain (16C-40)] sample areas that had been chained and seeded in the past to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). All of these sites are considered to be within crucial deer winter habitat and substantial elk winter habitat.

Nine studies [East Mountain (16C-18), Miles Point (16C-20), North Horn-Rock Canyon (16C-22), Black Dragon (16C-23), South Horn 1/4 Exclosure (16C-25), Muddy Creek (16C-32), Wildcat Knolls (16C-35), Box Canyon Sage Grouse (16C-42) and Olson Draw Sage Grouse (16C-43)] sample mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) communities, one study [Little Nelson Mountain (16C-33)] samples a Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*) community, and two studies [Box Canyon Knolls (16C-31) and South Sage Flat (16C-34)] sample black sagebrush (*A. nova*) communities. All of the studies in sagebrush communities are considered to be within crucial deer winter habitat and substantial elk winter habitat.

Six study sites [Trail Mountain Exclosure (16C-19), South Horn Exclosure (16C-24), Upper Hole Trail (16C-30), Joes Valley Overlook (16C-37), Trough Hollow (16C-41) and North Horn (16C-44)] sample mixed mountain brush communities. All six of these studies are considered to be substantial elk winter habitat, five of these studies (16C-19, 16C-24, 16C-30, 16C-37 and 16C-41) are within crucial deer winter habitat and one study (16C-44) is with crucial deer summer habitat. Two studies [West Huntington Canyon (16C-13) and Scab Hollow (16C-29)] sample curleef mountain mahogany (*Cercocarpus ledifolius*). Both studies are within crucial deer winter habitat, but West Huntington Canyon is within crucial elk summer habitat and Scab hollow is within substantial elk winter habitat. One study [Scad Hollow (16R-5)] samples a wet meadow that is considered to be crucial deer summer habitat and substantial elk summer habitat.

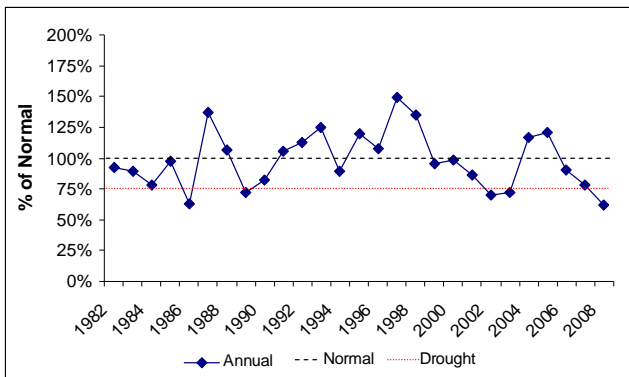


Figure 1. Percent annual precipitation based on the 27 year mean precipitation for WMU 16C, Central Mountains, Manti South. Precipitation data were collected at the Salina 24 E, Ferron and Castle Dale weather stations (Utah Climate Summary 2009).

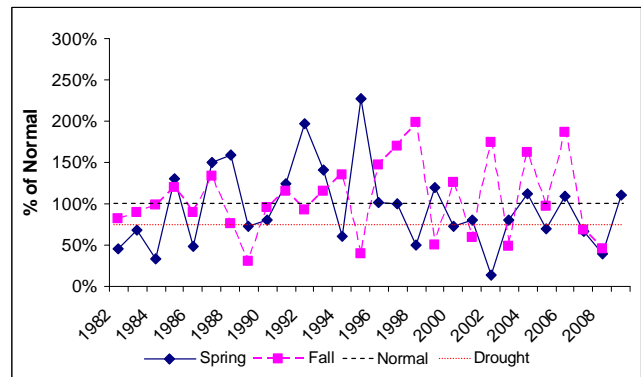


Figure 2. Percent annual precipitation based on the 27 year mean for spring (March-May) and fall (Sept.-Nov.) precipitation for WMU 16C, Central Mountains, Manti South. Precipitation data were collected at the Salina 24 E, Ferron and Castle Dale weather stations (Utah Climate Summary 2009).

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation data from this herd unit were compiled from the Salina 24 E, Ferron and Castle Dale weather stations (Figures 1 and 2). The units 27 year annual mean was 9.85 inches, the 28 year spring (March to May) mean was 2.20 inches, and the 27 year fall (Sept. to Nov.) mean was 2.82 inches. The unit annual precipitation was below 75% of the normal

annual mean (drought conditions) in 1986, 1989, 2002, 2003 and 2008 (Figure 1). Spring precipitation was below 75% of normal in 1982, 1983, 1984, 1986, 1989, 1994, 1998, 2000, 2002, 2005, 2007 and 2008 (Figure 2). Fall precipitation was below 75% of normal in 1989, 1995, 1999, 2001, 2003, 2007 and 2008 (Figure 2) (Utah Climate Summary 2009).

Browse

The median browse trend (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 the most common species sampled and was sampled at 21 study sites in the unit. The mean density of mountain big sagebrush remained relatively similar from 1994 to 2004 then increased significantly from 2004 to 2009 (Figure 3a). Much of the increase in density is due to an increase in the recruitment of young plants in many of the studies. This is reflected in the mean cover trend as there was little change in mountain big sagebrush cover between 2004 and 2009. There was, however, a significant increase in cover early in the study from 1994 to 1999 (Figure 3b). The mean population decadence of mountain big sagebrush was moderately low since 1994, but did increase significantly from the low of 19% in 1999 to the high of 25% in 2004 (Figure 3c).

Wyoming big sagebrush was sampled on only three sites in the unit: 16C-15, 16C-32 and 16C-33. The mean density and cover of Wyoming big decreased significantly from 1999 to 2004 with a large die-off that occurred throughout the area during that time.

Density of the Wyoming big sagebrush population increased again in 2009 (Figure 3a) primarily due to an increase in young plants as there was little change in cover (Figure 3b). The mean population decadence of Wyoming big sagebrush reflected the large die-off with a significant increase from 1999 to 2004. Decadence decreased significantly again in 2009 to more moderate levels (Figure 3c).

Black sagebrush was sampled on 16 studies in the unit. The mean density of black sagebrush also decreased significantly from 1999 to 2004, but increased significantly in 2009 (Figure 3a) due to a good recruitment of young plants. The mean cover of black sagebrush also decreased significantly from 1999 to 2004, but because young plants provide little cover, the cover of black sagebrush changed little from 2004 to 2009 (Figure 3b). The mean decadence of black sagebrush has fluctuated throughout the sample years from a high of 19% in 2004 to a low of 10% in 2009 (Figure 3c).

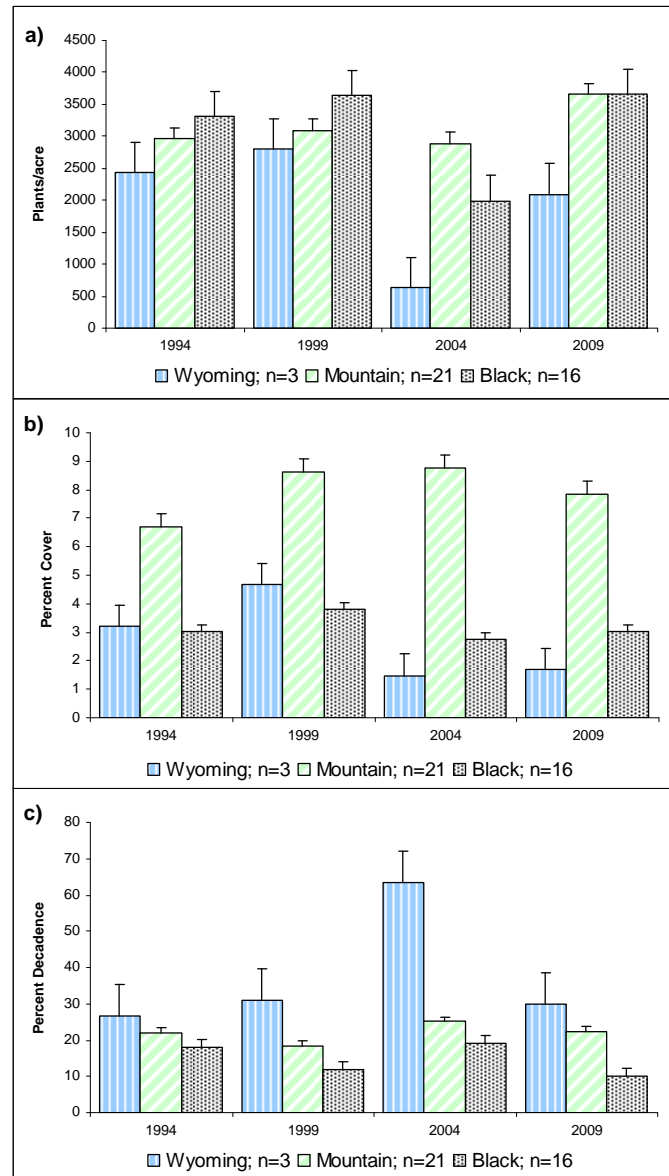


Figure 3. a) Mean density of sagebrush (*Artemisia* spp.) by year for WMU 16C, Central Mountains, Manti South. b) Mean cover of sagebrush by year for WMU 16C. c) Mean population decadence of sagebrush by year for WMU 16C.

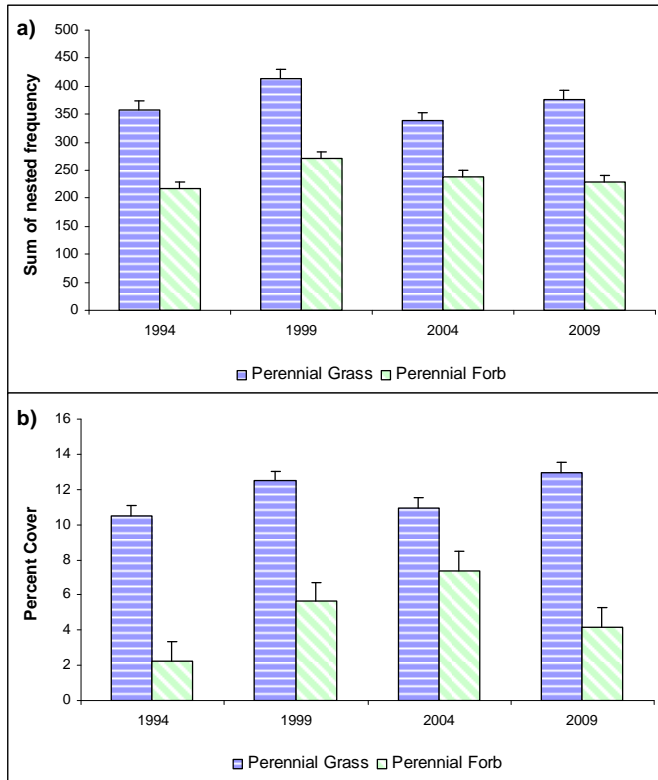


Figure 4. a) Mean perennial grass and perennial forb sum of nested frequency by year for WMU 16C, Central Mountains, Manti South. b) Mean perennial grass and perennial forb cover by year for WMU 16C.

Herbaceous Understory

The median grass trend (Figure 5). The mean perennial grass sum of nested frequency has fluctuated over the sample years with 1999 being significantly higher than all other sample years and 2004 being significantly lower than 1999 and 2009 (Figure 4a). The mean cover of perennial grass showed a similar trend, though cover was highest in 2009 and lowest in 1994 (Figure 4b). Cheatgrass (*Bromus tectorum*) was sampled on only a few studies at very low frequency and cover and was therefore not included in the unit summary.

The median forb trend (Figure 5). The mean perennial forb sum of nested frequency was similar in 1994, 2004, and 2009, but was significantly higher than all other sample years in 1999 (Figure 4a). The mean cover of perennial forbs increased significantly from 1994 to 1999, then increased again from 1999 to 2004, though not significantly, but decreased significantly from 2004 to 2009 (Figure 4b). No noxious weeds were sampled on the studies in this herd unit.

Desirable Components Index

Five of the studies that sample deer winter habitat, 16C-22, 16C-32, 16C-33, 16C-36, and 16C-40, are considered to be within the low potential scale for the deer Desirable Components Index (DCI). The mean DCI ranking for these studies has remained relatively stable at Fair over the sample years (Figure 6 and Table 1).

Nineteen studies, 16C-13, 16C-14, 16C-15, 16C-17, 16C-18, 16C-20, 16C-23, 16C-24, 16C-25, 16C-26, 16C-27, 16C-28, 16C-29, 16C-31, 16C-34, 16C-35, 16C-41, 16C-42 and 16C-43, are considered to be within the mid-level potential scale for the deer DCI on this unit. The mean mid-level potential DCI ranking of the unit increased from poor-fair to fair-good from 1994 to 1999 then decreased to fair in 2004 and 2009 (Figure 6 and Table 2).

Three studies, 16C-19, 16C-30 and 16C-44, are considered to be within the high potential scale for the deer DCI on this unit. There was little change in the mean high potential DCI ranking and scores remained similar over the sample years with a ranking of 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
94	10.2	6.4	1.6	15.1	0.0	1.4	0.0	34.6	Fair
99	8.8	3.5	3.8	21.2	-0.1	2.8	0.0	40.1	Fair
04	9.3	6.3	2.0	15.6	0.0	4.6	0.0	37.7	Fair
09	8.0	5.7	7.5	19.8	-0.1	1.2	0.0	42.2	Fair

Table 1. Low potential scale mean deer DCI scores (n=7) by year for WMU 16C, Central Mountains, Manti South. The deer DCI scores are divided into three categories based on ecological potentials which include 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	12.4	6.9	4.2	20.9	0.0	3.7	0.0	48.1	Poor-Fair
99	17.3	10.6	8.8	22.6	0.0	5.7	0.0	65.0	Fair-Good
04	16.2	7.7	4.9	20.0	0.0	4.7	0.0	53.5	Fair
09	15.3	9.5	8.6	20.4	0.0	4.5	0.0	58.2	Fair

Table 2. Mid-level potential scale mean deer DCI scores (n=17) by year for WMU 16C, Central Mountains, Manti South. The deer DCI scores are divided into three categories based on ecological potentials which include 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	25.8	11.5	8.7	18.2	0.0	10.0	0.0	74.2	Good
99	26.8	12.2	13.7	17.5	0.0	10.0	0.0	80.2	Good
04	26.7	12.5	12.7	20.2	0.0	9.4	0.0	81.6	Good
09	27.6	11.5	8.7	20.0	0.0	8.5	0.0	76.3	Good

Table 3. High potential scale mean deer DCI scores (n=3) by year for WMU 16C, Central Mountains, Manti South. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

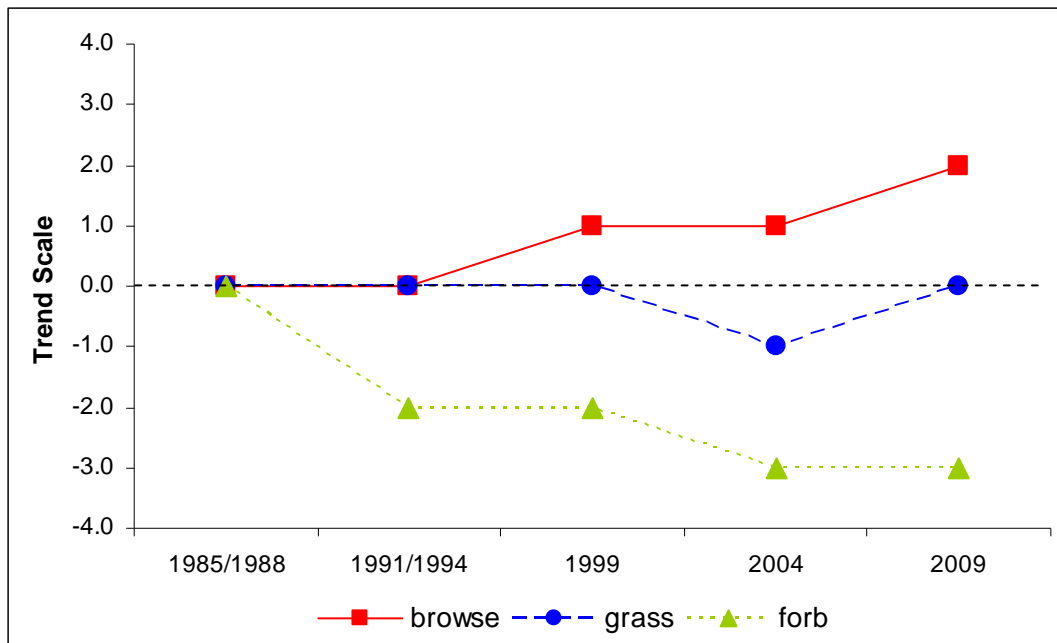


Figure 5. Cumulative median browse, grass and forb trends by year for WMU 16C, Central Mountains, Manti South.

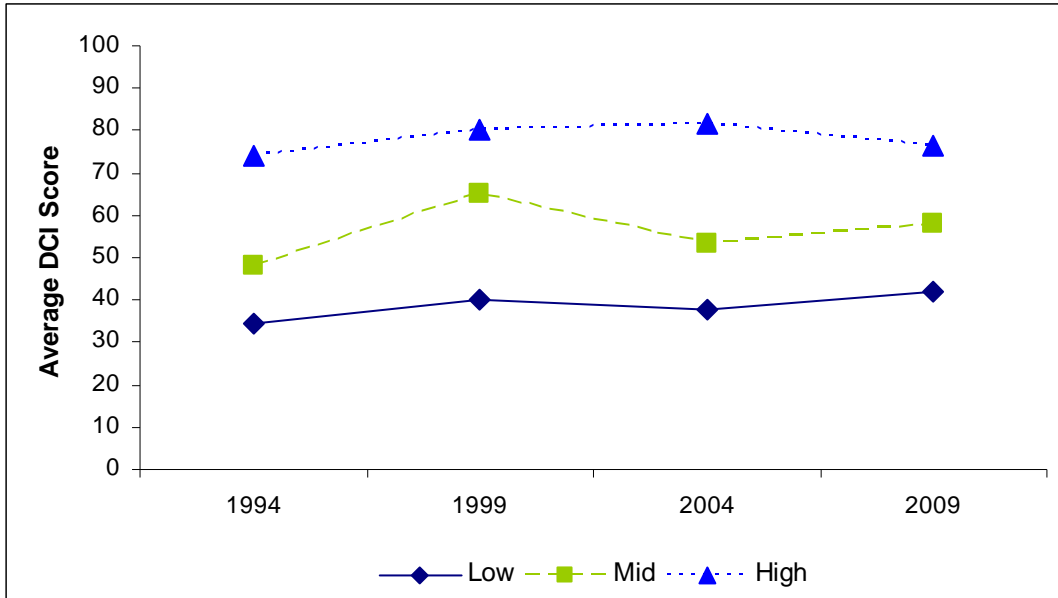
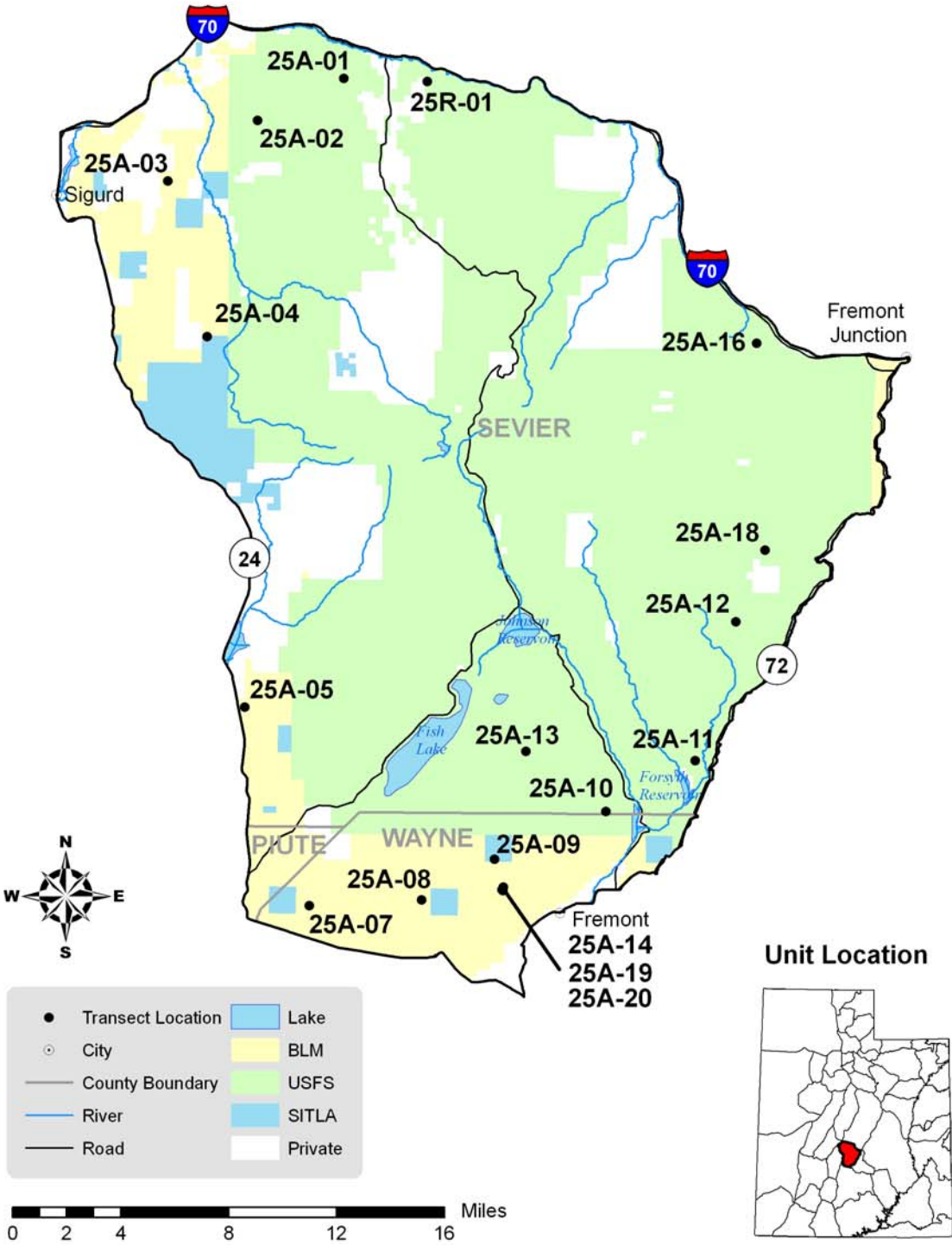


Figure 6. Mean low (n=7), mid-level (n=17) and high (n=3) potential scale DCI scores for WMU 16C, Central Mountains, Manti South. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

Management Unit 25A



WILDLIFE MANAGEMENT UNIT 25A - PLATEAU, FISH LAKE

Boundary Description

Sevier, Wayne and Piute Counties - Boundary begins at Highway SR-24 and Highway SR-72; west and north on SR-24 to Highway US-89; north on US-89 to Interstate 70; east on I-70 to SR-72; south on SR-72 to SR-24 and beginning point.

Management Unit Description

Prior to 1998, the Fish Lake unit was called deer herd unit 44. In the spring of 1998 this unit was enlarged, now it is a subunit within the larger Wildlife Management Unit 25 - Plateau. This wildlife management unit now incorporates the Boulder Mountains (25C), Thousand Lake Mountains (25B), and the Fish Lake Mountains (25A).

The Fish Lake unit includes Fish Lake Mountain and drainages; Otter Creek to the west and the Fremont River with its major tributaries, 7-mile Creek and UM Creek to the east. Some steep, relatively rough areas exist in the drainage heads along the northwestern side, but most of the unit is an inclined, rolling plateau. Elevation ranges from 11,599 feet on Mt. Marvine to 7,040 feet at Loa. The northern two-thirds of the unit include the higher elevations of the Fish Lake Mountains and constitutes summer range for deer and elk. Winter range is primarily confined to the lower elevations of the southern third of the unit and the sagebrush benches on the west side above Highway 24. Antelope are present and are normally found in the more open areas of the deer and elk winter range. Sage grouse are found near water in the same areas as those used by antelope. Fish Lake, Johnson Reservoir, Mill Meadow Reservoir, and Forsyth Reservoir are all popular summer fishing and camping areas. The higher portions of the unit are also popular elk and deer hunting areas. Another major public land use of the area is livestock grazing.

Huff and Blotter (1964) identified four dominant vegetation types on the winter range. Sagebrush was the most prevalent type. Black sagebrush (*Artemisia nova*) was the dominant species with islands of big sagebrush (*A. tridentata*) scattered throughout. Pinyon-juniper was the second most common vegetation type. Pinyon-juniper woodland occupies primarily southern slopes at higher elevations and is dispersed in patches throughout the lower elevations. Mountain brush can be found along the upper limits of the winter range. The mixed types occur in localized areas throughout the winter range.

The normal winter range can be found between 7,200 and 9,000 feet (Huff and Blotter 1964). Excessive accumulations of snow during severe winters confine deer below the 8,600-foot contour. Pinyon-juniper on both normal and severe wintering areas provide extremely important protective cover for elk and deer, while the closely associated sagebrush type produces the bulk of the required forage. In an update on winter range needs in the state, Mann (1985) considered the public land on the unit adequate to meet the wintering needs of deer without acquiring additional land from the private sector. The percent of the winter range that is administered by the BLM and USFS is, respectively, 30% and 47%. The Forest Service is responsible for managing almost all of the summer range (83%).

A history of heavy overgrazing by sheep and cattle is largely responsible for the present composition of most of the vegetative communities. Grazing began in the 1860's when the first settlers arrived in the Fremont Valley. Cattle, horses, and sheep grazed unregulated and range conditions deteriorated as herds increased. The result was overuse of the valuable cool-season grasses and forbs and degradation of the range in general. Even after the inception of the Forest Reserve (the predecessor to the Forest Service) in 1906, the situation worsened until livestock numbers peaked in 1924. Although overgrazing still occurs in many areas, grazing restrictions and management plans have been implemented on both Forest Service and BLM lands. Range conditions appear to be improving in most areas.

Browse species increased as the competition from grasses and forbs was reduced by the heavy grazing. The result was large areas of deer winter range with abundant browse forage. However, good spring-fall deer range or transition range is lacking. During these seasons, deer seek succulent green grasses and forbs. Because the herbaceous component is inadequate, depredation occurs on private croplands, especially alfalfa fields. The DWR is working with the other agencies to improve spring-fall ranges with chaining, spraying, harrowing, and/or seeding projects.

Mining activities are nonexistent on the area, but gas and oil exploration and road building are current land management concerns. There is presently a moderately high density of roads on the area. Although off-road use of vehicles is prohibited, OHV's and four-wheel drive vehicles have access throughout the unit.

Range Trend Studies

Twelve trend study sites were established within the Fish Lake unit in 1985 and have been monitored through 2009. Seven of the studies [Sage Flat (25A-3), Praetor Slope (25A-5), Evans Reservoir (25A-7), Row of Pines (25A-9), Cedarless Flat (25A-10), Forsyth Reservoir (25A-11) and Tommy Hollow (25A-16)] sample sagebrush-grass communities, four of the studies [Triangle Mountain (25A-1), Black Mountain (25A-2), Durfee Homestead (25A-4) and Lower Dog Flat (25A-8)] sample chained and seeded pinyon-juniper communities and one study [Elk Camp (25A-18)] samples mixed mountain brush deer and elk summer range. In 1991, three additional summer or transitional range sites were established at East Tidwell (25A-12), Ox Spring (25A-13), and Row of Pines Exclosure (25A-14). Two additional study sites were established in 1999, within the Row of Pines exclosure complex. One samples the Livestock Exclosure (25A-19) and the other samples the Total Exclosure (25A-20). Data from these sites can be compared with the Row of Pines trend study, which samples the area outside of the exclosure. One special study [Gooseberry (25R-1)] was established in 1997 to monitor a pinyon-juniper treatment and was read as a regular range trend study site in 2009.

TRIANGLE MOUNTIAN - TREND STUDY NO. 25A-1-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 6,700 ft (2,042 m)

Aspect: Southwest

Slope: 5%-10%

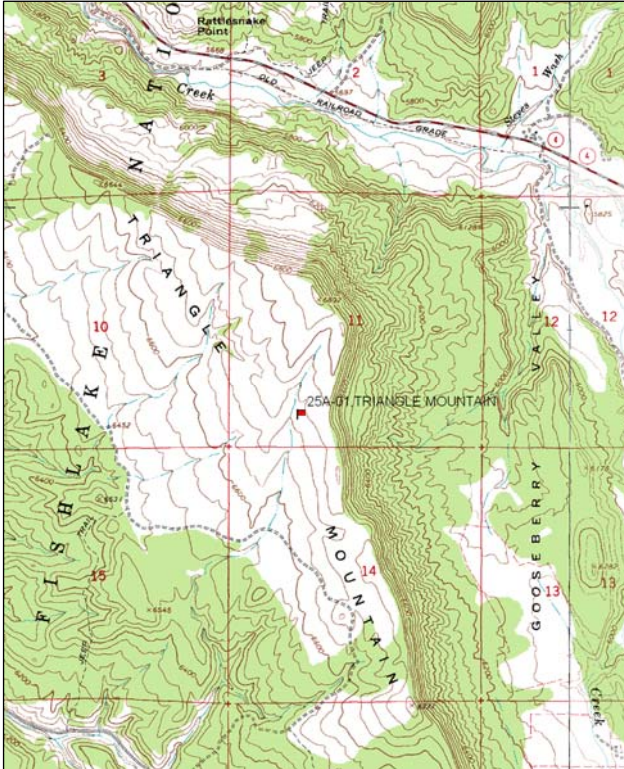
Transect bearing: 180 degrees magnetic

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

Directions:

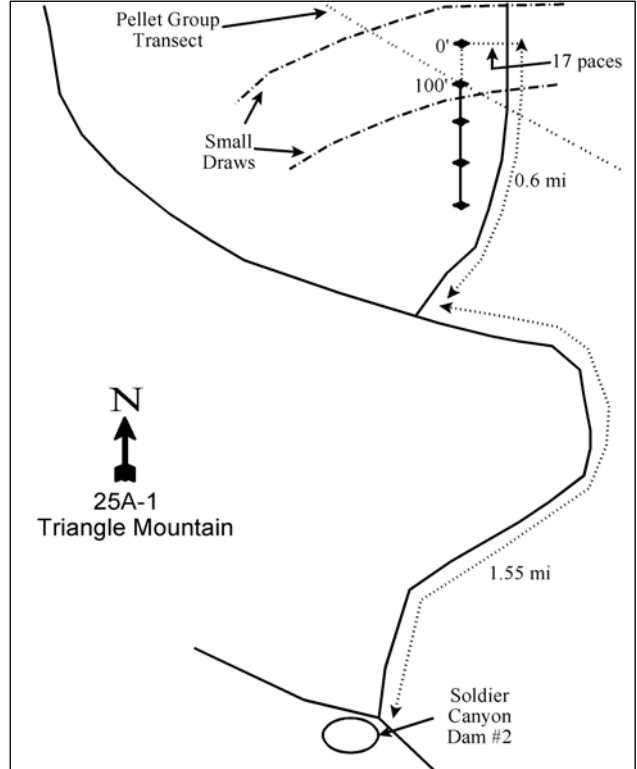
From the Gooseberry Creek Road outside Salina, take the Soldier Canyon Road west approximately 2.5 miles to Soldier Canyon Dam #2. At the dam, turn right up the road to Triangle Mountain. Go 1.55 miles to a fork. Take the right fork 0.6 miles to the top of a low rise between 2 small draws. Walk 17 paces due west of the road to the 0-foot baseline stake, which is a 4-foot rebar. A pellet group transect crosses the frequency baseline at the 100-foot mark.

Map Name: Salina, Utah



Township: 22S, Range: 1E, Section: 11

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 433160 E 4306455 N

TRIANGLE MOUNTAIN - TREND STUDY NO. 25A-1

Site Information

Site Description: This study is located on a pinyon-juniper chaining on Triangle Mountain that was done in 1970. Several small pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees had begun to reoccupy the site, along with seeded perennial grasses, and the area was retreated by a lop-and-scatter to remove pinyon and juniper between the 2004 and 2009 samples. As part of the Brown's Hole allotment, cattle graze from June 1 to June 15 depending on range conditions. Pellet group data has indicated deer use has decreased with each sampling since 1999 from moderate to light. Estimated elk use has fluctuated from moderate to high while cattle use has been high (Tables – Pellet Group Data).

Browse: Black sagebrush (*Artemisia nova*) is the key browse species found on this site, but it occurs in very low densities. Densities for black sagebrush have averaged 317 plants/acre since 1985 (Table - Browse Characteristics) while cover has been less than 1% since 1999 (Table - Browse Trends). Pinyon pine and Utah juniper density, as estimated by the point centered quarter method, decreased in 2009 following the lop-and-scatter treatment (Table - Point-Quarter Data). More dense stands of pinyon-juniper surround this area and provide more cover.

Herbaceous Understory: Herbaceous species account for most of the vegetation cover on this site. Perennial grasses are plentiful and provide good cover. The most common species, from highest cover, are crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*A. intermedium*) and Russian wildrye (*Elymus junceus*). Only one annual species, cheatgrass (*Bromus tectorum*), has been sampled and it occurs at low levels. Perennial forbs declined from a high of 4% cover in 1999 to less than 1% cover in subsequent years. Annual forbs have increased in cover each sample year and are dominated by pale alyssum (*Alyssum alyssoides*) (Table - Herbaceous Trends).

Soil: The soil is classified as a loam with a slightly alkaline pH (7.6) due to limestone parent material. Soil organic matter is high at 5.8% (Table - Soil Analysis Data). Protective surface cover is good and has averaged 76% since 1999. The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 - up (+2):** Black sagebrush density increased three-fold to 199 plants/acre. Decadence is low and young plants make up the bulk of the population.
- **1991 to 1999 - stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Black sagebrush decadence remained minimal and recruitment of young plants was good at 38% of the population. Black sagebrush cover is very low at below 1%.
- **1999 to 2004 – slightly down (-1):** Black sagebrush density decreased 13% to 420 plants/acre while decadence has increased to 19% and no recruitment new recruitment of young sagebrush plants occurred. Cover of sagebrush is very low at below 1%.
- **2004 to 2009 - stable (0):** Black sagebrush density is unchanged, though decadence decreased to 0% and recruitment of young plants increased to 14%. Cover is still less than 1%

Grass:

- **1985 to 1991 – slightly up (+1):** The sum of nested frequency of perennial grasses increased 26%. Crested and intermediate wheatgrass dominate the grass community.
- **1991 to 1999 - stable (0):** The sum of nested frequency of perennial grasses is similar to the last sampling. Perennial grasses provide 12% cover. Crested and intermediate wheatgrass provide 83% of grass cover.

- **1999 to 2004 – slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 21%, but cover has increased to 20%. Crested and intermediate wheatgrass account for 90% of grass cover.
- **2004 to 2009 – slightly up (+1):** The sum of nested frequency of perennial grasses increased 18% and cover increased to 25%. Crested and intermediate wheatgrass provided 89% of grass cover. Russian wildrye is increasing in cover.

Forb:

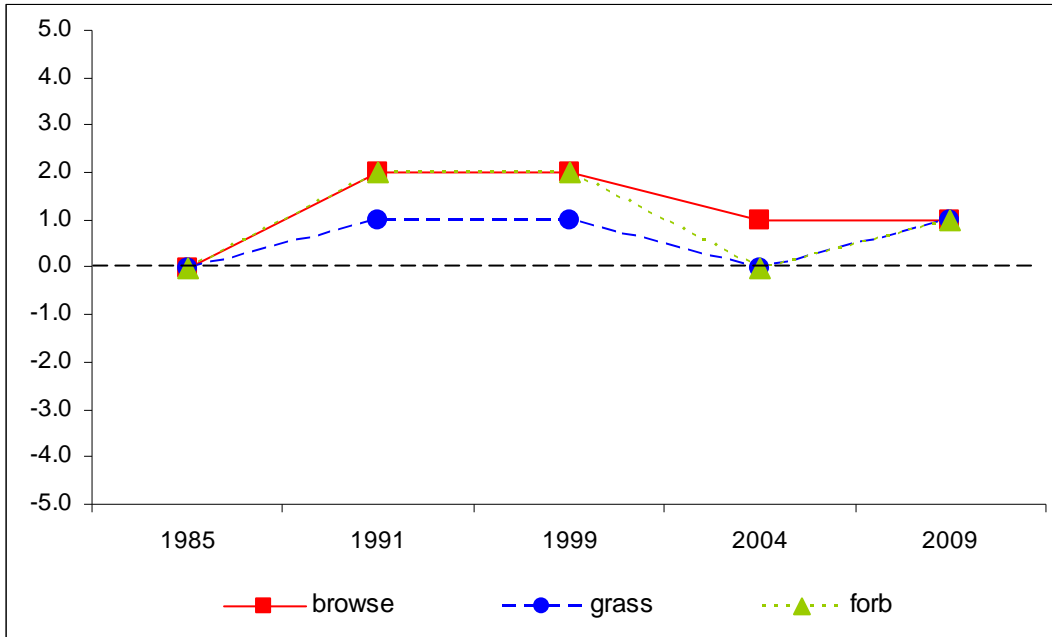
- **1985 to 1991 - up (+2):** The sum of nested frequency of perennial forbs increased 65%. Alfalfa (*Medicago sativa*) was the most frequent species.
- **1991 to 1999 - stable (0):** The sum of nested frequency of perennial forbs is similar to the last reading. Annual forbs are very common due to pale alyssum. Perennial forb cover is just under 4%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased 80% while annual forbs have continued to increase. Annual forb cover is now 3.5%, due to bur buttercup (*Ranunculus testiculatus*) while perennial forb cover is below 1%.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial forbs increased 38% while annual forbs are similar to the last sampling. Annual forb cover has increased to 6% due to a combination of pale alyssum and bur buttercup. Perennial forb cover increased, but is still low at 1%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 25A, study no: 1

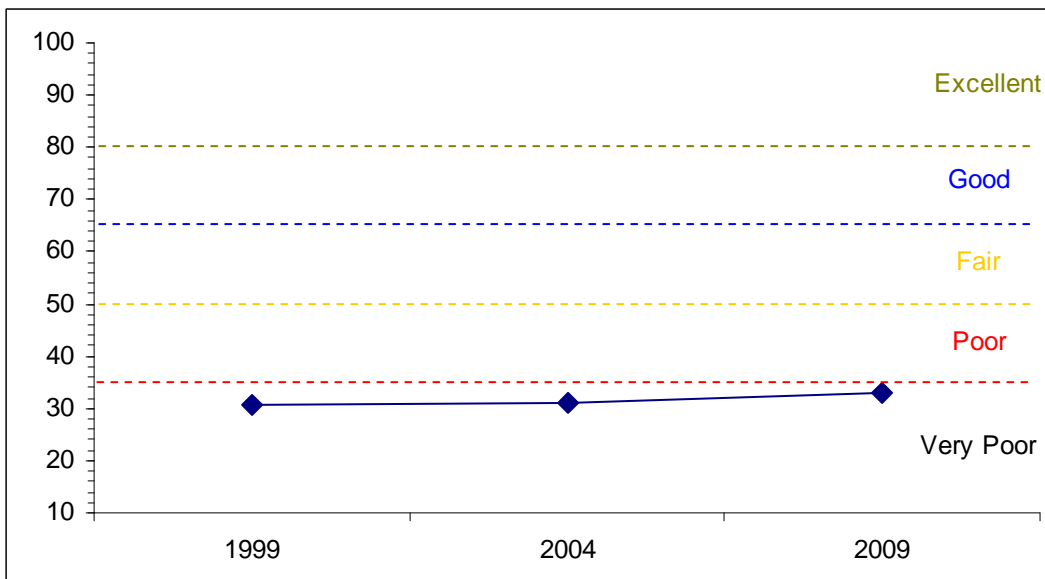
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	0.0	0.0	0.0	23.2	0.0	7.3	0.0	30.5	Very Poor
04	0.2	0.0	0.0	30.0	-0.1	1.1	0.0	31.2	Very Poor
09	0.9	0.0	0.0	30.0	0.0	2.0	0.0	32.8	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25A Study no: 1



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 25A, Study no: 1



HERBACEOUS TRENDS--
Management unit 25A, Study no: 1

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	b ₂₆₇	b ₂₉₃	b ₂₄₂	a ₂₀₈	b ₂₅₅	7.19	13.39	15.72
G	Agropyron intermedium	a ₁₀₉	a ₁₅₈	b ₁₈₀	b ₁₆₃	b ₁₈₄	2.45	4.88	6.44
G	Agropyron smithii	a ₁	b ₁₈	a ⁻	a ⁻	a ⁻	-	-	-
G	Agropyron spicatum	7	7	2	-	12	.00	-	.12
G	Bromus tectorum (a)	-	-	6	19	15	.02	.11	.05
G	Elymus junceus	bc ₇₉	c ₉₉	bc ₉₅	a ₂₄	ab ₅₈	1.76	.59	2.58
G	Elymus salina	a ⁻	a ⁻	a ⁻	b ₁₈	a ₁	-	.99	.15
G	Festuca ovina	b ₉	c ₂₅	a ⁻	a ⁻	a ⁻	-	-	-
G	Oryzopsis hymenoides	-	-	1	2	-	.00	.06	-
G	Poa secunda	a ⁻	a ⁻	c ₂₉	b ₁₉	a ⁻	.20	.13	-
G	Sitanion hystrix	3	-	-	-	-	-	-	-
Total for Annual Grasses		0	0	6	19	15	0.01	0.10	0.05
Total for Perennial Grasses		475	600	549	434	510	11.62	20.05	25.03
Total for Grasses		475	600	555	453	525	11.64	20.16	25.08
F	Alyssum alyssoides (a)	-	-	b ₂₆₀	a ₂₀₅	b ₂₈₁	1.41	1.14	4.06
F	Antennaria rosea	b ₁₈	a ⁻	ab ₇	a ₂	a ₂	.04	.01	.03
F	Aster sp.	5	-	1	-	-	.00	-	-
F	Astragalus sp.	a ₁	ab ₁₁	ab ₆	ab ₂	b ₁₃	.21	.00	.20
F	Chaenactis douglasii	-	2	-	-	-	-	-	-
F	Cryptantha sp.	a ⁻	ab ₁₉	b ₅₂	a ₁	a ⁻	.92	.00	-
F	Descurainia pinnata (a)	-	-	-	4	-	-	.02	-
F	Gilia sp. (a)	-	-	-	-	-	-	.00	-
F	Hymenoxys acaulis	-	8	-	-	-	-	-	-
F	Linum lewisii	-	-	-	-	4	-	-	.01
F	Lithospermum ruderales	1	1	3	-	-	.03	-	-
F	Medicago sativa	b ₇₄	b ₁₁₀	b ₉₉	a ₂₄	a ₂₃	2.43	.47	.67
F	Penstemon sp.	-	-	-	-	3	-	-	.03
F	Phlox austromontana	ab ₄	b ₁₃	a ₁	ab ₂	a ₂	.00	.01	.03
F	Ranunculus testiculatus (a)	-	-	a ₃	c ₁₉₂	b ₁₁₇	.00	2.35	1.97
F	Streptanthus cordatus	-	-	-	3	-	-	.03	-
F	Townsendia sp.	-	6	-	-	-	-	-	-
Total for Annual Forbs		0	0	263	401	398	1.41	3.53	6.03
Total for Perennial Forbs		103	170	169	34	47	3.65	0.53	0.98
Total for Forbs		103	170	432	435	445	5.07	4.06	7.02

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

BROWSE TRENDS--

Management unit 25A, Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia nova	15	14	15	.01	.18	.71
B	Chrysothamnus nauseosus	2	0	1	.00	-	.03
B	Chrysothamnus viscidiflorus	2	2	1	.00	.15	.00
B	Gutierrezia sarothrae	1	4	8	.00	.00	.30
B	Juniperus osteosperma	0	1	2	-	1.18	1.00
B	Leptodactylon pungens	2	2	0	.00	.00	-
B	Pinus edulis	3	0	0	.48	-	-
Total for Browse		25	23	27	0.49	1.51	2.04

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 1

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	.88	.76
Chrysothamnus viscidiflorus	-	.03	-
Gutierrezia sarothrae	-	.48	.50
Juniperus osteosperma	-	1.39	1.28
Pinus edulis	3.00	-	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 1

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	2.0	1.3

POINT-QUARTER TREE DATA--

Management unit 25A, Study no: 1

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	35	34	24	5.3	4.8	4.1
Pinus edulis	43	33	20	4.0	5.6	4.7

BASIC COVER--

Management unit 25A, Study no: 1

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	10.50	12.50	19.34	26.27	35.95
Rock	4.50	4.75	4.50	6.74	4.11
Pavement	19.50	13.50	10.88	23.19	6.56
Litter	30.75	48.00	26.33	31.02	41.54
Cryptogams	0	.50	1.20	2.27	.39
Bare Ground	34.75	20.75	18.20	18.53	33.67

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 1, Study Name: Triangle Mountain

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.7	7.6	40	34.7	25.3	5.8	6.5	243.2	0.7

PELLET GROUP DATA--

Management unit 25A, Study no: 1

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	27	44	11	-	-	-
Elk	18	12	34	66 (162)	12 (30)	51 (127)
Deer	18	16	17	21 (53)	10 (25)	4 (10)
Cattle	10	12	8	49 (120)	5 (13)	38 (93)

BROWSE CHARACTERISTICS--

Management unit 25A, 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 nova										
85	66	0	100	0	-	0	0	0	12/20	
91	199	67	33	0	-	33	0	0	19/36	
99	480	38	63	0	40	29	0	0	15/23	
04	420	0	81	19	-	19	0	5	11/18	
09	420	14	86	0	-	5	0	5	12/24	
Chrysothamnus nauseosus										
85	66	0	100	0	-	0	0	0	14/9	
91	399	83	0	17	-	17	0	17	-/-	
99	40	50	50	0	-	0	0	0	18/16	
04	0	0	0	0	-	0	0	0	17/19	
09	20	0	100	0	-	0	0	0	24/31	
Chrysothamnus nauseosus hololeucus										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	26/40	
09	0	0	0	-	-	0	0	0	-/-	
Chrysothamnus viscidiflorus										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	40	0	100	-	-	0	0	0	8/8	
04	60	0	100	-	-	0	0	0	6/7	
09	40	0	100	-	-	100	0	0	8/7	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Gutierrezia sarothrae</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	-	0	0	0	9/7	
04	120	0	100	-	-	0	0	0	10/14	
09	460	4	96	-	-	0	0	0	8/12	
<i>Juniperus osteosperma</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	0	0	0	0	-	0	0	0	-/-	
04	20	0	100	0	-	0	0	0	-/-	
09	40	0	0	100	-	0	0	100	-/-	
<i>Leptodactylon pungens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	60	0	100	-	-	0	0	0	4/13	
04	40	0	100	-	-	0	0	0	5/10	
09	0	0	0	-	-	0	0	0	-/-	
<i>Pinus edulis</i>										
85	66	0	100	-	-	0	0	0	51/31	
91	66	0	100	-	-	0	0	0	72/75	
99	60	0	100	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	

BLACK MOUNTAIN - TREND STUDY NO. 25A-2-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 6,400 ft (1,951 m)

Aspect: South

Slope: 5%

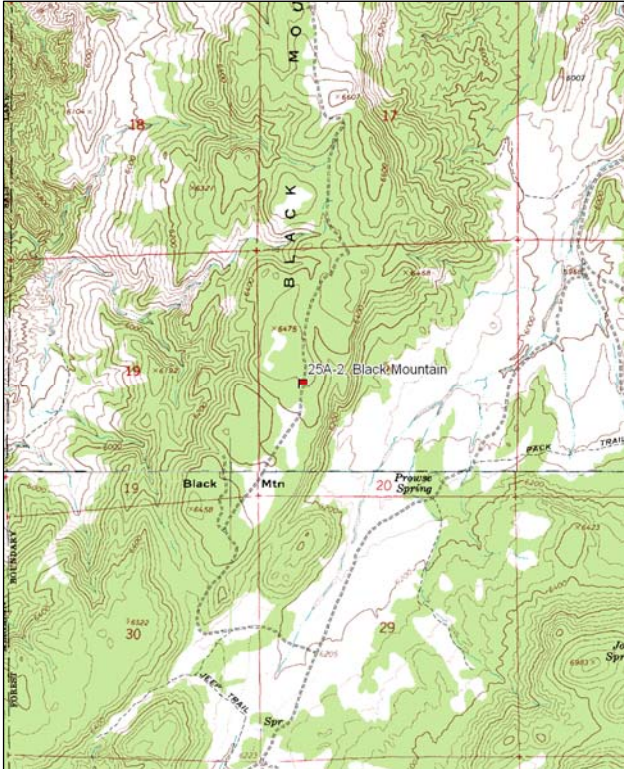
Transect bearing: 180 degrees magnetic

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

Directions:

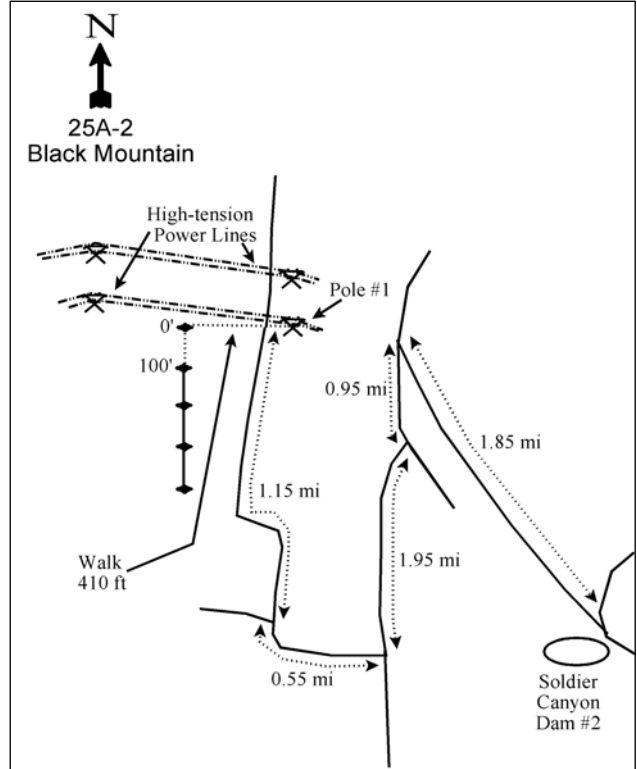
From Soldier Canyon Dam #2, proceed 1.85 miles west on the Soldier Canyon Road to the Black Mountain Road. Make a sharp left turn onto this road and travel south-southeast 0.95 miles to a junction. Take the right fork 0.85 miles to the double high-tension powerlines. The transect starts under these lines on the mesa to the right. Continue 1.1 miles beyond the powerlines to a 90-degree fork to the right. Turn right and go 0.55 miles to another fork. Stay to the right and proceed 1.15 miles up the hill and across a chaining until you are between the powerlines. Starting from the pole (#1) east of the road, pace off 410 feet west directly under the lines to the start of the frequency baseline which is 10 feet to the right. The 0 foot post is marked with browse tag #7028.

Map Name: Salina, Utah



Township: 22S, Range: 1E, Section: 20

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 428021 E 4303957 N

BLACK MOUNTAIN - TREND STUDY NO. 25A-2

Site Information

Site Description: This study was established within the Browns Hole cattle allotment in an area that was chained and seeded in 1984. The dominant species are black sagebrush (*Artemisia nova*) and sticklyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* spp. *viscidiflorus*) with a healthy perennial grass understory. The area was treated by a lop-and-scatter to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) between the 2004 and 2009 sample years. Cattle have grazed this area for more than 30 years, however, the nearest water is 1.5 to 2 miles away and limits livestock use to two weeks while they are moving to summer range. Pellet group data has estimated that deer use has been high on this site since 1999. Estimated elk use is moderate to high and cattle use has varied (Tables – Pellet group Data).

Browse: The key browse species on this site is black sagebrush. It has had moderate to low densities since 1985. Sticklyleaf low rabbitbrush is the dominant browse (Table - Browse Characteristics). Utah juniper density decreased in 2009, following the treatment. Pinyon pine densities have been consistently low, averaging 22 tree/acre from 1999 to 2009 (Table - Point Quarter Tree Data).

Herbaceous Understory: Numerous perennial grass species are present on the site and have provided an average of 10% cover from 1999 to 2009. Indian ricegrass (*Oryzopsis hymenoides*) has been the dominant species in each sample year. Other common species include crested wheatgrass (*Agropyron cristatum*) and bottlebrush squirreltail (*Sitanion hystrix*). Cheatgrass (*Bromus tectorum*) is present in small quantities. Perennial forbs are very rare on this site. Weedy annual forbs have increased in frequency each year since 1985 and are dominated by pale alyssum (*Alyssum alyssoides*) and bur buttercup (*Ranunculus testiculatus*) (Table - Herbaceous Trends).

Soil: The soil is classified as sandy clay loam with a slightly alkaline pH (7.6). Phosphorous is low at 5.7 ppm and has limited availability for plant growth and development (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground is moderate on the site and has ranged from 20% to 38% over the sample years (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 - down (-2):** Black sagebrush density decreased 40% from 999 plants/acre to 598 plants/acre. Decadence of black sagebrush increased from 13% to 33% and no recruitment of young plants was noted. Sticklyleaf low rabbitbrush was sampled for the first time in 1991.
- **1991 to 1999 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1999; therefore trend was determined using other parameters. Black sagebrush decadence decreased to 5% and recruitment of young increased to 21% of the population.
- **1999 to 2004 - down (-2):** Black sagebrush density decreased 37% to 540 plants/acre and decadence increased to 63% with no new recruitment of young plants. Sticklyleaf low rabbitbrush density also decreased, to 1,400 plants/acre.
- **2004 to 2009 – slightly down (-1):** Black sagebrush density decreased 11% and decadence is still high at 42%, recruitment is low at 8%. Sticklyleaf low rabbitbrush density increased to 4,600 plants/acre.

Grass:

- **1985 to 1991 - up (+2):** Perennial grass sum of nested frequency increased over two-fold. There was a significant increase in the nested frequency of crested wheatgrass, intermediate wheatgrass and bluebunch wheatgrass (*Agropyron spicatum*).

- **1991 to 1999 - 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 intermediate wheatgrass and bluebunch wheatgrass, and a significant increase in the nested frequency of smooth brome (*Bromus inermis*).
- **1999 to 2004 - slightly up (+1):** There was little change in the sum of nested frequency of perennial grasses, but cover increased from 8% to 12%. Also, cheatgrass nested frequency decreased significantly and cover decreased to less than 1%. There was a significant increase in the nested frequency of crested wheatgrass.
- **2004 to 2009 - stable (0):** The sum of nested frequency and cover of perennial grasses remained similar.

Forb:

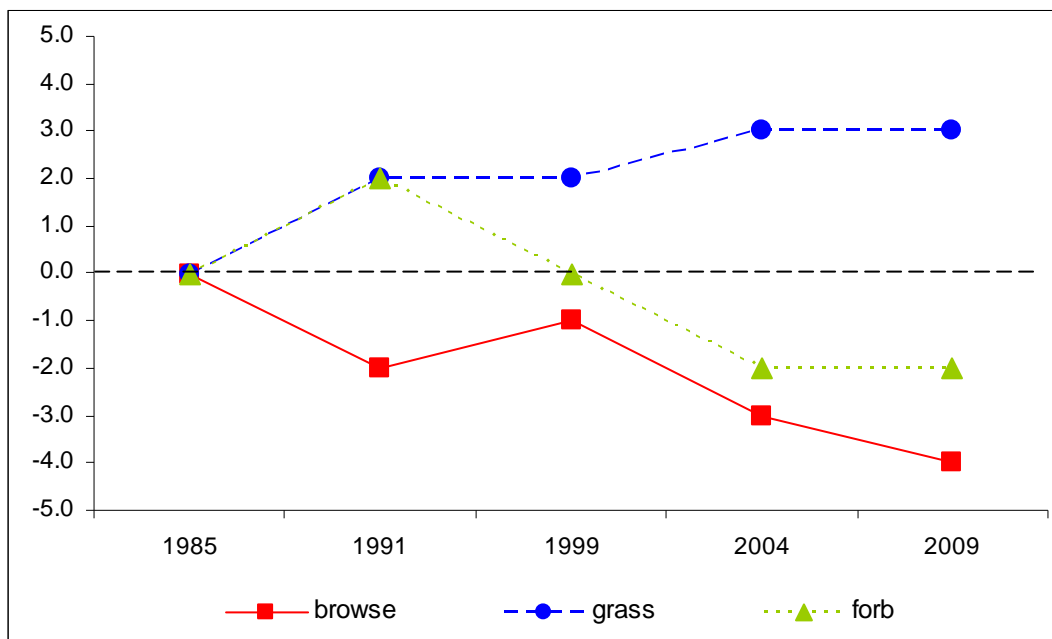
- **1985 to 1991 - up (+2):** There was a large increase in the sum of nested frequency of perennial forbs.
- **1991 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 73% and cover was very low at less than 1%. Annual forbs increased markedly on the site.
- **1999 to 2004 - down (-2):** No perennial forbs were sampled on the site and annual forbs continued to increase.
- **2004 to 2009 - stable (0):** Perennial forbs remain extremely rare on the site and the sum of nested frequency and cover of annual forbs continued to increase.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 25A, 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
99	2.1	0.0	0.0	16.1	-1.0	0.3	0.0	17.5	Very Poor
04	1.4	0.0	0.0	24.5	-0.1	0.0	0.0	25.8	Very Poor
09	1.1	0.0	0.0	21.0	-0.4	0.3	0.0	22.0	Very Poor

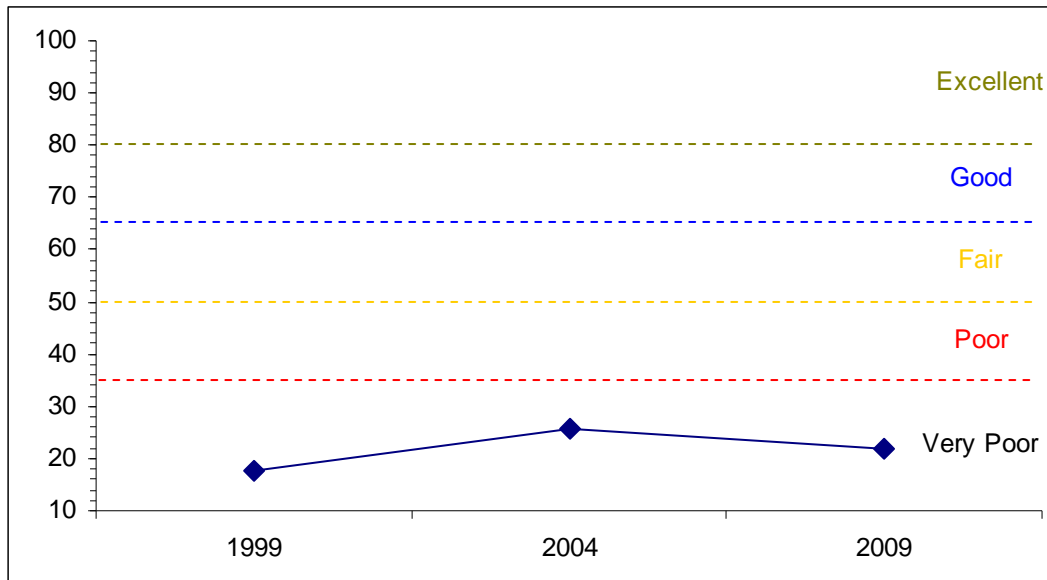
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25A Study no: 2



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL

Management unit 25A, Study no: 2



HERBACEOUS TRENDS--

Management unit 25A, Study no: 2

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	a14	bc57	ab41	d98	cd78	.75	3.25	2.52
G	Agropyron intermedium	a9	c88	ab42	bc55	bc60	.89	1.26	.72
G	Agropyron smithii	4	-	-	-	2	-	-	.03
G	Agropyron spicatum	a5	b45	a6	a10	a15	.09	.48	.36
G	Bromus inermis	a4	a6	b73	a11	a10	1.20	.12	.10
G	Bromus tectorum (a)	-	-	b133	a14	a26	1.31	.18	.52
G	Elymus junceus	-	9	12	6	10	.11	.22	.24
G	Festuca ovina	a-	ab10	b27	a2	a-	.37	.00	-
G	Oryzopsis hymenoides	a68	a77	a95	ab105	b136	2.92	4.10	5.74
G	Poa fendleriana	2	-	6	2	-	.06	.03	-
G	Poa secunda	-	-	5	5	5	.06	.04	.04
G	Sitanion hystrix	ab49	b89	b80	b79	a31	1.58	2.74	.73
Total for Annual Grasses		0	0	133	14	26	1.31	0.18	0.51
Total for Perennial Grasses		155	381	387	373	347	8.06	12.25	10.51
Total for Grasses		155	381	520	387	373	9.38	12.44	11.03
F	Alyssum alyssoides (a)	-	-	b189	a137	b207	.62	1.31	1.91
F	Antennaria rosea	6	-	-	-	-	-	-	-
F	Astragalus sp.	ab4	b30	ab14	a-	ab7	.11	-	.16
F	Castilleja sp.	-	2	-	-	-	-	-	-
F	Chaenactis douglasii	a-	b12	a-	a-	a-	-	-	-
F	Cryptantha sp.	-	-	1	-	-	.00	-	-
F	Erigeron engelmannii	-	2	-	-	-	-	-	-
F	Eriogonum ovalifolium	a-	b14	a-	a-	a2	-	-	.00
F	Gilia sp. (a)	-	-	-	10	-	-	.02	-

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
F	<i>Lactuca serriola</i>	a ⁻	b ⁷	a ⁻	a ⁻	a ⁻	-	-	-
F	<i>Machaeranthera canescens</i>	-	4	-	-	-	-	-	-
F	<i>Medicago sativa</i>	b ¹⁴	a ¹	a ⁻	a ⁻	a ⁻	-	-	-
F	<i>Phlox longifolia</i>	a ⁻	b ¹²	a ⁻	a ⁻	a ⁻	-	-	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	a ⁻	b ¹⁷⁴	c ²⁵⁵	-	1.11	4.06
F	<i>Salsola iberica</i> (a)	a ¹	b ¹⁹	a ⁻	a ⁻	a ⁻	-	-	-
F	<i>Sanguisorba minor</i>	b ²⁹	a ¹	a ⁻	a ⁻	a ⁻	-	-	-
F	<i>Senecio multilobatus</i>	3	-	-	-	-	-	-	-
F	<i>Streptanthus cordatus</i>	2	2	-	-	-	-	-	-
F	<i>Taraxacum officinale</i>	-	1	-	-	-	-	-	-
F	<i>Tragopogon dubius</i>	-	3	10	-	-	.02	-	-
F	Unknown forb-perennial	-	2	-	-	-	-	-	-
Total for Annual Forbs		1	19	189	321	462	0.62	2.45	5.97
Total for Perennial Forbs		58	93	25	0	9	0.13	0	0.16
Total for Forbs		59	112	214	321	471	0.75	2.45	6.13

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

BROWSE TRENDS--

Management unit 25A, Study no: 2

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	<i>Artemisia nova</i>	26	16	13	1.70	1.03	.86
B	<i>Artemisia tridentata vaseyana</i>	1	2	0	-	.12	-
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	42	36	63	2.12	1.97	2.45
B	<i>Juniperus osteosperma</i>	8	4	0	1.83	2.27	1.94
B	<i>Pinus edulis</i>	1	0	0	.03	.15	-
Total for Browse		78	58	76	5.70	5.55	5.26

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 2

Species	Percent Cover	
	'04	'09
<i>Artemisia nova</i>	1.50	1.08
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	4.55	3.83
<i>Juniperus osteosperma</i>	1.81	1.98

POINT-QUARTER TREE DATA--
Management unit 25A, Study no: 2

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	72	-	35	2.3	-	4.7
Pinus edulis	23	-	20	1.7	-	3.5

BASIC COVER--
Management unit 25A, Study no: 2

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	1.50	3.00	18.36	19.96	22.52
Rock	1.75	3.25	4.71	4.80	5.59
Pavement	30.25	14.00	11.60	31.67	16.30
Litter	46.50	42.00	21.79	29.77	34.37
Cryptogams	0	0	.05	1.04	.98
Bare Ground	20.00	37.75	29.98	26.72	27.22

SOIL ANALYSIS DATA --
Management unit 25A, Study no: 2, Study Name: Black Mountain

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.7	7.6	50	25.1	24.9	3.5	5.7	316.8	0.5

PELLET GROUP DATA--
Management unit 25A, Study no: 2

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	18	56	42	-	-	-
Elk	15	16	8	38 (93)	20 (50)	15 (36)
Deer	24	39	37	78 (192)	52 (127)	44 (107)
Cattle	16	6	16	24 (59)	12 (30)	36 (90)

BROWSE CHARACTERISTICS--
Management unit 25A, Study no: 2

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia nova									
85	999	0	87	13	-	7	0	0	6/7
91	598	0	67	33	-	0	0	0	8/11
99	860	21	74	5	20	40	0	0	11/18
04	540	0	37	63	-	22	15	48	11/18
09	480	8	50	42	-	38	21	8	9/15

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Artemisia tridentata vaseyana</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
99	40	100	0	0	-	100	0	0	13/16
04	40	0	50	50	-	50	50	50	11/15
09	0	0	0	0	-	0	0	0	19/44
<i>Chrysothamnus depressus</i>									
85	532	0	75	25	-	0	0	0	7/7
91	265	25	75	0	-	0	0	0	13/14
99	0	0	0	0	-	0	0	0	-/-
04	0	0	0	0	-	0	0	0	-/-
09	0	0	0	0	-	0	0	0	5/9
<i>Chrysothamnus nauseosus</i>									
85	0	0	0	-	-	0	0	0	-/-
91	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	13/15
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
85	0	0	0	0	-	0	0	0	-/-
91	599	44	56	0	66	0	0	0	15/19
99	2200	25	73	3	40	20	16	16	14/22
04	1400	0	96	4	-	0	6	3	13/23
09	4600	42	57	1	40	16	13	.86	9/15
<i>Juniperus osteosperma</i>									
85	132	50	0	50	-	0	0	0	-/-
91	66	100	0	0	-	0	0	0	-/-
99	160	75	25	0	20	0	0	0	-/-
04	80	25	75	0	-	25	0	0	-/-
09	0	0	0	0	-	0	0	0	-/-
<i>Pinus edulis</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	20	100	0	-	-	0	0	100	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-

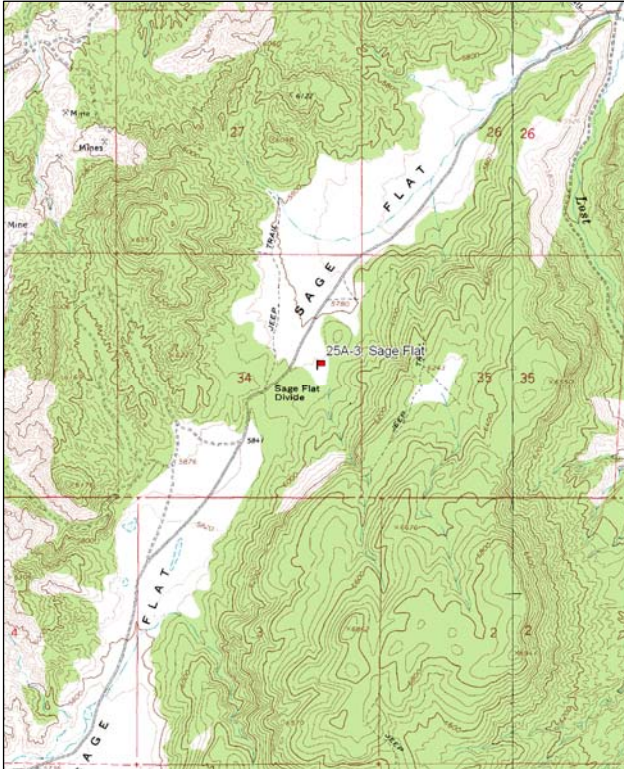
SAGE FLAT - TREND STUDY NO. 25A-3-09

Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 5,800 ft (1,768 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:

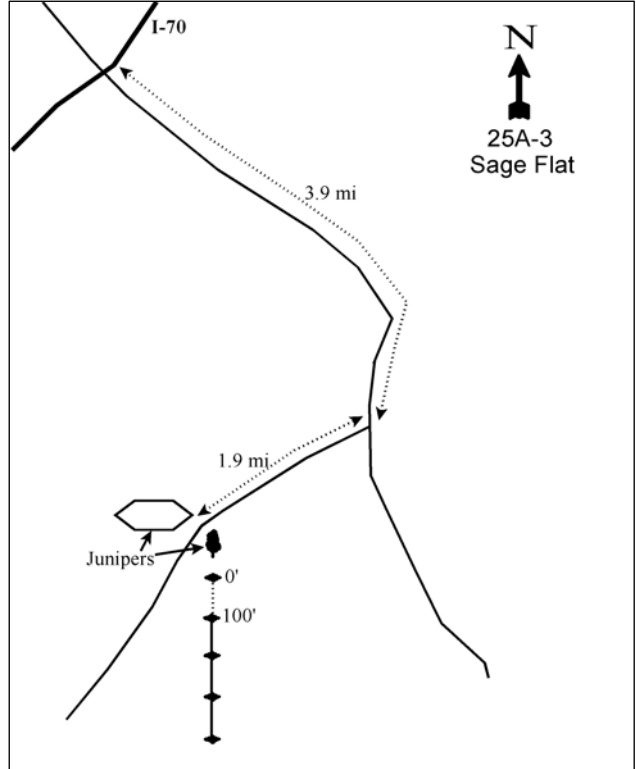
Beginning at the point where the Lost Creek Road passes under I-70 east of Aurora, proceed southeast up the Lost Creek Road 1.2 miles to a truck crossing. Continue past the truck crossing 1.65 miles to a bridge, then 1.05 miles beyond the bridge to a road turning off to the right. Turn right here onto the Sage Flat Road. Drive along this road for 1.9 miles to a slight bend with 5 junipers on the right side. Stop the vehicle 20-30 yards beyond these trees. On the left side of the road is a lone juniper. The baseline begins 15 feet south of this tree.

Map Name: Sigurd, Utah



Township: 22S, Range: 1W, Section 34

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 422656 E 4300339 N

SAGE FLAT - TREND STUDY NO. 25A-3

Site Information

Site Description: This study is located in a Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat amid a juniper woodland. As part of the Gypsum allotment, sheep graze this area in winter and cattle and sheep use it in spring. A road through the flat is well-used and may lead to some off-road use. Deer use of this area has been very heavy in each sampling from 1999 to 2009. Elk and cattle use has been light in the same period (Tables – Pellet Group Data).

Browse: Wyoming big sagebrush is the dominant browse species and has averaged 99% of total shrub cover since 1999 (Table - Browse Trends). The population has seen increasing decadence rates (at 51% in 2009) each sample year and has seen decreasing recruitment of young since 1991. The population density has decreased steadily since new density estimation methods were first used in 1991.

Herbaceous Understory: The herbaceous understory is weedy and consists almost entirely of cheatgrass (*Bromus tectorum*) and weedy annual forbs such as pale alyssum (*Alyssum alyssoides*), storkbill (*Erodium cicutarium*) and burr buttercup (*Ranunculus testiculatus*). No perennial forbs or grasses were sampled in 2009 (Table - Herbaceous Trends).

Soil: The soils are classified as sandy loam and are slightly alkaline (pH 7.7). Organic matter and phosphorus are low, and phosphorus may limit plant growth and development (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The amount of bareground has decreased as cheatgrass has proliferated. The soil erosion condition was classified as stale in both 2004 and 2009 although some active gullies are found on the site.

Trend Assessments

Browse:

- **1985 to 1991 - up (+2):** Wyoming big sagebrush density nearly doubled due to a high increase in the recruitment of young sagebrush plants. Decadence is moderate and decreased slightly from 33% to 26%.
- **1991 to 1999 - slightly down (-1):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Wyoming big sagebrush decadence increased slightly to 31%, and recruitment of young plants has fallen to 11% of the population.
- **1999 to 2004 – slightly down (-1):** Wyoming big sagebrush density is similar to the last reading but decadence has increased to 38% and recruitment of young plants has decreased to 3%.
- **2004 to 2009 - down (-2):** Wyoming big sagebrush density decreased 24% to 2,440 plants/acre. Decadence has continued to increase to 51% of the population and no young plants were sampled.

Grass:

- **1985 to 1991 - down (-2):** The sum of nested frequency for perennial grasses decreased 54%. Data was not taken on cheatgrass in this sample.
- **1991 to 1999 - down (-2):** Perennial grasses are almost non-existent on this site. Cheat grass dominates the herbaceous understory at 15% cover and accounts for 86% of herbaceous cover.
- **1999 to 2004 – slightly down (-1):** Cheatgrass cover has more than doubled to 32%. The nested frequency of cheatgrass increased significantly.
- **2004 to 2009 - stable (0):** Cheatgrass accounted for 100% of grass cover and 69% of the total herbaceous cover, and provides 27% cover.

Forb:

- **1985 to 1991 - stable (0):** The forb population is essentially non-existent. Forbs were encountered in only two quadrats.
- **1991 to 1999 - down (-2):** Perennial forbs were not encountered in this sample. Weedy annual forbs have invaded the site, mostly bur buttercup and tumble mustard (*Sisymbrium altissimum*). Annual forb cover is at 2%.
- **1999 to 2004 - down (-2):** Weedy annual species continue to increase. Bur buttercup is the dominant forb species and provides 78% of forb cover. Annual forb cover is at 4%.
- **2004 to 2009 - down (-2):** Bur buttercup has continued to increase and provides 66% of forb cover. Annual forb cover is at 12%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

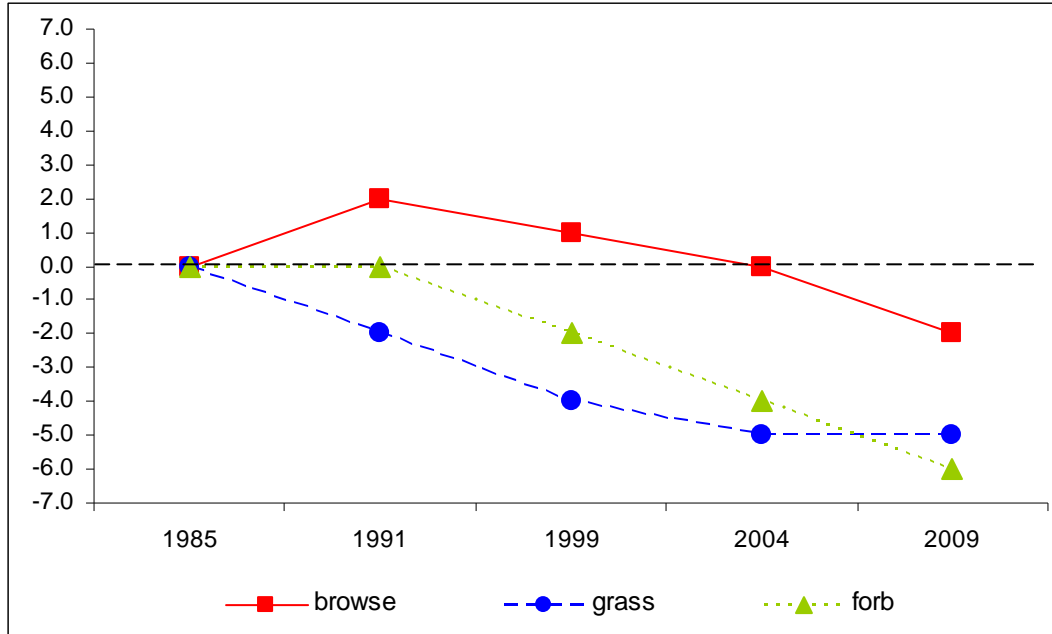
Management unit 25A, study no: 3

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	18.6	5.7	5.5	0.4	-11.3	0.0	0.0	19.0	Poor
04	16.7	3.6	1.5	0.0	-20.0	0.0	0.0	1.9	Very Poor
09	11.1	-0.3	0.0	0.0	-20.0	0.0	0.0	-9.2	Very Poor

Trend Summary

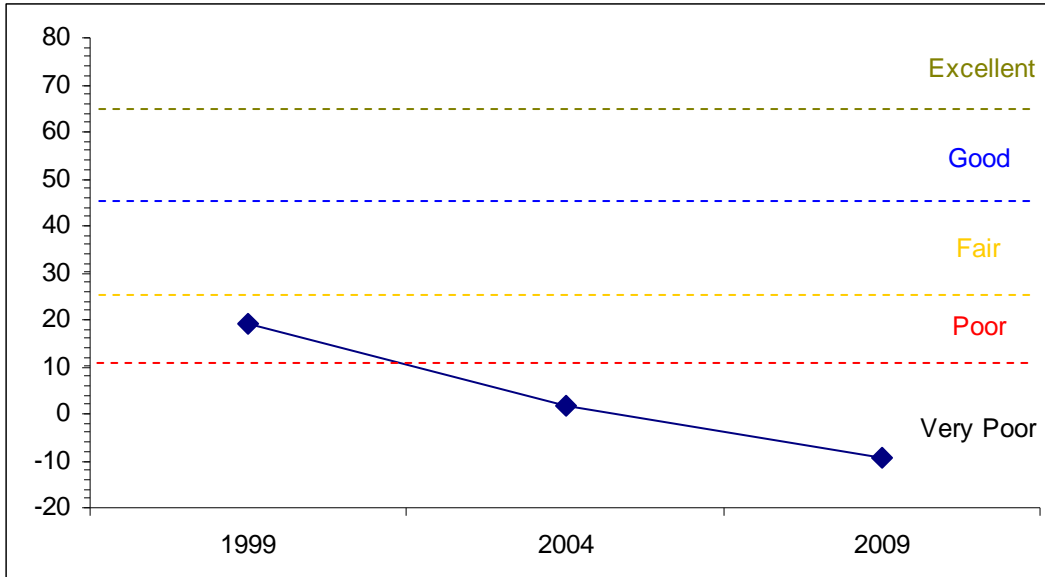
CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 25A Study no: 3



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 25A, Study no: 3



HERBACEOUS TRENDS--

Management unit 25A, Study no: 3

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Bromus tectorum (a)	-	-	a349	b379	a353	15.05	32.11	27.49
G	Poa secunda	3	-	-	-	-	-	-	-
G	Sitanion hystrix	b38	b19	a3	a3	a-	.03	.03	-
G	Sporobolus cryptandrus	-	-	1	-	-	.18	-	-
Total for Annual Grasses		0	0	349	379	353	15.05	32.11	27.49
Total for Perennial Grasses		41	19	4	3	0	0.21	0.02	0
Total for Grasses		41	19	353	382	353	15.26	32.14	27.49
F	Alyssum alyssoides (a)	-	-	a23	a25	b108	.17	.14	1.45
F	Erodium cicutarium (a)	-	-	a-	b36	c68	-	.63	2.19
F	Ranunculus testiculatus (a)	-	-	a143	b267	b288	.88	3.12	8.02
F	Salsola iberica (a)	-	-	-	4	-	-	.00	-
F	Sisymbrium altissimum (a)	-	-	ab18	a8	b30	1.20	.07	.43
F	Tragopogon dubius	-	1	-	-	-	-	-	-
F	Unknown forb-perennial	-	1	-	-	-	-	-	-
Total for Annual Forbs		0	0	184	340	494	2.25	3.99	12.10
Total for Perennial Forbs		0	2	0	0	0	0	0	0
Total for Forbs		0	2	184	340	494	2.25	3.99	12.10

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

BROWSE TRENDS--

Management unit 25A, Study no: 3

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia tridentata wyomingensis	84	86	84	14.90	13.39	8.88
B	Opuntia sp.	1	1	1	.00	.03	.15
Total for Browse		85	87	85	14.90	13.42	9.02

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 3

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	19.66	10.69
Opuntia sp.	.10	.13

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 3

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.3	1.4

BASIC COVER--

Management unit 25A, Study no: 3

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	8.50	1.25	30.59	49.87	45.70
Rock	1.50	1.75	1.32	1.52	1.22
Pavement	7.75	19.25	10.25	11.38	4.91
Litter	54.25	55.25	37.05	43.91	42.95
Cryptogams	0	0	.09	.87	.03
Bare Ground	28.00	22.50	20.09	12.67	16.25

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 3, Study Name: Sage Flat

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.2	7.7	52	28.7	19.3	1.3	5.8	147.2	0.6

PELLET GROUP DATA--

Management unit 25A, Study no: 3

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	35	36	60	-	-	-
Elk	-	1	2	4 (9)	1 (2)	-
Deer	53	82	69	125 (308)	246 (608)	191 (473)
Cattle	2	2	1	6 (14)	4 (9)	7 (18)

BROWSE CHARACTERISTICS--
 Management unit 25A, 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)	
<i>Artemisia tridentata wyomingensis</i>										
85	2398	6	61	33	-	3	0	6	24/26	
91	5198	55	19	26	7999	24	0	5	21/19	
99	3500	11	58	31	20	26	3	1	26/34	
04	3200	3	59	38	-	18	74	26	22/31	
09	2440	0	49	51	-	33	4	27	23/28	
<i>Opuntia sp.</i>										
85	66	0	100	-	-	0	0	0	6/6	
91	66	0	100	-	-	0	0	0	6/13	
99	20	0	100	-	-	0	0	0	-/-	
04	20	0	100	-	-	0	0	0	4/9	
09	20	0	100	-	-	0	0	0	4/16	

DURFEE HOMESTEAD - TREND STUDY NO. 25A-4-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: SITLA

Elevation: 7,400 ft (2,256 m)

Aspect: West

Slope: 10%

Transect bearing: 180 degrees magnetic

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

Directions:

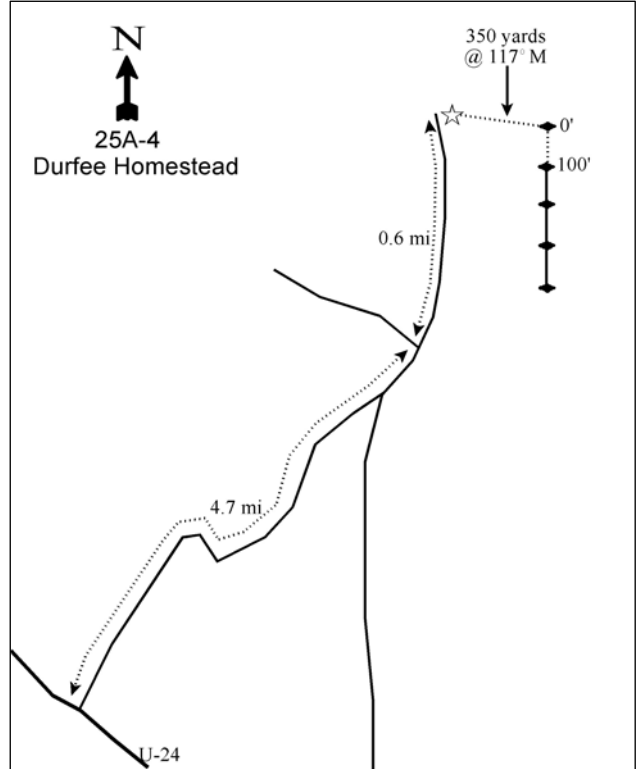
From Sigurd, drive east on U-24 to mile marker 21. Turn left (north) on the Sand Ledge Road and drive northeast for 1.6 miles. Turn left at the intersection and proceed north 3.1 miles to an intersection with a trough and pond. Continue 0.1 miles to a road that goes up the draw bottom. Drive up this road for 0.5 miles. Stop at the witness post (1/2" red rebar 2' tall on east side of road) and walk out 350 yards at a bearing of 117 degrees magnetic. The baseline starts out in the chaining about 100 feet from the edge of the PJ. The 0-foot baseline stake has a red browse tag #7194 attached.

Map Name: Rex Reservoir, Utah



Township: 23S, Range: 1W, Section: 36

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 425009 E 4291073 N

DURFEE HOMESTEAD - TREND STUDY NO. 25A-4

Site Information

Site Description: This study is located on BLM administered land within the Sand Ledge allotment. This area was chained and seeded in 1983 and the transect lies within 100 ft. of untreated pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland. Cattle graze the area in late spring. Deer, elk and cow use have been moderately low since 1999. Sheep sign was noted in 2009 and indicated low use (Table - Pellet Group Data).

Browse: Wyoming big sagebrush (*Artemisia tridentata* spp. *wyomingensis*) is the key species, however, preferred browse species are rare on the site. After a high density estimate in 1985 the highest sagebrush density estimate was in 2009 at 140 plants/acre. Decadence has not been of concern, but little to no recruitment has occurred. In recent years, Gambel oak (*Quercus gambelii*) has been sampled, adding some additional browse to the area (Table - Browse Characteristics).

Herbaceous Understory: The perennial grass understory is diverse and productive. Principal species include bluebunch wheatgrass (*Agropyron spicatum*) and smooth brome (*Bromus inermis*). Cheatgrass (*Bromus tectorum*) is also present on the site, but has averaged only 1% cover. The forb community is very diverse. Perennial forbs have been slowly decreasing while annual forbs have increased in frequency and cover (Table - Herbaceous Trends).

Soil: The soil is classified as clay loam that is slightly alkaline (pH 7.5) (Table - Soil Analysis Data). The soil is heavily armored with rock and pavement providing an average of 42% cover. Bare soil is low, averaging 15% (Table - Basic Cover). The soil erosion condition was classified as stable in both 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 - down (-2):** The density of Wyoming big sagebrush decreased 94% from 1,198 plants/acre to 66 plants/acre, but no dead plants were sampled in 1991. Decadence decreased from 72% to 0% and no new recruitment of young plants was sampled.
- **1991 to 1999 - down (-2):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. There was no change in Wyoming big sagebrush decadence and recruitment.
- **1999 to 2004 - up (+2):** Sagebrush density increased from 20 plants/acre to 100 plants/acre. Decadence is at 0% and recruitment of young plants increased to 20% of the population.
- **2004 to 2009 - slightly up (+2):** Wyoming big sagebrush density increased to 140 plants/acre. Decadence also increased, but is still low, to 14% and no young plants were sampled.

Grass:

- **1985 to 1991 - down (-2):** The sum of nested frequency of perennial grasses decreased 36%. A good mix of perennial species is present.
- **1991 to 1999 - up (+2):** The sum of nested frequency of perennial grasses increased 85% and cover is at 9%. Bluebunch wheatgrass provided 38% of the grass cover and smooth brome provided 28%. Cheatgrass cover was low at 1%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased 21%, though cover increased to 10%. Bluebunch wheatgrass provided 46% of grass cover while smooth brome provided 20%. Cheatgrass cover increased to 3%.

- **2004 to 2009 - up (+2):** The nested frequency of perennial grasses increased 27% and cover increased to 12%. Bluebunch wheatgrass provided 32% of grass cover and smooth brome provided 34%. Cheatgrass cover decreased to 1%.

Forb:

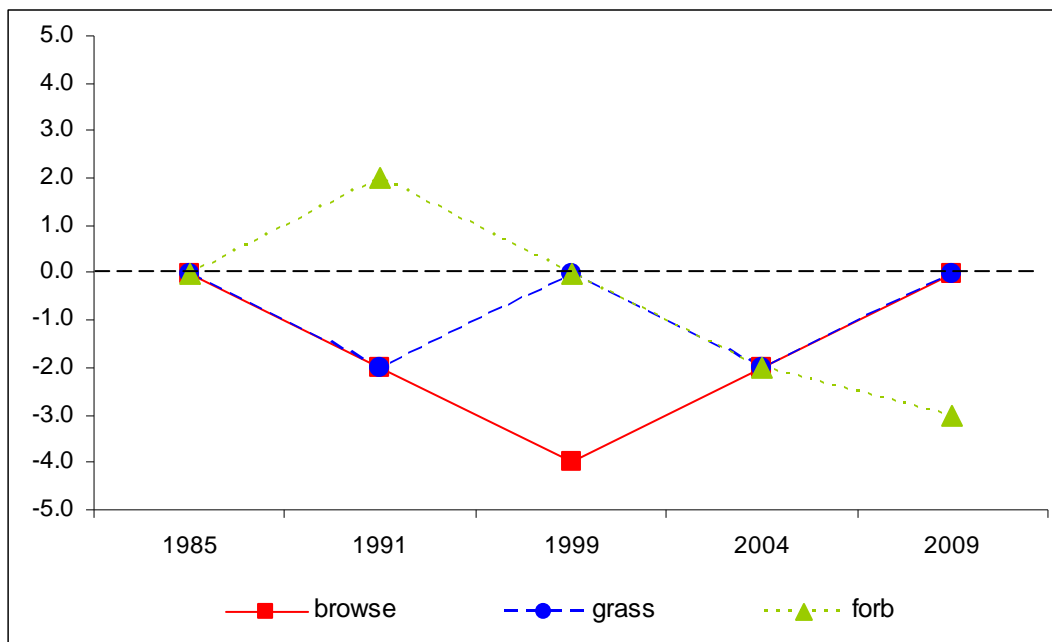
- **1985 to 1991 - up (+2):** The forb community is diverse and dominated by perennial species. The sum of nested frequency of perennial forbs increased more than two-fold.
- **1991 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased 34%. Perennial forbs provide 3% cover. Annual forbs have established and are increasing.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased 45%. The sum of nested frequency of annual forbs has increased nearly three-fold.
- **2004 to 2009 – slightly down (-1):** The sum of nested frequency of perennial forbs decreased 12%, cover is still at 3%. Annual forb cover increased from 1% to 3%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 25A, 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
99	3.3	0.0	0.0	17.1	-0.7	6.8	0.0	26.5	Poor-Fair
04	4.7	0.0	0.0	19.2	-1.9	5.3	0.0	27.3	Fair
09	6.4	13.7	0.0	23.8	-0.7	5.5	0.0	48.6	Good

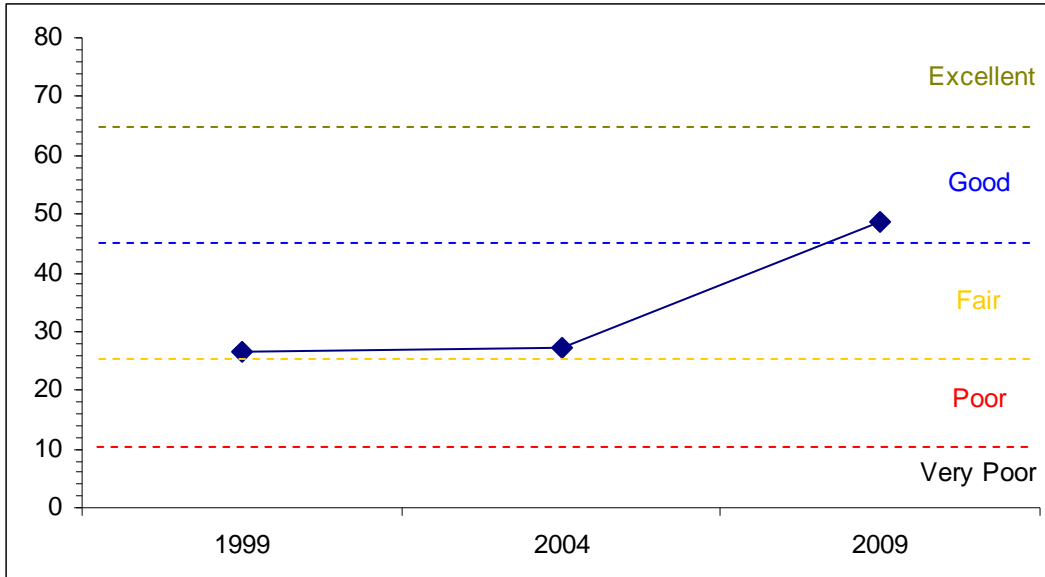
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25A Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 25A, Study no: 4



HERBACEOUS TRENDS--

Management unit 25A, Study no: 4

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	b ₂₂	b ₂₀	a ₃	ab ₇	ab ₁₅	.03	.06	.27
G	Agropyron intermedium	b ₄₆	a ₁₀	a ₂₀	a ₁₅	a ₁₉	.43	.60	.43
G	Agropyron spicatum	a ₆₈	a ₄₈	b ₁₂₄	b ₁₂₃	b ₁₀₉	3.56	5.56	4.15
G	Bromus inermis	a ₁₈	a ₁₂	b ₈₀	b ₈₃	b ₁₀₆	2.65	2.41	4.36
G	Bromus tectorum (a)	-	-	b ₁₁₀	b ₉₂	a ₅₆	.90	2.57	.98
G	Carex sp.	b ₁₂	a ⁻	ab ₂	a ⁻	ab ₄	.03	-	.06
G	Oryzopsis hymenoides	-	-	-	-	-	.00	-	-
G	Poa fendleriana	b ₅₈	b ₄₆	ab ₃₃	a ₁₆	ab ₃₅	.28	.46	1.66
G	Poa secunda	a ₉	ab ₂₀	c ₇₉	b ₃₈	c ₇₁	1.32	.40	.87
G	Sitanion hystrix	c ₇₆	b ₄₂	ab ₂₅	a ₉	a ₁₀	.20	.09	.07
Total for Annual Grasses		0	0	110	92	56	0.90	2.57	0.98
Total for Perennial Grasses		309	198	366	291	369	8.53	9.61	11.89
Total for Grasses		309	198	476	383	425	9.44	12.18	12.88
F	Agoseris glauca	a ₇	b ₂₉	ab ₁₈	a ₄	a ₂	.17	.01	.15
F	Allium sp.	4	5	-	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	a ⁻	a ⁻	b ₅₈	-	-	.46
F	Arabis sp.	-	5	3	4	-	.01	.01	-
F	Astragalus beckwithii	6	10	3	3	-	.00	.03	-
F	Chaenactis douglasii	4	1	11	-	-	.03	-	-
F	Cirsium sp.	a ⁻	b ₂₁	b ₄₀	b ₃₇	b ₂₂	1.23	1.27	.59
F	Collinsia parviflora (a)	-	-	a ₉	c ₁₉₀	b ₇₃	.01	.52	.36
F	Collomia linearis (a)	-	-	a ₁	b ₅₈	a ₃	.00	.17	.00
F	Comandra pallida	ab ₃	b ₁₃	a ₁	a ⁻	a ₁	.00	-	.00
F	Crepis acuminata	2	4	-	2	13	-	.00	.10

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
F	<i>Cymopterus longipes</i>	3	2	-	-	-	-	-	-
F	<i>Draba</i> sp. (a)	-	-	6	3	-	.04	.00	-
F	<i>Epilobium brachycarpum</i> (a)	-	-	b39	a4	a-	.13	.01	-
F	<i>Erigeron eatonii</i>	-	2	6	2	-	.04	.01	-
F	<i>Erigeron pumilus</i>	a8	ab9	b21	a5	a1	.42	.04	.00
F	<i>Eriogonum racemosum</i>	9	15	6	6	7	.04	.23	.11
F	<i>Eriogonum umbellatum</i>	b19	a1	a4	a2	a1	.01	.03	.06
F	<i>Erodium cicutarium</i> (a)	-	3	-	-	-	-	-	-
F	<i>Gayophytum ramosissimum</i> (a)	-	-	b21	b25	a-	.17	.10	-
F	<i>Lactuca serriola</i>	a-	b64	a-	a-	a-	-	-	-
F	<i>Lepidium</i> sp. (a)	-	-	-	7	-	-	.02	-
F	<i>Machaeranthera canescens</i>	b50	b46	a16	a3	a1	.12	.03	.00
F	<i>Medicago sativa</i>	-	-	-	-	-	-	-	.03
F	<i>Microsteris gracilis</i> (a)	-	-	a24	b66	b79	.06	.16	.44
F	<i>Petroradia pumila</i>	a-	a-	b6	b17	b14	.60	.84	1.00
F	<i>Phlox longifolia</i>	a-	b35	a3	b27	b30	.00	.12	.48
F	<i>Polygonum douglasii</i> (a)	-	-	a7	b31	ab24	.02	.09	.21
F	<i>Ranunculus testiculatus</i> (a)	-	-	a8	b63	c178	.01	.16	1.66
F	<i>Sphaeralcea coccinea</i>	-	-	3	-	4	.03	-	.15
F	<i>Tragopogon dubius</i>	ab4	b18	c61	a-	a1	.67	.00	.03
F	<i>Trifolium</i> sp.	a4	b21	a-	a-	a-	-	-	-
F	Unknown forb-perennial	-	3	-	-	-	-	-	-
F	<i>Zigadenus paniculatus</i>	-	-	-	-	2	-	-	.03
Total for Annual Forbs		0	3	115	447	415	0.46	1.25	3.15
Total for Perennial Forbs		123	304	202	112	99	3.40	2.66	2.76
Total for Forbs		123	307	317	559	514	3.87	3.92	5.92

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

BROWSE TRENDS--

Management unit 25A, Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Amelanchier utahensis	0	1	1	-	.03	.00
B	Artemisia tridentata wyomingensis	1	5	5	.15	.38	.30
B	Chrysothamnus depressus	3	4	4	.03	.30	.33
B	Chrysothamnus nauseosus hololeucus	3	1	1	.18	.03	.03
B	Chrysothamnus viscidiflorus viscidiflorus	55	53	61	6.44	5.06	4.53
B	Eriogonum microthecum	2	2	3	.00	.00	.06
B	Gutierrezia sarothrae	33	57	24	1.37	2.36	.12
B	Purshia tridentata	2	1	2	.30	.38	.63
B	Quercus gambelii	1	3	5	2.03	2.24	3.65
B	Sambucus cerulea	1	1	2	.38	.63	.63
B	Tetradymia canescens	4	2	4	.03	.00	.03
Total for Browse		105	130	112	10.92	11.43	10.33

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 4

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	.08	.10
Artemisia tridentata wyomingensis	-	.91	1.14
Chrysothamnus depressus	-	.28	-
Chrysothamnus nauseosus hololeucus	-	.11	.20
Chrysothamnus viscidiflorus viscidiflorus	-	6.90	7.13
Gutierrezia sarothrae	-	5.84	.16
Juniperus osteosperma	-	1.00	-
Purshia tridentata	-	.60	1.63
Quercus gambelii	1.39	2.48	4.83
Sambucus cerulea	-	.36	.45
Tetradymia canescens	-	-	.06

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 4

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.3	1.2
Purshia tridentata	5.2	2.9

BASIC COVER--

Management unit 25A, Study no: 4

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	2.75	6.00	23.77	27.43	32.20
Rock	12.25	38.00	22.90	29.98	22.77
Pavement	3.75	9.00	15.65	29.29	29.79
Litter	72.00	21.00	18.27	14.93	24.03
Cryptogams	.25	0	.01	.00	.39
Bare Ground	9.00	26.00	19.98	8.79	12.98

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 4, Study Name: Durfee Homestead

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.9	7.5	34	38.7	27.3	4.3	38.1	214.4	0.7

PELLET GROUP DATA--

Management unit 25A, Study no: 4

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	8	56	13	-	-	-
Elk	9	7	7	33 (82)	7 (17)	9 (22)
Deer	7	11	10	15 (38)	15 (36)	13 (31)
Cattle	9	1	2	16 (40)	4 (9)	11 (27)
Sheep	-	-	-	-	-	1 (2)

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 4

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Amelanchier utahensis									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	20	0	0	0	20/28
04	20	0	100	-	-	0	100	0	14/17
09	20	0	100	-	-	0	0	0	21/25
Artemisia tridentata wyomingensis									
85	1198	6	22	72	133	44	6	28	13/14
91	66	0	100	0	-	0	0	0	11/7
99	20	0	100	0	-	0	0	0	35/53
04	100	20	80	0	-	40	0	0	16/22
09	140	0	86	14	-	0	0	14	19/23

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Atriplex canescens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	19/27	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
<i>Chrysothamnus depressus</i>										
85	932	14	71	14	66	0	0	0	5/8	
91	0	0	0	0	-	0	0	0	-/-	
99	140	0	100	0	-	29	0	0	5/7	
04	260	0	77	23	-	31	69	8	5/8	
09	280	0	100	0	-	0	0	0	4/10	
<i>Chrysothamnus nauseosus hololeucus</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	60	0	100	-	-	0	0	0	22/32	
04	40	0	100	-	20	0	100	0	21/28	
09	20	0	100	-	-	0	0	0	20/29	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
85	865	31	69	0	66	0	0	0	6/7	
91	2333	100	0	0	199	6	9	0	-/-	
99	3660	5	78	17	-	1	0	8	15/22	
04	4660	5	74	21	-	3	4	41	13/24	
09	3640	8	89	3	100	0	0	3	13/21	
<i>Echinocereus triglochidatus</i>										
85	66	100	0	-	-	0	0	0	-/-	
91	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	-/-	
<i>Eriogonum microthecum</i>										
85	1731	35	62	4	-	8	4	0	7/7	
91	0	0	0	0	-	0	0	0	-/-	
99	60	0	100	0	-	100	0	0	3/13	
04	120	0	100	0	-	0	0	0	7/14	
09	200	0	100	0	-	0	0	0	6/12	
<i>Gutierrezia sarothrae</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	1700	6	94	0	20	0	1	0	8/11	
04	10200	3	97	0	20	0	0	.39	9/12	
09	620	3	97	0	-	0	0	0	8/6	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Pinus edulis</i>									
85	132	50	0	50	-	0	0	100	-/-
91	0	0	0	0	-	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	-/-
<i>Purshia tridentata</i>									
85	532	25	63	12	-	50	13	0	15/25
91	0	0	0	0	-	0	0	0	-/-
99	40	0	100	0	-	0	100	0	20/48
04	20	0	100	0	-	0	100	0	21/57
09	40	0	100	0	-	0	0	0	23/77
<i>Quercus gambelii</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	260	0	100	-	-	0	0	0	69/69
04	600	10	90	-	-	0	0	0	51/37
09	100	0	100	-	-	0	0	0	67/68
<i>Sambucus cerulea</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	20	0	100	-	-	0	0	0	43/52
04	20	0	100	-	-	0	100	0	55/57
09	60	33	67	-	-	0	0	0	38/43
<i>Tetradymia canescens</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
99	100	0	100	0	-	20	0	0	6/14
04	40	0	100	0	-	50	0	0	10/20
09	80	0	50	50	-	25	0	50	10/27

PRAETOR SLOPE - TREND STUDY NO. 25A-5-09

Vegetation Type: Seeded Grasses

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: BLM

Elevation: 7,000 ft (2,133 m)

Aspect: West

Slope: 2%-5%

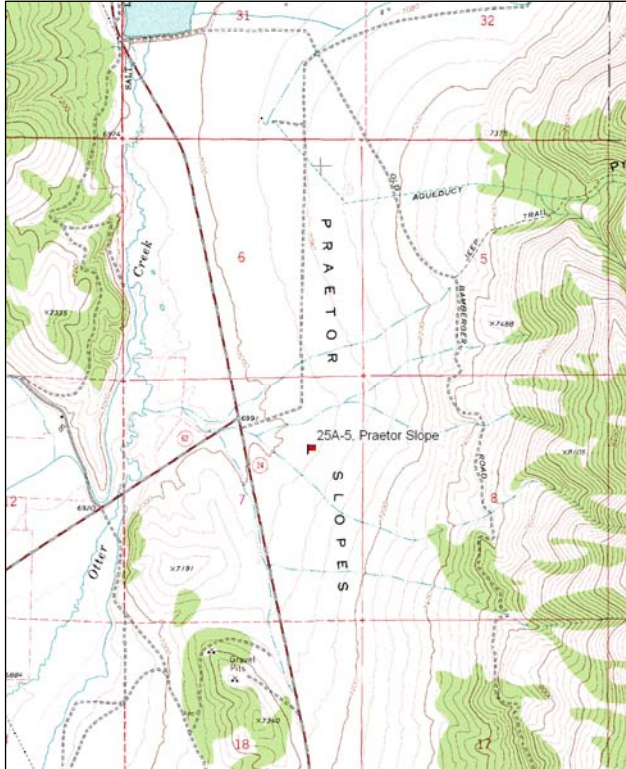
Transect bearing: 168 degrees magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

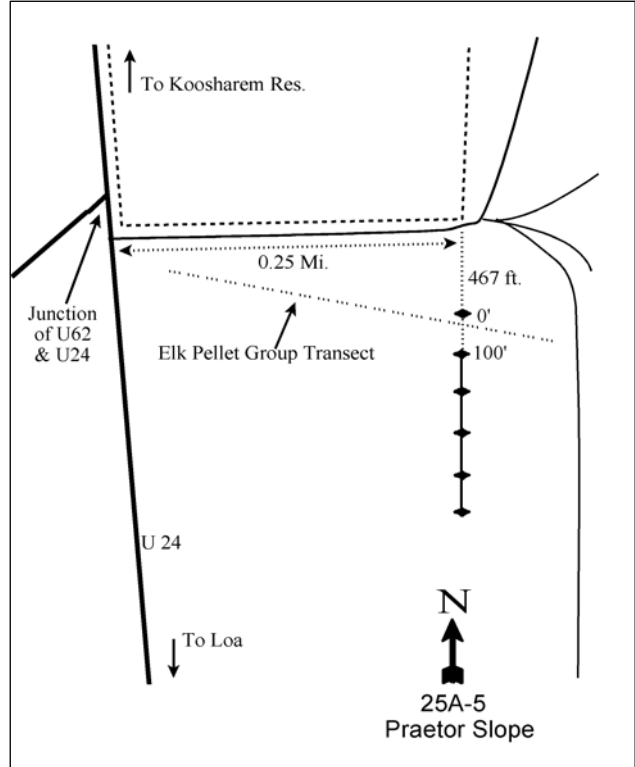
From the junction of U-62 and U-24 south of Koosharem Reservoir, proceed south for 25 yards and turn left onto a dirt road. Go through the gate and up the road 0.25 miles to where the road turns at the fence corner. Walk 467 feet due south from the fence corner to the top of a small rise. The baseline starts here, and is marked by a 5' steel fence post with a blue browse tag #55.

Map Name: Burrville, Utah



Township: 26S, Range: 1E, Section: 7

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 427194 E 4269175 N

PRAETOR SLOPE - TREND STUDY NO. 25A-5

Site Information

Site Description: This study is located south of Koosharem Reservoir and west of state highway U-24 on BLM administered land within the Fishlake grazing allotment. More than 1,400 acres of this area was chained and seeded in 1964, and then 3,000 acres were harrowed and seeded in the fall of 2002. Sheep use this area on a rest rotation grazing system. Deer use has been low in all sample years. Elk use was low until 2009 when it was very heavy. Cattle use was low in 2009 and there was no sign of sheep use (Table - Pellet Group Data).

Browse: Wyoming big sagebrush dominated the site until the harrow treatment in 2002 which removed 90% of sagebrush cover. The site now has little browse remaining. Prior to treatment the sagebrush stand had little recruitment and decadence was moderately high (Table - Browse Characteristics).

Herbaceous Understory: Crested wheatgrass (*Agropyron cristatum*) is the dominant grass species and has provided nearly all the grass cover since 1985. Perennial forbs are rare on the site and bur buttercup has increased steadily in frequency and cover (Table - Herbaceous Trends).

Soil: The soil was classified as loam and is slightly alkaline (pH 7.6) (Table - Soil Analysis Data). Bare ground has fluctuated between 11% and 27% since 1985 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 – down (-2):** Wyoming big sagebrush density decreased 32% from 8,265 plants/acre to 5,598 plants/acre. Decadence increased from 3% to 52%, while recruitment fell from 43% to 4%.
- **1991 to 1999 - stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Wyoming big sagebrush recruitment is very low at 1% and decadence is still high at 30%.
- **1999 to 2004 - down (-2):** There was a harrow treatment applied in 2002, so the decreases in trend were anticipated. Sagebrush density decreased 91% from 4,420 plants/acre to 380 plants/acre and cover decreased from 12% to less than 1%. Decadence increased slightly to 37% and plants displaying poor vigor increased from 11% to 37%. However, recruitment of young plants increased to 11%.
- **2004 to 2009 - up (+2):** Wyoming big sagebrush density increased 31% to 500 plants/acre. Decadence decreased to only 4% and poor vigor decreased to 0%, but recruitment also decreased and is low at 4%. The sagebrush population seems to be recovering from the harrow treatment in 2002.

Grass:

- **1985 to 1991 - stable (0):** The sum of nested frequency for perennial grasses remains similar to the past reading. Crested wheatgrass is the dominant species accounting for nearly 100% of all quadrat frequency.
- **1991 to 1999 - stable (0):** The sum of nested frequency for perennial remains similar to past readings and provides 16% cover. Crested wheat grass still accounts for 100% of grass cover.
- **1999 to 2004 – slightly down (-1):** There was a harrow treatment applied in 2002 that was intended to increase the herbaceous understory. The sum of nested frequency for perennial grasses decreased 10%, but cover increased from 16% to 28%. Crested wheatgrass provided all of the grass cover.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency for perennial grasses increased 11% and cover remained similar at 29%. Crested wheatgrass accounts for 99% of grass cover.

Forb:

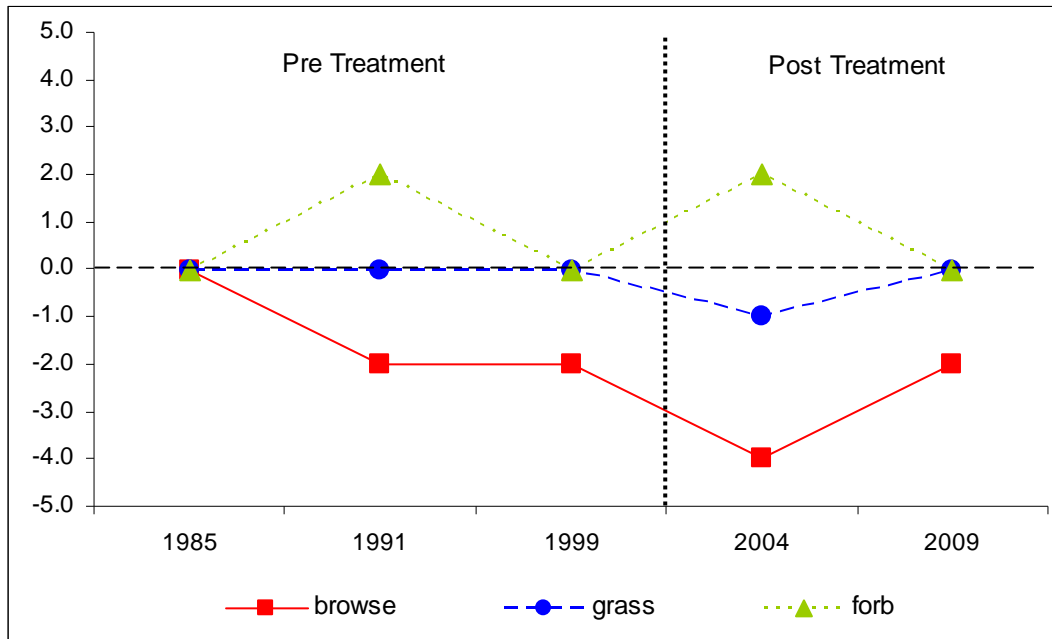
- **1985 to 1991 - up (+2):** The sum of nested frequency for perennial forbs increased three-fold. Forbs are rare on the site and this may be a short term fluctuation.
- **1991 to 1999 - down (-2):** No perennial forbs were sampled this year. Bur buttercup was the only species sampled. Total forb cover is below 1%.
- **1999 to 2004 – up (+2):** There was a harrow treatment applied in 2002 that was intended to increase the herbaceous understory. The sum of nested frequency for perennial forbs increased substantially, as did that of various annual species. Perennial forb cover increased from 0% to 2%, but annual forb cover also increased markedly. Blue flax (*Linum lewisii*) was the most common perennial species, but the annual species, burr buttercup, accounted for 51% of forb cover.
- **2004 to 2009 - down (-2):** The sum of nested frequency for perennial forbs decreased 73% and cover decreased to less than 1%. Bur buttercup provides 96% of forb cover (4% cover).

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
 Management unit 25A, 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
99	15.1	6.0	0.5	30.0	0.0	0.0	0.0	51.6	Good
04	0.4	0.0	0.0	30.0	0.0	3.8	0.0	34.2	Fair
09	1.3	0.0	0.0	30.0	0.0	0.4	0.0	31.6	Fair

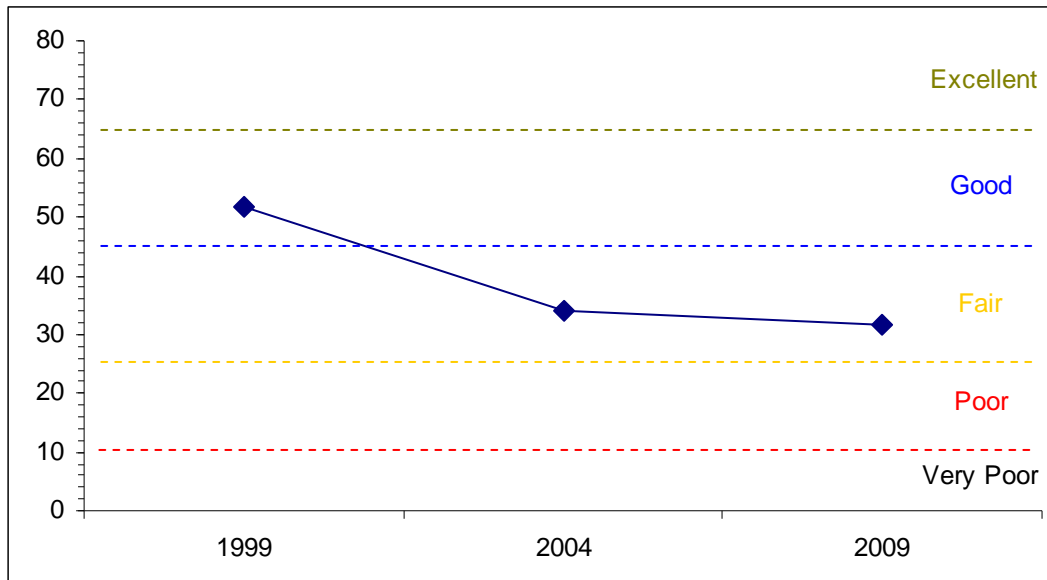
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 25A Study no: 5



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 25A, Study no: 5



HERBACEOUS TRENDS--

Management unit 25A, Study no: 5

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	c329	bc316	bc311	a269	ab298	16.31	27.72	28.59
G	Agropyron intermedium	-	-	-	8	3	-	.09	.03
G	Agropyron smithii	-	-	-	3	-	-	.00	-
G	Poa secunda	a-	a-	a-	a2	b12	-	.00	.33
G	Sitanion hystrix	1	2	-	-	-	-	-	-
G	Stipa lettermani	-	3	1	-	1	.00	-	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		330	321	312	282	314	16.31	27.82	28.95
Total for Grasses		330	321	312	282	314	16.31	27.82	28.95
F	Antennaria rosea	5	-	-	-	3	-	-	.00
F	Arabis sp.	-	1	-	-	-	-	-	-
F	Astragalus beckwithii	-	4	-	-	-	-	-	-
F	Astragalus miser	6	10	-	7	-	-	.09	-
F	Chenopodium fremontii (a)	-	-	-	3	-	-	.00	-
F	Erigeron sp.	6	3	-	-	1	-	-	.03
F	Eriogonum sp.	-	1	-	-	-	-	-	-
F	Gayophytum ramosissimum(a)	-	-	a-	b11	a-	-	.07	-
F	Linum lewisii	a-	a-	a-	b70	a-	-	1.44	-
F	Microsteris gracilis (a)	-	-	-	7	-	-	.01	-
F	Penstemon sp.	-	-	-	1	-	-	.03	-
F	Phlox hoodii	-	-	-	-	2	-	-	.00
F	Phlox longifolia	a-	b57	a-	ab15	a1	-	.06	.03
F	Ranunculus testiculatus (a)	-	-	a29	b185	c266	.15	2.07	3.87
F	Sanguisorba minor	-	-	-	2	-	-	.00	-

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
F	<i>Sphaeralcea grossulariifolia</i>	a ⁻	a ⁻	a ⁻	b ¹⁶	b ¹²	-	.27	.11
F	<i>Trifolium</i> sp.	b ¹⁸	b ³³	a ⁻	a ⁻	a ⁻	-	-	-
Total for Annual Forbs		0	0	29	206	266	0.15	2.17	3.87
Total for Perennial Forbs		35	109	0	111	19	0	1.90	0.18
Total for Forbs		35	109	29	317	285	0.15	4.08	4.05

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

BROWSE TRENDS--

Management unit 25A, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	<i>Artemisia tridentata wyomingensis</i>	90	16	21	12.08	.31	1.00
B	<i>Leptodactylon pungens</i>	0	1	2	-	.00	.00
Total for Browse		90	17	23	12.08	0.31	1.00

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 5

Species	Percent Cover	
	'04	'09
<i>Artemisia tridentata wyomingensis</i>	.33	.63
<i>Leptodactylon pungens</i>	.13	-

BASIC COVER--

Management unit 25A, Study no: 5

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	4.75	4.75	25.31	31.67	32.40
Rock	5.00	13.25	12.26	19.76	10.42
Pavement	24.50	17.75	29.79	16.14	30.94
Litter	44.75	37.00	21.65	25.97	25.81
Cryptogams	0	0	1.10	0	0
Bare Ground	21.00	27.25	11.23	20.52	10.86

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 5, Study Name: Praetor Slope

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.8	7.6	36	39.1	24.9	1.7	14.7	361.6	0.9

PELLET GROUP DATA--

Management unit 25A, Study no: 5

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Sheep	8	-	-	22 (56)	-	-
Rabbit	66	45	34	-	-	-
Elk	1	2	24	1 (2)	4 (10)	73 (180)
Deer	12	1	15	12 (30)	-	2 (5)
Cattle	1	-	2	-	-	4 (9)

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 5

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Artemisia tridentata wyomingensis</i>									
85	8265	43	49	8	733	39	48	6	17/21
91	5598	5	43	52	-	65	8	24	16/18
99	4420	1	68	30	-	62	23	11	21/28
04	380	11	53	37	20	0	16	37	13/16
09	500	4	92	4	-	0	0	0	17/17
<i>Atriplex canescens</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	9/12
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus nauseosus</i>									
85	0	0	0	-	-	0	0	0	-/-
91	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	28/31
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
85	0	0	0	-	-	0	0	0	-/-
91	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	11/8
<i>Leptodactylon pungens</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	20	0	100	-	-	0	0	0	5/7
09	60	0	100	-	-	0	0	0	6/9

		Age class distribution			Utilization				
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Opuntia sp.									
85	66	0	100	-	-	0	0	0	6/9
91	66	0	100	-	-	0	0	0	2/2
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-

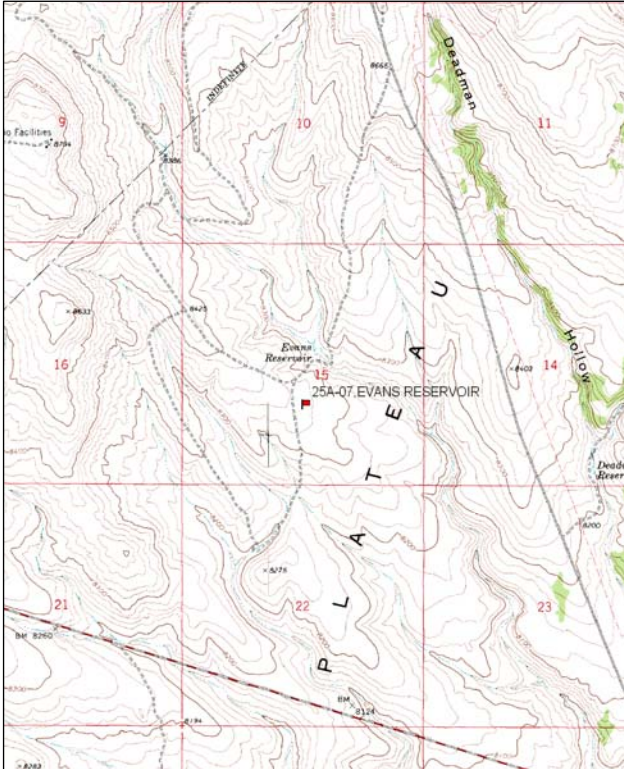
EVANS RESERVOIR - TREND STUDY NO. 25A-7-09

Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 8,300 ft (2,530 m)
Aspect: North
Slope: 2%-5%
Transect bearing: 180 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

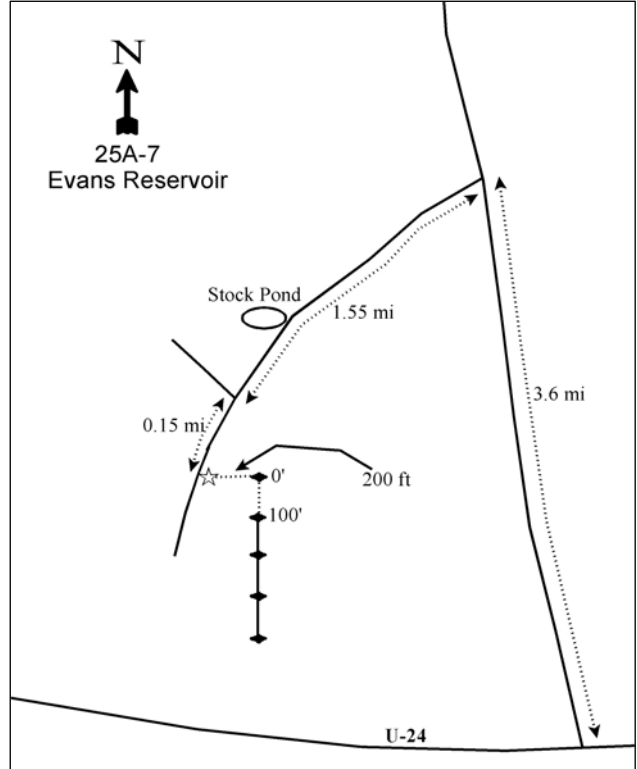
Heading northwest out of Loa on U-24, turn right at mile marker 45. Go 3.5 miles to a green and yellow fence post on the left (20 feet off the road). Continue about 0.1 miles past the fence post and turn left. Go 1.55 miles past a stock pond and up to a fork. Turn left at the fork and go 0.15 miles to a steel rebar witness post on the left side of the road. From the witness post, walk 200 feet east to the 0-foot baseline stake, a rebar with browse tag #7122.

Map Name: Abes Knoll, Utah



Township: 27S, Range: 1E, Section: 15

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 431095 E 4257134 N

EVANS RESERVOIR - TREND STUDY NO. 25A-7

Site Information

Site Description: This study is located on an open rolling ridge on the Awapa Plateau. The area was two-way Dixie harrowed and fourteen species were seeded in the fall of 1999. A small stock pond is located a quarter of a mile north of the transect and sheep graze the area in the spring and fall as part of the Fishlake allotment. Both deer and antelope use the area and sage grouse have been seen. Deer/antelope use was moderate in 1999 and 2004 then was very high in 2009. Elk use was high in 1999 and moderate in 2004 and 2009 (Table - Pellet Group Data).

Browse: Key browse species are mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*Artemisia nova*). Following the two-way harrow treatment in the fall of 1999 there was a substantial decrease in sagebrush cover (Table - Browse Trends) and density, as well as an improvement in decadence rates (Table - Browse Characteristics).

Herbaceous Understory: Perennial native grasses dominate the understory and provide good cover. Bluebunch wheatgrass (*Agropyron spicatum*) and Indian ricegrass (*Oryzopsis hymenoides*) are the predominant species and have provided an average of 67% of grass cover since 1999. The forb community is diverse and perennial species have provided an average of 4% cover since 1999. Desert phlox (*Phlox austromontana*) has consistently been the most common forb since 1999 (Table - Herbaceous Trends).

Soil: The soil was classified as sandy loam with a neutral pH (7.1). Organic matter and phosphorus are low and phosphorus may limit plant growth and development (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Vegetation cover has increased from 11% in 1985 to 34% in 2009 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 – slightly down (-1):** Mountain big sagebrush density decreased 24% to 4,732 plants/acre. Decadence improved from 47% to 28% and recruitment of young plants is increased from poor at 3% to good at 10%. Black sagebrush density decreased 29% and decadence decreased from 59% to 48%, which is still considered high. No new recruitment of young black sagebrush was sampled.
- **1991 to 1999 – slightly down (-1):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Mountain big sagebrush decadence increased to 53% and recruitment of young plants remained good at 10%. Black sagebrush decadence remained high at 43% and young plants comprised 6% of the population.
- **1999 to 2004 - down (-2):** This reading followed the two-way dixie harrow completed in the fall of 1999, so the downward trend was expected. Following the treatment mountain big sagebrush density decreased 63% from 4,360 to 1,620 plants/acre and cover decreased from 10% to 3%. However, decadence of mountain big sagebrush decreased to 31%. Recruitment of young mountain sagebrush plants also decreased slightly to 7%. Black sagebrush density decreased 56% from 4,140 to 1,820 plants/acre and cover decreased from 7% to 2%. Black sagebrush decadence also decreased to 14% and recruitment of young plants remained similar at 5%.
- **2004 to 2009 – slightly up (+1):** Mountain big sagebrush density increased 14% to 1,860 plants/acre. Decadence is still moderately high at 31% and recruitment is low at 6%. Black sagebrush density increased 17% to 2,140 plants/acre. Decadence of black sagebrush remained similar at 18%, but recruitment of young plants increased to 13%.

Grass:

- **1985 to 1991 - up (+2):** The sum of nested frequency for perennial grasses increased 47%. Primary species include mutton bluegrass (*Poa fendleriana*), bottlebrush squirreltail (*Sitanion hystrix*) and Pinewoods needlegrass (*Stipa pinetorum*).
- **1991 to 1999 – slightly down (-1):** The sum of nested frequency for perennial grasses decreased 12% and cover is at 13%. Bluebunch wheatgrass and mutton bluegrass combined provided 69% of grass cover.
- **1999 to 2004 - stable (0):** This reading followed the two-way dixie harrow completed in the fall of 1999 and was intended to increase the herbaceous understory. Following the treatment the sum of nested frequency for perennial grasses is similar to the past reading, but perennial grass cover increased to 19%. Bluebunch wheatgrass and mutton bluegrass combined to provide 76% of grass cover.
- **2004 to 2009 - stable (0):** The sum of nested frequency and cover of perennial grasses is similar to the last reading. Bluebunch wheatgrass, mutton bluegrass and pinewoods needlegrass combined to provide 90% of grass cover.

Forb:

- **1985 to 1991 - up (+2):** The sum of nested frequency for perennial forbs increased 21%. Desert phlox is the most frequent species.
- **1991 to 1999 - down (-2):** The sum of nested frequency for perennial forbs decreased 25% and cover is at 5%. Timber poisonvetch (*Astragalus convallarius*) provided 41% of the forb cover.
- **1999 to 2004 - down (-2):** This reading followed the two-way dixie harrow completed in the fall of 1999 that was intended to increase the herbaceous understory. Following the treatment the sum of nested frequency for perennial forbs decreased 22% and perennial forb cover decreased to 3%. Desert phlox is the most common forb species.
- **2004 to 2009 – slightly down (-1):** The sum of nested frequency for perennial forbs decreased 12% and forb cover remained at 3%.

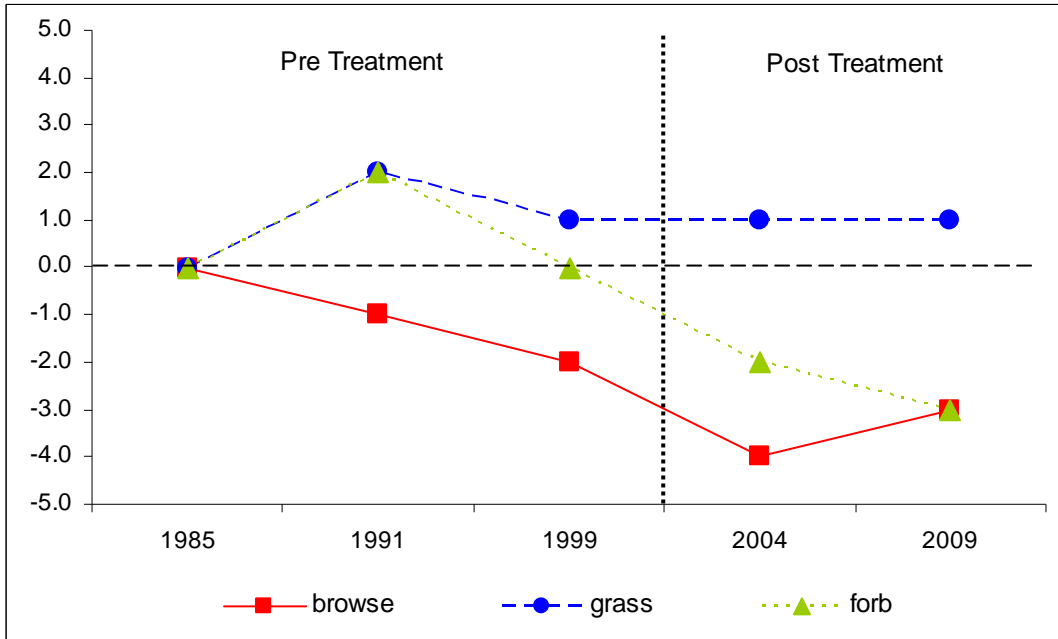
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 25A, study no: 7

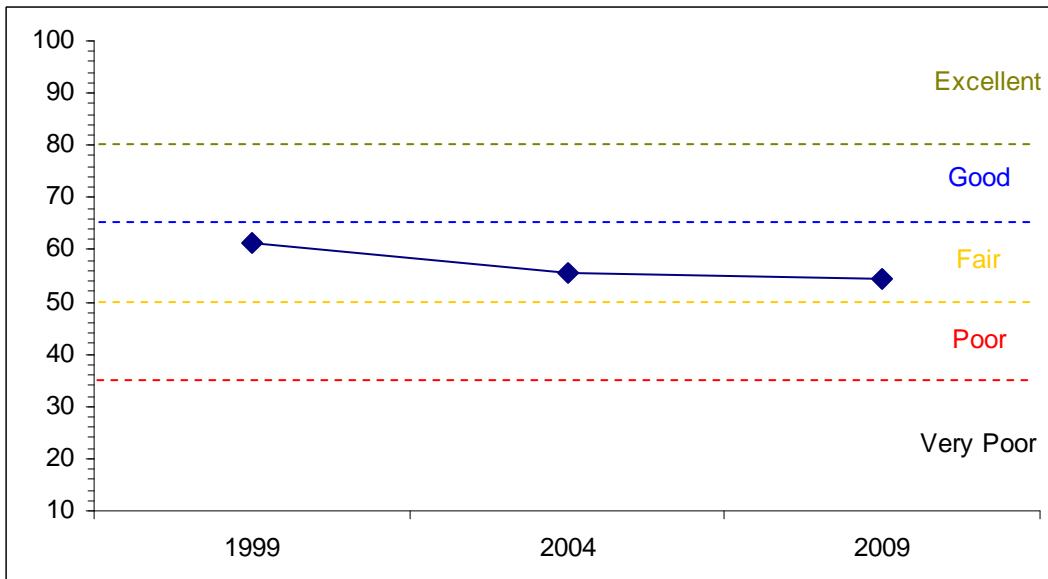
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	20.9	0.4	4.2	26.0	0.0	10.0	0.0	61.5	Fair
04	7.6	8.0	3.1	30.0	0.0	6.8	0.0	55.5	Fair
09	7.3	7.4	4.2	30.0	0.0	5.5	0.0	54.4	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25A Study no: 7



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 25A, Study no: 7



HERBACEOUS TRENDS--
Management unit 25A, Study no: 7

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	a-	a-	a-	b19	b14	-	.28	.65
G	Agropyron intermedium	a-	a-	a-	a-	b6	-	.00	.21
G	Agropyron spicatum	a2	b51	c127	c116	c113	4.24	6.28	5.76
G	Agropyron trachycaulum	-	-	-	3	-	-	.03	-
G	Bouteloua gracilis	37	40	50	39	34	.65	.75	1.29
G	Carex sp.	6	4	18	19	25	.56	.29	.20
G	Oryzopsis hymenoides	-	2	7	3	6	.33	.06	.06
G	Poa fendleriana	abc136	bc168	ab139	c178	a120	4.73	8.13	4.46
G	Poa secunda	b44	a16	a10	a4	a2	.09	.04	.03
G	Sitanion hystrix	b62	c119	a25	ab45	ab38	.71	1.11	.95
G	Stipa comata	a-	a-	b5	b7	b7	.21	.24	.22
G	Stipa pinetorum	ab81	d142	bc97	a47	cd115	1.47	1.64	4.13
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		368	542	478	480	480	13.02	18.89	18.00
Total for Grasses		368	542	478	480	480	13.02	18.89	18.00
F	Androsace septentrionalis (a)	-	-	b29	a5	a-	.19	.01	-
F	Arabis demissa	b62	a19	a3	a6	a10	.00	.01	.06
F	Aster sp.	-	1	-	-	-	-	-	-
F	Astragalus convallarius	a6	a14	c71	b39	ab25	2.23	.31	.20
F	Astragalus sp.	1	-	-	-	-	-	-	-
F	Castilleja chromosa	-	5	-	-	-	-	-	-
F	Chaenactis douglasii	-	3	8	-	-	.02	-	-
F	Chenopodium leptophyllum(a)	-	-	-	-	3	-	-	.00
F	Collinsia parviflora (a)	-	-	-	-	3	-	-	.03
F	Comandra pallida	-	-	4	2	2	.06	.03	.03
F	Cryptantha sp.	b58	b68	a17	a19	a5	.25	.16	.04
F	Erigeron pumilus	3	1	5	12	4	.01	.13	.04
F	Eriogonum alatum	-	-	2	-	3	.00	-	.00
F	Eriogonum racemosum	-	-	1	3	2	.01	.06	.03
F	Eriogonum umbellatum	14	11	10	4	4	.21	.09	.04
F	Gayophytum ramosissimum(a)	-	-	-	19	12	-	.06	.03
F	Lactuca serriola	-	3	-	-	-	-	-	-
F	Lappula occidentalis (a)	-	-	-	8	-	-	.02	-
F	Linum lewisii	a1	ab17	ab29	a1	b15	.30	.00	.06
F	Lotus utahensis	b55	a-	ab16	ab16	a4	.36	.80	.04
F	Penstemon comarrhenus	-	-	-	1	2	-	.03	.03
F	Phlox austromontana	a67	b130	ab101	b100	ab102	1.83	1.67	2.07
F	Phlox longifolia	ab9	b19	a-	ab9	a2	-	.03	.00
F	Sanguisorba minor	b6	a-	a-	a-	a-	-	-	-
F	Senecio multilobatus	a3	b61	a6	a-	a6	.05	-	.04
F	Streptanthus cordatus	-	5	-	2	-	-	.03	-
F	Tragopogon dubius	-	-	-	-	2	-	-	.03
F	Trifolium sp.	a-	b13	a5	a2	a3	.01	.01	.00

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
F	Unknown forb-perennial	_b 20	a ⁻	a ⁻	a ⁻	a ⁻	-	-	-
F	Zigadenus paniculatus	2	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	29	32	18	0.19	0.09	0.06
Total for Perennial Forbs		307	370	278	216	191	5.38	3.40	2.75
Total for Forbs		307	370	307	248	209	5.57	3.49	2.82

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

BROWSE TRENDS--

Management unit 25A, Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia nova	65	42	47	6.79	2.40	2.15
B	Artemisia tridentata vaseyana	85	47	55	9.89	3.47	3.54
B	Chrysothamnus viscidiflorus viscidiflorus	30	42	36	.46	1.54	1.73
B	Coryphantha vivipara	1	0	0	.00	-	-
B	Eriogonum corymbosum	1	2	1	.03	.03	.00
B	Eriogonum microthecum	3	13	10	.06	.18	.18
B	Gutierrezia sarothrae	1	24	28	.00	.91	.29
B	Kochia prostrata	0	0	0	-	.02	-
B	Leptodactylon pungens	18	25	21	.09	.23	.48
B	Opuntia sp.	1	0	1	.00	-	.00
B	Tetradymia canescens	0	2	2	-	.00	.00
Total for Browse		205	197	201	17.33	8.82	8.39

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 7

Species	Percent Cover	
	'04	'09
Artemisia nova	3.54	3.48
Artemisia tridentata vaseyana	5.09	5.84
Chrysothamnus viscidiflorus viscidiflorus	2.26	.73
Eriogonum microthecum	.16	-
Gutierrezia sarothrae	1.03	1.20
Leptodactylon pungens	.25	.16

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 7

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.0	1.1

BASIC COVER--

Management unit 25A, Study no: 7

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	11.00	8.75	35.34	32.10	33.76
Rock	0	4.00	1.35	2.43	.39
Pavement	54.75	33.00	25.01	31.26	14.33
Litter	26.25	30.25	25.26	31.07	35.95
Cryptogams	.50	1.00	.08	.03	0
Bare Ground	7.50	23.00	10.93	16.96	20.91

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 7, Study Name: Evans Reservoir

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
9.3	7.1	59.3	21.4	19.3	1.7	8.8	217.6	1.2

PELLET GROUP DATA--

Management unit 25A, Study no: 7

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	45	53	58	-	-	-
Grouse	2	2	-	26 pellets/acre	-	17 pellets/acre
Elk	38	14	53	51 (126)	25 (63)	25 (61)
Deer	5	18	9	16 (40)	15 (36)	80 (198)
Antelope	1	3	-	-	5 (12)	-

BROWSE CHARACTERISTICS--

Management unit 25A, 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 nova										
85	3731	4	37	59	199	36	54	11	10/9	
91	2665	0	52	48	-	75	0	23	8/16	
99	4140	6	51	43	80	44	1	24	11/19	
04	1820	5	80	14	2180	0	0	4	8/16	
09	2140	13	69	18	60	18	12	15	9/15	
Artemisia tridentata vaseyana										
85	6265	3	50	47	533	68	11	9	15/21	
91	4732	10	62	28	266	49	34	17	18/26	
99	4360	10	37	53	-	62	10	15	17/29	
04	1620	7	62	31	1480	12	6	11	14/23	
09	1860	6	62	31	20	11	20	18	14/22	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
85	1066	0	69	31	133	0	0	6	5/4	
91	332	40	40	20	-	20	20	20	5/6	
99	1220	8	87	5	-	0	0	0	8/10	
04	1540	1	97	1	160	0	0	0	9/15	
09	1200	0	95	5	-	0	0	8	7/12	
<i>Coryphantha vivipara</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	-	0	0	0	2/4	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
<i>Eriogonum corymbosum</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	40	50	50	-	-	0	0	0	7/6	
04	60	0	100	-	-	33	0	0	9/12	
09	20	0	100	-	-	0	0	0	8/12	
<i>Eriogonum microthecum</i>										
85	399	0	100	-	-	0	0	0	7/5	
91	466	29	71	-	-	57	29	0	5/7	
99	80	0	100	-	-	25	0	0	4/4	
04	440	5	95	-	-	0	5	0	7/11	
09	200	0	100	-	-	0	0	0	6/9	
<i>Gutierrezia sarothrae</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	20	0	100	0	-	0	0	0	3/7	
04	920	0	100	0	100	0	0	0	9/13	
09	1100	5	75	20	-	13	0	15	6/9	
<i>Kochia prostrata</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	360	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	12/5	
<i>Leptodactylon pungens</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	600	7	93	0	-	0	0	0	6/7	
04	820	7	88	5	-	0	0	5	6/10	
09	780	0	100	0	-	0	0	3	5/9	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Opuntia</i> sp.										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	-	0	0	0	5/13	
04	0	0	0	-	-	0	0	0	6/9	
09	20	0	100	-	-	0	0	0	4/11	
<i>Symphoricarpos oreophilus</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	66	100	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	11/27	
09	0	0	0	-	-	0	0	0	6/19	
<i>Tetradymia canescens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	80	75	25	-	-	0	0	0	4/5	
09	40	0	100	-	-	0	0	0	4/4	

LOWER DOG FLAT - TREND STUDY NO. 25A-8-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: BLM

Elevation: 8,100 ft (2,469 m)

Aspect: South

Slope: 13%-15%

Transect bearing: 165 degrees magnetic

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

Directions:

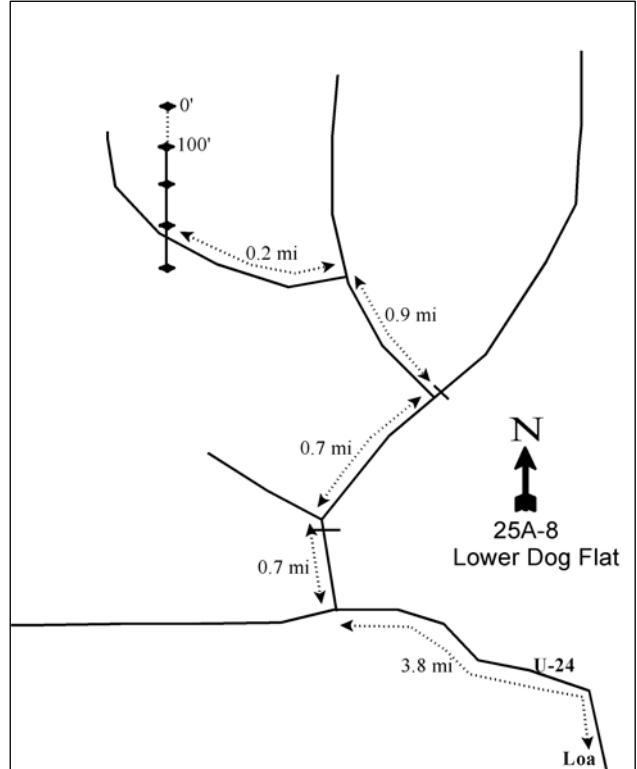
From Loa, go 3.8 miles northwest on U-24 (0.9 miles beyond mile marker 49). Turn right (north) on a gravel road and proceed 0.7 miles. Just beyond the cattleguard turn right and go another 0.7 miles. Turn left just before another cattleguard and go 0.9 miles. At the bottom of the hill, a road forks off to the left, through a wash, up a steep hill and west into the chaining. Take this road 0.2 miles and stop at a 3' rebar post on the right side of the road marking the 300' stake of the baseline. The 0-foot baseline stake is marked by browse tag #7188.

Map Name: Loa, Utah



Township: 27S, Range: 2E, Section: 17

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 437801 E 4257498 N

LOWER DOG FLAT - TREND STUDY NO. 25A-8

Site Information

Site Description: This study is located on the eastern side of the Awapa Plateau in a chaining completed in 1980. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and broom snakeweed (*Gutierrezia sarothrae*) are the principal species, while seeded species did not establish well. The area was retreated with a dixie harrow as part of the Seven Mile WRI project ([Project# 594](#)) in the fall of 2006 to rejuvenate the sagebrush and improve the grass/forb composition with a native/non-native seed mix of grass, forb, and shrubs (Table - Seed Mix). The study transect intersected across the treatment edge with two of the frequency belts inside the treatment area and three of the frequency belts outside the treatment area. As part of the BLM’s Seven Mile allotment, cattle graze the area for about 20 days in May under a deferred grazing system. Pellet group data estimated moderate deer use from 1999 to 2004 and heavy use in 2009. Elk and cattle use was light in all sample years (Tables – Pellet Group Data).

Browse: Mountain big sagebrush is the key browse species and all sagebrush has been classified as mountain big sagebrush although some individuals resemble black sagebrush (*Artemisia nova*). It has maintained a good population with moderate decadence, but recruitment has decreased steadily. Broom snakeweed has periodically had very high densities (Table - Browse Characteristics).

Herbaceous Understory: Grass composition is dominated by blue grama (*Bouteloa gracilis*) which has provided more than 80% of grass cover since 1999. Forbs are rare on this site and have provided less than 1% cover since 1999. Seeded species have not established well (Table - Herbaceous Trends).

Soil: The soil is classified as a clay loam with a neutral pH (7.1) (Table - Soil Analysis Data). A dense hardpan is located at about a foot in depth. Bare ground has ranged from 13% to 22% since 1985 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

SEED MIX

Management unit 25A; study no. 8

Project name: Seven Mile - Low elevation

WRI Database #: 594

Mix lot # sr-tt-smle-07	Size (acre):		4400
Seed type	lbs in mix	lbs/acre	
Crested Wheatgrass 'Ephraim'	2200	0.50	
Crested Wheatgrass 'Hycrest'	2220	0.50	
Pubescent Wheatgrass	2200	0.50	
Big Bluegrass 'Sherman'	1169	0.27	
Great Basin Wildrye 'Trailhead'	3535	0.80	
Russian Wildrye	70	0.02	
Sheep Fescue	1100	0.25	
Yellow Sweetclover	1100	0.25	
Blue Flax	1433	0.33	
Alfalfa 'Ladak'	2200	0.50	
Sandberg Bluegrass 'Toole MT'	1094	0.25	
Small Burnet 'Delar'	8800	2.00	
Annual Sunflower--Millard UT	140	0.03	
Russian Wildrye	4350	0.99	
TOTAL:	31611	7.18	

Trend Assessments

Browse:

- **1985 to 1991 - slightly up (+1):** Mountain big sagebrush density increased 17% due to an increase in the recruitment of young plants from 27% to 40% of the population. Decadence of mountain big sagebrush decreased slightly from 15% to 13%.
- **1991 to 1999 - stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Mountain big sagebrush decadence remained similar at 15%, but recruitment of young plants decreased substantially to 12%.
- **1999 to 2004 - stable (0):** Mountain big sagebrush densities are similar to past years. Decadence has increased to 21% and recruitment is low at 3%.
- **2004 to 2009 - down (-2):** Mountain big sagebrush density decreased 23%. Decadence is at 18% and recruitment is still low at 2%.

Grass:

- **1985 to 1991 – slightly down (-1):** The sum of nested frequency of perennial grasses decreased 14%. Blue grama and bottlebrush squirreltail (*Sitanion hystrix*) are the most frequent species.
- **1991 to 1999 – slightly up (+1):** The sum of nested frequency of perennial grasses increased 17% and cover is at 9%. Blue grama accounts for 82% of grass cover.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased 37%, with a slight decrease in cover to 8%. Blue grama provided 92% of grass cover.
- **2004 to 2009 – slightly down (-1):** The sum of nested frequency of perennial grasses decreased 14%, and cover decreased to 4%. Blue grama provides 91% of grass cover.

Forb:

- **1985 to 1991 – slightly down (-1):** The forb component is poor so even small changes affect the trend. The sum of nested frequency of perennial forbs decreased by 14%. No one species is especially common.
- **1991 to 1999 – slightly up (+1):** The sum of nested frequency of perennial forbs increased 17%. Perennial forb cover is below 1%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased 37% and cover decreased to near 0%.
- **2004 to 2009 – slightly down (-1):** The sum of nested frequency of perennial forbs decreased 14% and forb cover is still near 0%.

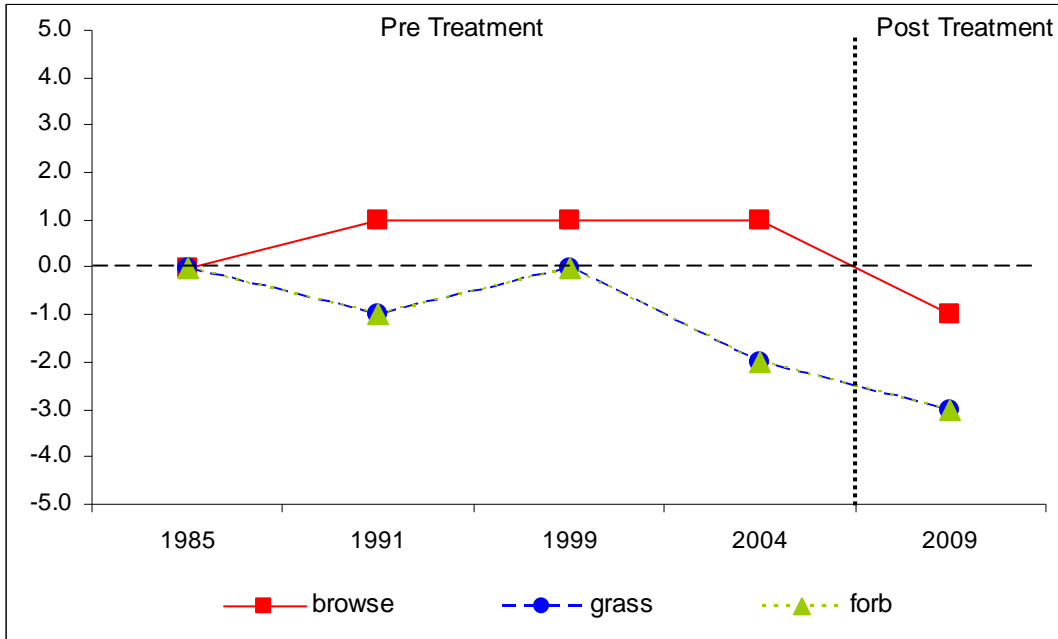
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 25A, study no: 8

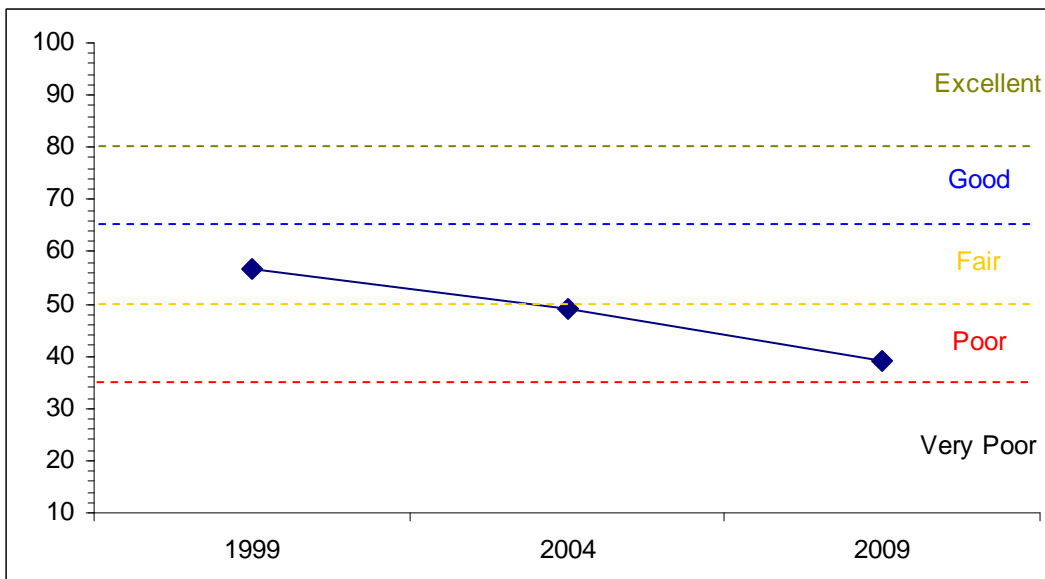
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	22.2	10.5	6.0	17.4	0.0	0.5	0.0	56.6	Fair
04	23.1	8.7	1.5	15.7	0.0	0.1	0.0	49.1	Poor-Fair
09	19.7	9.6	1.0	8.8	0.0	0.0	0.0	39.1	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25A Study no: 8



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 25A, Study no: 8



HERBACEOUS TRENDS--
Management unit 25A, Study no: 8

T y P e	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	c43	a-	b14	a-	a-	.07	-	-
G	Agropyron intermedium	6	-	2	-	-	.00	-	-
G	Agropyron sp.	-	7	-	-	-	-	-	-
G	Agropyron spicatum	b26	a-	a-	a-	a-	-	-	-
G	Bouteloua gracilis	a115	b166	c215	bc193	ab162	7.15	7.20	4.01
G	Bromus inermis	c141	a-	b11	a-	a-	.13	-	-
G	Koeleria cristata	-	-	4	-	5	.03	-	.09
G	Oryzopsis hymenoides	-	-	-	4	2	-	.03	.06
G	Poa fendleriana	2	-	3	-	-	.00	-	-
G	Sitanion hystrix	a41	b149	b137	a49	a43	1.27	.61	.25
G	Stipa comata	-	-	3	-	-	.03	-	-
G	Stipa pinetorum	b17	ab13	a3	a-	a-	.00	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		391	335	392	246	212	8.71	7.85	4.41
Total for Grasses		391	335	392	246	212	8.71	7.85	4.41
F	Androsace septentrionalis (a)	-	-	b27	b16	a3	.14	.04	.00
F	Antennaria rosea	-	-	-	3	-	-	.00	-
F	Arabis demissa	b27	b20	a3	a2	a-	.00	.00	-
F	Astragalus sp.	3	-	-	4	-	-	.00	-
F	Chaenactis douglasii	3	-	-	-	-	-	-	-
F	Chenopodium sp. (a)	-	-	-	4	-	-	.01	-
F	Cryptantha sp.	b16	b10	a-	ab5	a-	-	.01	-
F	Descurainia pinnata (a)	-	10	5	6	-	.01	.01	-
F	Erigeron pumilus	ab16	bc22	c40	a5	ab5	.21	.01	.02
F	Eriogonum ovalifolium	6	3	3	3	-	.03	.00	-
F	Machaeranthera canescens	2	-	-	-	-	-	-	-
F	Medicago sativa	b16	a-	a-	a-	a-	-	-	-
F	Melilotus officinalis	8	-	-	-	-	-	-	-
F	Penstemon comarrhenus	1	-	-	-	-	-	-	-
F	Phlox longifolia	a4	b22	a4	a3	a2	.01	.01	.00
F	Salsola iberica (a)	-	-	-	-	3	-	-	.01
F	Salsola pestifer (a)	2	-	-	-	-	-	-	-
F	Sanguisorba minor	3	-	-	-	-	-	-	-
F	Unknown forb-perennial	b11	a-	a-	a-	a-	-	-	-
Total for Annual Forbs		2	10	32	26	6	0.15	0.06	0.01
Total for Perennial Forbs		116	77	50	25	7	0.25	0.05	0.02
Total for Forbs		118	87	82	51	13	0.41	0.11	0.03

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

BROWSE TRENDS--

Management unit 25A, Study no: 8

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia nova	1	0	0	.00	-	-
B	Artemisia tridentata vaseyana	93	92	89	17.72	18.47	15.73
B	Gutierrezia sarothrae	84	75	38	1.20	2.07	.17
B	Opuntia sp.	2	2	3	.00	.00	.00
B	Pediocactus simpsonii	0	2	0	-	.03	-
B	Pinus edulis	0	0	1	-	-	.03
Total for Browse		180	171	131	18.93	20.59	15.95

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 8

Species	Percent Cover	
	'04	'09
Artemisia tridentata vaseyana	21.50	15.80
Gutierrezia sarothrae	1.70	.40

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 8

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	1.7	1.2

POINT-QUARTER TREE DATA--

Management unit 25A, Study no: 8

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus scopulorum	6	<18	<18	3.3	-	-
Pinus edulis	7	25	22	2.5	1.9	2.7

BASIC COVER--

Management unit 25A, Study no: 8

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	8.00	7.50	27.16	27.31	20.89
Rock	8.00	29.75	24.86	24.52	20.85
Pavement	33.00	17.25	24.32	22.38	15.73
Litter	37.00	29.75	20.95	22.14	23.79
Cryptogams	0	0	.08	.24	.03
Bare Ground	14.00	15.75	13.14	20.08	21.82

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 8, Study Name: Lower Dog Flat

Effective rooting depth (in)	pH	clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10.7	7.3	43.3	29.4	27.3	2.3	6.7	201.6	0.7

PELLET GROUP DATA--

Management unit 25A, Study no: 8

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	26	43	56	-	-	-
Elk	3	1	2	1 (3)	2 (5)	7 (18)
Deer	10	13	9	17 (43)	21 (53)	61 (150)
Cattle	4	1	2	8 (20)	5 (13)	5 (13)

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 8

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia frigida</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	20	0	0	0	-/-
<i>Artemisia nova</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	20	0	100	-	-	100	0	0	5/9
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Artemisia tridentata vaseyana</i>									
85	5331	27	58	15	5333	1	0	0	18/17
91	6265	40	47	13	866	9	0	5	19/18
99	6180	12	72	15	100	37	17	6	16/26
04	6540	3	76	21	4740	48	17	7	16/28
09	5020	2	81	18	-	26	0	6	15/23
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	5/6
09	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
85	18466	34	66	0	12933	0	0	0	9/9
91	4331	28	58	14	12599	8	0	5	2/3
99	20580	68	31	0	2800	0	0	.09	6/6
04	6800	14	86	0	640	0	0	0	6/8
09	1340	1	99	0	20	0	0	0	6/5

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Leptodactylon pungens										
85	133	0	100	0	66	0	0	0	7/7	
91	198	33	33	33	-	33	0	0	3/4	
99	0	0	0	0	-	0	0	0	-/-	
04	0	0	0	0	-	0	0	0	-/-	
09	0	0	0	0	-	0	0	0	-/-	
Opuntia sp.										
85	133	100	0	-	-	0	0	0	-/-	
91	66	100	0	-	-	0	0	0	-/-	
99	40	0	100	-	-	0	0	0	3/7	
04	40	0	100	-	-	0	0	0	3/10	
09	60	0	100	-	-	0	0	0	4/11	
Pediocactus simpsonii										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	40	50	50	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	0/1	
Pinus edulis										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	40	0	0	0	-/-	
04	0	0	0	-	20	0	0	0	-/-	
09	20	0	100	-	20	0	0	0	-/-	

ROW OF PINES - TREND STUDY NO. 25A-9-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: BLM

Elevation: 8,400 ft (2,560 m)

Aspect: South

Slope: 0%-3%

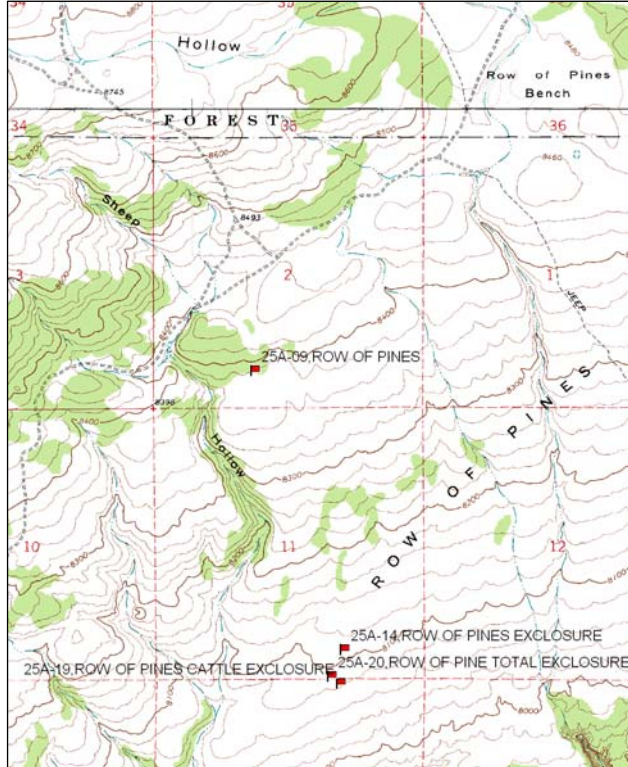
Transect bearing: 165 degrees magnetic

Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), belt 4 rebar @ 3'

Directions:

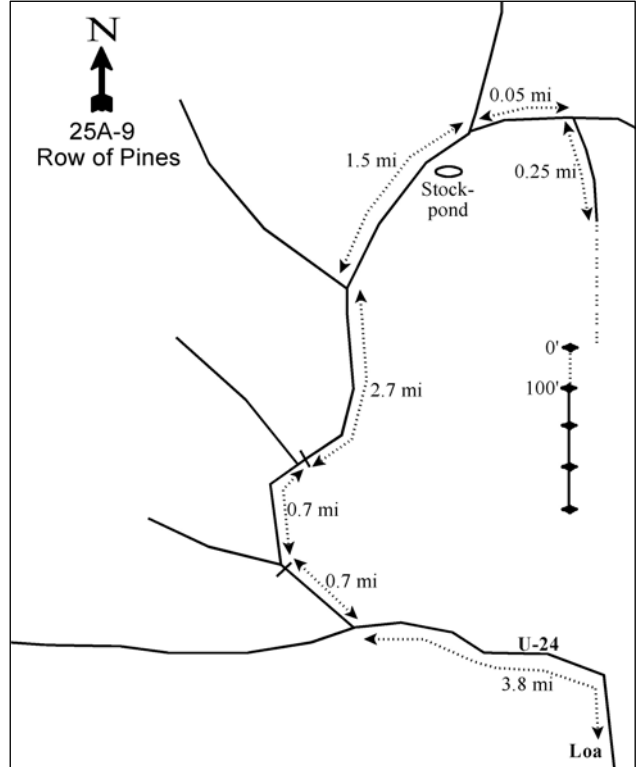
From Loa, proceed northwest on U-24 for 3.8 miles (0.9 miles beyond mile marker 49). Turn right and go 0.7 miles to a cattleguard. Just beyond the cattleguard turn right and go another 0.7 miles. Turn right and go across a cattleguard. Proceed 2.7 miles to an intersection, turn right and continue 1.3 miles to a stock pond on the east side of the road. Continue 0.2 miles to a fork, turn right and go 0.05 miles. Turn right and go 0.25 miles to the end of the road, where a pellet group transect begins. On the left side of the road is a gray fence post which marks the north end of the pellet transect. Count 16 stakes south through the belt of pinyon-juniper (the 16th stake is 25 feet from the trees). The beginning of the frequency baseline is 50 feet west of the 16th pellet group stake. Rebar (2-1/2 feet tall) is used to mark the transect, the 0-foot baseline stake has a red browse tag #7064 attached.

Map Name: Loa, Utah



Township: 27S, Range: 2E, Section: 2

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 442149 E 4259915 N

ROW OF PINES - TREND STUDY NO. 25A-9

Site Information

Site Description: This study is located on the gently sloping Row of Pines Bench, north of Loa. The area is a sagebrush-steppe with a few scattered trees. As part of the Seven Mile allotment, cattle graze the area for about 20 days in May on a deferred rotation system. Pellet group data has estimated varied use by deer depending on the year. Elk and cattle use has been consistently low (Table – Pellet Group Data).

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the key browse species. The average density since 1991 is over 7,000 plants/acre. Decadence has, historically, been high and recruitment of young has tended to be low. Broom snakeweed (*Gutierrezia sarothrae*) is the most abundant browse species but the population has varied between 500 and 11,000 plants/acre over the sample years (Table - Browse Characteristics).

Herbaceous Understory: Blue grama (*Bouteloa gracilis*) is the most abundant herbaceous species and provides little to no forage, especially as a warm season grass in a May allotment. Bottlebrush squirreltail (*Sitanion hystrix*) occurs with some frequency, though it has not provided much cover. Forbs are very rare on the site and have not provided over 1% cover since 1999 (Table - Herbaceous Trends).

Soil: The soil has been classified as a sandy clay loam with a neutral pH (6.9) (Table - Soil Analysis Data). The percent bare ground has ranged from 18% to 28% since 1985 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 – stable (0):** Wyoming big sagebrush density was similar between years though decadence increased from 47% to 52%, it was already very high. Recruitment of young plants increased slightly from 6% to 10%.
- **1991 to 1999 – stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Wyoming big sagebrush decadence improved from 52% to 41%, but is still very high. Recruitment of young sagebrush plants also decreased and is low at 5%.
- **1999 to 2004 - down (-2):** Wyoming big sagebrush density decreased 19% from 7,100 to 5,760 plants/acre. Decadence increased to 50% and recruitment continued to decrease to 2%.
- **2004 to 2009 - up (+2):** Wyoming big sagebrush density increased 24% to 7,180 plants/acre. Decadence decreased to 38% and recruitment of young plants improved to 13% of the population.

Grass:

- **1985 to 1991 - stable (0):** The sum of nested frequency of perennial grasses remained similar to the past reading. Blue grama is the dominant grass with some bottlebrush squirreltail present.
- **1991 to 1999 - up (+2):** The sum of nested frequency of perennial grasses increased 63% and cover is at 7%. Blue grama accounted for 84% of grass cover.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased 42% and cover decreased to 3%. Blue grama accounted for 71% of grass cover.
- **2004 to 2009 – slightly down (-1):** The sum of nested frequency of perennial grasses decreased 15% and cover is at 2%. Blue grama provides 82% of grass cover.

Forb:

- **1985 to 1991 – slightly down (-1):** The sum of nested frequency of perennial forbs decreased 10%. The forb community is not diverse or abundant.
- **1991 to 1999 – slightly up (+1):** The sum of nested frequency of perennial forbs increased 10%, though forb cover is less than 1%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased 25% and cover is still below 1%.
- **2004 to 2009 - down (-2):** The sum of nested frequency of perennial forbs decreased 80%. Only four forb species were sampled.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

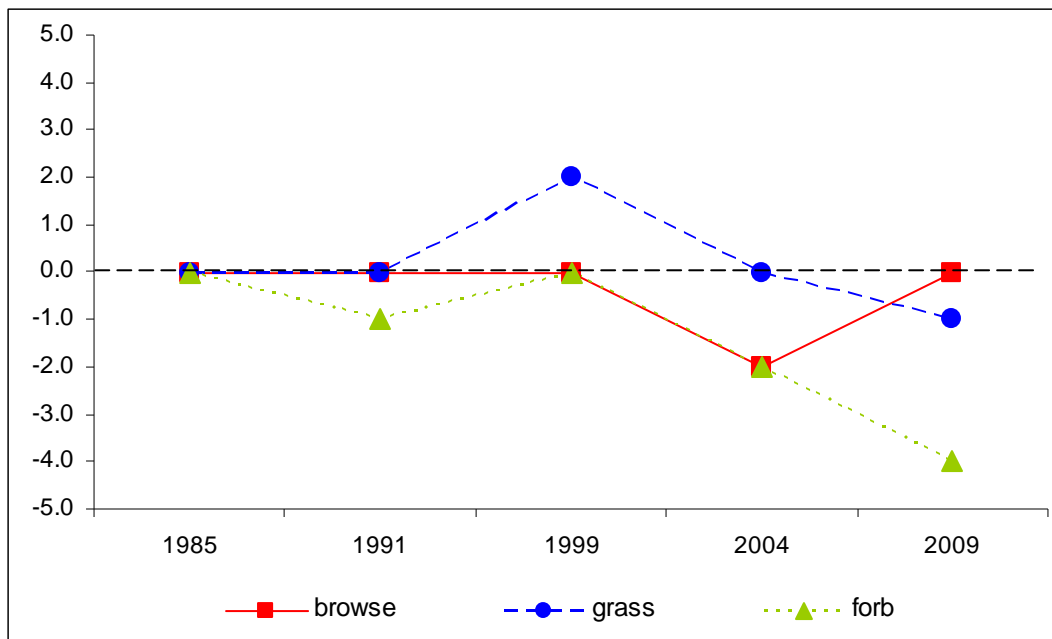
Management unit 25A, study no: 9

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	30.0	3.7	2.5	13.3	0.0	1.1	0.0	50.6	Good
04	24.5	0.7	0.9	5.8	0.0	0.5	0.0	32.4	Fair
09	25.3	2.8	5.9	4.8	0.0	0.1	0.0	38.9	Fair

Trend Summary

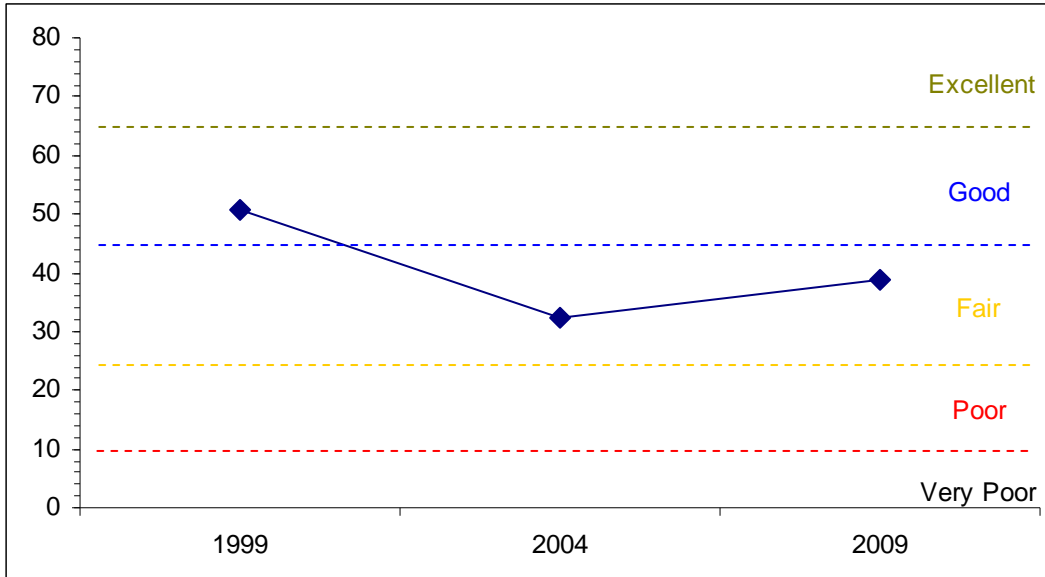
CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 25A Study no: 9



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 25A, Study no: 9



HERBACEOUS TRENDS--

Management unit 25A, Study no: 9

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron smithii	-	-	12	3	7	.07	.00	.01
G	Agropyron spicatum	-	-	6	-	-	.01	-	-
G	Bouteloua gracilis	ab100	ab102	b173	ab105	a93	5.55	2.06	1.97
G	Oryzopsis hymenoides	b31	a7	a10	a3	a8	.10	.04	.04
G	Poa secunda	-	-	2	-	-	.00	-	-
G	Sitanion hystrix	a58	ab82	b110	ab61	a47	.84	.74	.37
G	Stipa pinetorum	-	4	4	11	-	.03	.05	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		189	195	317	183	155	6.63	2.90	2.40
Total for Grasses		189	195	317	183	155	6.63	2.90	2.40
F	Androsace septentrionalis (a)	-	-	c87	b11	a-	.44	.02	-
F	Arabis demissa	b22	ab12	a6	ab24	a-	.04	.05	-
F	Astragalus lentiginosus	b21	a3	a3	a7	a-	.01	.01	-
F	Chenopodium leptophyllum(a)	-	-	-	4	2	-	.01	.00
F	Cryptantha sp.	2	7	-	-	3	-	-	.01
F	Descurainia pinnata (a)	-	-	4	1	-	.01	.00	-
F	Erigeron pumilus	ab20	a-	b34	a6	a8	.23	.04	.02
F	Eriogonum ovalifolium	7	16	13	10	1	.19	.08	.00
F	Phlox longifolia	a8	b33	a-	a6	a-	.00	.01	-
F	Senecio multilobatus	a-	a1	b23	ab6	a-	.06	.04	-
Total for Annual Forbs		0	0	91	16	2	0.45	0.04	0.00
Total for Perennial Forbs		80	72	79	59	12	0.54	0.25	0.03
Total for Forbs		80	72	170	75	14	0.99	0.30	0.03

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

BROWSE TRENDS--

Management unit 25A, Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia frigida	6	4	1	.03	.00	.00
B	Artemisia nova	20	23	20	4.51	2.30	1.72
B	Artemisia tridentata wyomingensis	93	93	95	24.40	17.31	18.51
B	Chrysothamnus viscidiflorus stenophyllus	0	2	0	-	.03	-
B	Gutierrezia sarothrae	64	22	15	4.71	.18	.10
B	Opuntia fragilis	11	10	6	.06	.18	.03
B	Pediocactus simpsonii	1	5	0	.00	.00	-
B	Pinus edulis	0	0	1	-	-	.03
Total for Browse		195	159	138	33.74	20.03	20.40

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 9

Species	Percent Cover	
	'04	'09
Artemisia nova	2.33	1.25
Artemisia tridentata wyomingensis	21.43	19.45
Gutierrezia sarothrae	.51	.16
Opuntia fragilis	.06	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 9

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.2	1.1

BASIC COVER--

Management unit 25A, Study no: 9

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	10.00	6.00	41.90	23.89	24.38
Rock	2.75	3.75	8.67	6.71	4.84
Pavement	31.75	34.75	33.29	27.15	23.90
Litter	34.50	24.50	22.44	32.81	29.05
Cryptogams	3.50	3.50	2.30	1.96	.51
Bare Ground	17.50	27.50	18.19	23.42	23.29

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 9, Study Name: Row of Pines

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.7	6.9	51.3	23.4	25.3	1.1	9.1	192	0.5

PELLET GROUP DATA--

Management unit 25A, Study no: 9

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	28	49	49	-	-	-
Elk	-	-	2	1 (2)	-	11 (28)
Deer	15	30	16	13 (32)	49 (121)	21 (53)
Cattle	3	2	-	3 (7)	2 (5)	2 (5)

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 9

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia frigida</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
99	240	8	83	8	-	17	42	0	3/4
04	100	20	80	0	-	0	0	0	5/6
09	20	0	100	0	-	0	0	0	7/2
<i>Artemisia nova</i>									
85	2665	17	40	43	266	53	0	0	10/13
91	2532	11	37	53	-	5	0	32	8/14
99	1600	5	76	19	-	69	5	8	10/17
04	1300	0	71	29	100	6	0	18	7/17
09	940	0	30	70	-	34	38	64	8/17
<i>Artemisia tridentata wyomingensis</i>									
85	8398	6	48	47	466	60	28	13	16/17
91	8265	10	38	52	-	19	5	10	16/19
99	7100	5	54	41	120	43	12	18	18/28
04	5760	2	48	50	1380	30	6	27	16/26
09	7180	13	50	38	380	17	11	30	14/22
<i>Chrysothamnus viscidiflorus stenophyllus</i>									
85	465	0	43	57	-	0	0	0	7/9
91	0	0	0	0	-	0	0	0	-/-
99	0	0	0	0	-	0	0	0	-/-
04	60	0	100	0	-	0	0	0	5/6
09	0	0	0	0	-	0	0	0	4/6
<i>Eriogonum microthecum</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	3/5
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)	
<i>Gutierrezia sarothrae</i>										
85	10732	32	65	3	1333	1	0	0	8/7	
91	1465	45	18	36	-	23	9	5	2/2	
99	11300	8	90	2	860	0	0	.88	8/9	
04	640	6	94	0	-	0	0	0	6/7	
09	500	0	100	0	-	0	0	4	6/7	
<i>Opuntia fragilis</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	66	100	0	-	-	0	0	0	-/-	
99	260	15	85	-	20	0	0	0	3/9	
04	220	0	100	-	-	0	0	9	2/10	
09	160	0	100	-	-	0	0	0	2/9	
<i>Pediocactus simpsonii</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	-	0	0	0	1/2	
04	160	0	100	-	-	0	0	0	1/2	
09	0	0	0	-	-	0	0	0	-/-	
<i>Pinus edulis</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	40	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	20	100	0	-	40	0	0	0	-/-	

CEDARLESS FLAT - TREND STUDY NO. 25A-10-09

Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,200 ft (2,499 m)
Aspect: Southeast
Slope: 12%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

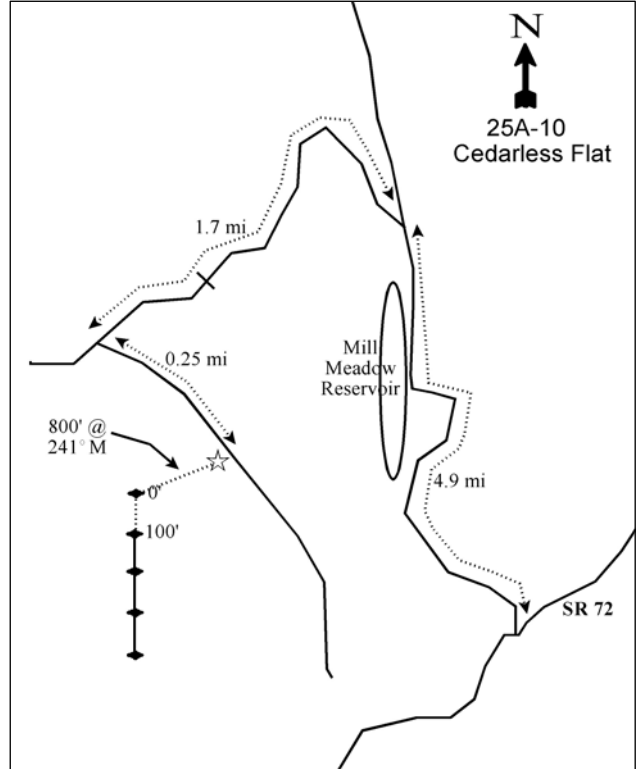
From Fremont, travel northeast on SR72 for 2.25 miles to a major fork (the sign says Mill Meadow Reservoir). Turn left and proceed 4.5 miles past the reservoir to Fremont Creek. Cross the bridge and go 0.4 miles to a fork. Bear left on the Mytoge Road and go 1.1 miles to a cattleguard in Cedarless Flat. From the cattleguard, go 0.6 miles to a fork. Turn left and go exactly 0.25 miles to a witness post on the south side of the road. From the witness post, go 800 feet at 241°M to the 0 ft baseline stake. The baseline stake is marked with a red browse tag number 407.

Map Name: Forsyth Reservoir, Utah



Township: 26S, Range: 3E, Section: 33

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 448784 E 4262764 N

CEDARLESS FLAT - TREND STUDY NO. 25A-10

Site Information

Site Description: This study is located in USFS land on a sagebrush hill near Fremont. As part of the UM Creek allotment this area is grazed for two weeks from June 1 to June 15. The area was chained and seeded in 1987 to reduce sagebrush and increase forbs and cool season grasses. By 1999, treatment boundaries were nearly indistinguishable. Several areas were excluded from chaining to preserve sage grouse habitat. Pellet group data estimated low deer, elk, and cow use in 1999 and 2004. By 2009, deer use was heavy, elk use was low but increasing and cattle use remained low (Table – Pellet Group Data).

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the dominant browse species. Browse density decreased each year from 1985 to 2004 before increasing in 2009. Sagebrush decadence was low until a spike in 2004. A few black sagebrush (*Artemisia nova*) were sampled beginning in 1999, but numbers have remained low. Broom snakeweed (*Gutierrezia sarothrae*) also occurs, but its density has fluctuated greatly (ranging from 0 to 4,240 plants/acre) since 1985 (Table - Browse Characteristics).

Herbaceous Understory: Prior to treatment the herbaceous understory was paltry. Immediately following treatment the herbaceous understory responded well with a large increase in the sum of nested frequency of perennial grasses. Cool season grasses such as crested wheatgrass (*Agropyron cristatum*) and Russian wildrye (*Elymus junceus*) were introduced in the seed mix. Perennial forbs are very rare on the site. The annual forb, slimleaf goosefoot (*Chenopodium leptophyllum*), provided more than 6% cover in 2004, but has been rare in all other sample years (Table - Herbaceous Trends).

Soil: The soil is a clay loam that is slightly alkaline (pH 7.4) (Table - Soil Analysis Data). Erosion is limited by good pavement and rock cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2009.

Trend Assessments

Browse:

- **1985 to 1991 – down (-2):** The area was chained in 1987, so the downward trend for browse was anticipated. After being chained, the sagebrush density decreased 25% from 8,798 to 6,599 plants/acre, but this thinning improved the overall population health with a decrease in decadence from 28% to 14%, and increase in recruitment of young plants from 12% to 20%.
- **1991 to 1999 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Wyoming big sagebrush decadence decreased from 14% to 4% and recruitment of young increased to 31%. Broom snakeweed density was estimated at 4,240 plants/acre.
- **1999 to 2004 – down (-2):** Wyoming big sagebrush density decreased 21% from 5,440 to 4,320 plants/acre primarily due to a decrease in the recruitment of young plants to just 5% of the population. Decadence also increased to 38% and plants displaying poor vigor increased from 3% to 27%. On a positive note, the broom snakeweed density fell 59% to 1,720 plants/acre.
- **2004 to 2009 - up (+2):** Wyoming big sagebrush density increased 21% to 5,240 plants/acre, with a subsequent decrease in decadence to 15% and increase in recruitment to 10%.

Grass:

- **1985 to 1991 - up (+2):** The area was chained in 1987 and there was an anticipated increase in the herbaceous understory. Following the treatment the sum of nested frequency of perennial grasses increased over two-fold. Cool season grasses such as crested wheatgrass and Russian wildrye have established from the treatment.

- **1991 to 1999 – down (-2):** The sum of nested frequency of perennial grasses declined 21% with perennial grass cover at 13%, with blue grama (*Bouteloa gracilis*) accounting for 62% of grass cover. Crested wheatgrass has declined significantly in nested frequency and provides 1% cover. Russian wildrye provide 3% cover. No annual species were sampled
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased 40% and cover decreased to 4%. Blue grama accounts for 44% of grass cover. Russian wildrye provided 1% cover.
- **2004 to 2009 - stable (0):** The sum of nested frequency of perennial grasses has remained similar to the last sample and cover has increased to 6%. Blue grama accounted for 57% of grass cover. Russian wildrye provided 2% cover. No annual species were sampled.

Forb:

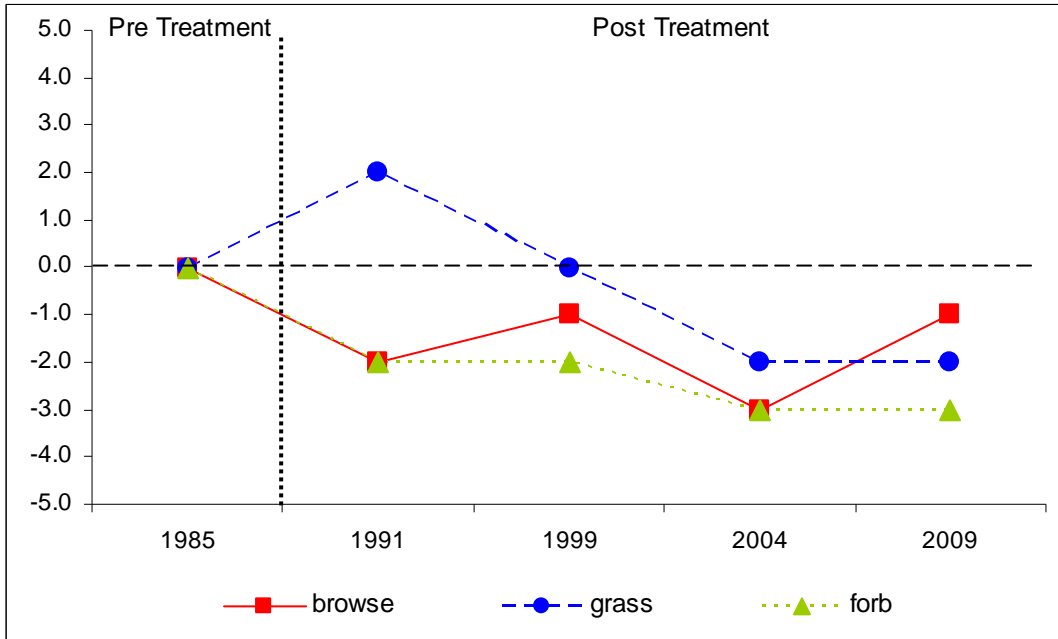
- **1985 to 1991 - down (-2):** The area was chained in 1987 and it was anticipated that there would be an increase in the herbaceous understory. However, perennial forb sum of nested frequency decreased substantially. Perennial forbs remained very rare on the site.
- **1991 to 1999 – stable (0):** The sum of nested frequency of perennial forbs decreased 17% and provided less than 0.1% cover. Forbs were so rare that the change is not substantial.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial decreased 70%. Only two perennial species were sampled, each one encountered once. Perennial forbs remained extremely rare. The annual slimleaf goosefoot (*Chenopodium leptophyllum*) was encountered for the first time and produced 7% cover.
- **2004 to 2009 - stable (0):** The sum of nested frequency of perennial forbs decreased 67% and only one perennial species was encountered, once. Even annual species were very rare in this sample as total forb cover was less than 0.1%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 25A, study no: 10

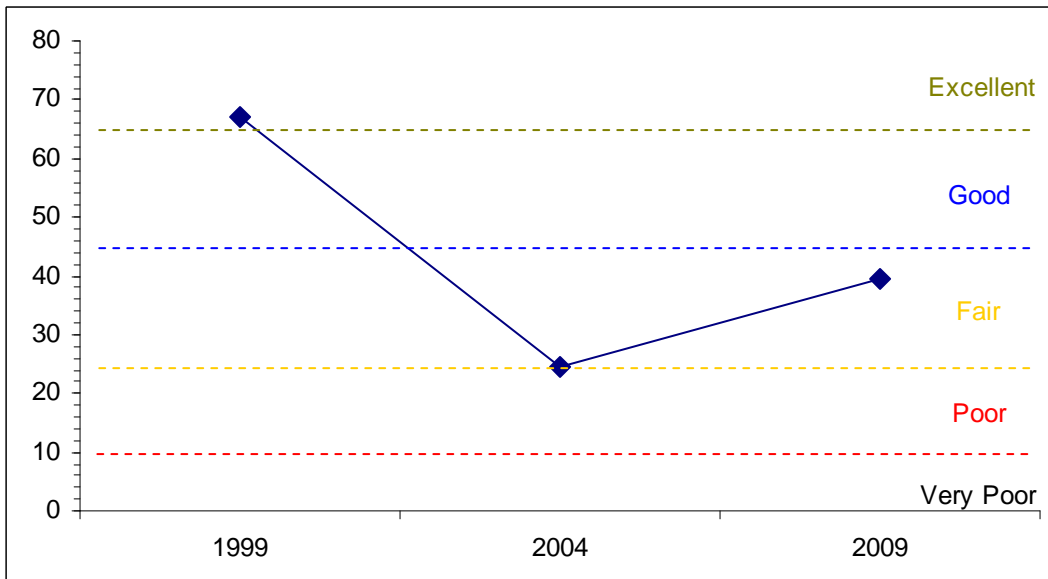
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	11.6	13.8	15.0	26.6	0.0	0.1	0.0	67.1	Excellent
04	9.7	3.6	2.5	8.6	0.0	0.0	0.0	24.4	Poor-Fair
09	12.1	10.5	5.0	11.8	0.0	0.0	0.0	39.3	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 25A Study no: 10



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 25A, Study no: 10



HERBACEOUS TRENDS--
Management unit 25A, Study no: 10

T y P e	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	a- 70	c155	b41	b27	b19	1.14	.69	.28
G	Bouteloua gracilis	a70	b104	c193	b105	b108	8.30	1.89	3.36
G	Bromus inermis	a-	b55	ab12	a-	a-	.22	-	.00
G	Bromus tectorum (a)	-	3	-	-	-	-	-	-
G	Carex sp.	a-	a-	b15	b14	b17	.07	.07	.06
G	Elymus junceus	a-	b84	ab61	a51	ab64	2.59	1.41	1.88
G	Oryzopsis hymenoides	bc15	a15	b36	ab18	a9	.72	.08	.04
G	Poa fendleriana	-	-	-	-	3	-	-	.00
G	Sitanion hystrix	b97	b75	a29	a18	a12	.20	.12	.22
G	Stipa lettermani	1	5	4	-	1	.01	-	.00
Total for Annual Grasses		0	3	0	0	0	0	0	0
Total for Perennial Grasses		183	493	391	233	233	13.29	4.28	5.88
Total for Grasses		183	496	391	233	233	13.29	4.28	5.88
F	Androsace septentrionalis (a)	-	-	b11	a-	a-	.02	-	-
F	Arabis demissa	9	2	3	-	-	.00	-	-
F	Astragalus lentiginosus	4	-	5	1	1	.03	.00	.00
F	Chenopodium fremontii (a)	-	-	a-	b25	a1	-	.27	.00
F	Chenopodium leptophyllum(a)	-	-	a-	c236	b25	-	6.38	.06
F	Cryptantha sp.	5	3	1	-	-	.03	-	-
F	Descurainia pinnata (a)	-	-	-	3	-	-	.00	-
F	Erigeron pumilus	4	1	-	-	-	-	-	-
F	Eriogonum cernuum (a)	-	-	-	3	-	-	.00	-
F	Eriogonum ovalifolium	5	1	-	-	-	-	-	-
F	Phlox longifolia	1	5	1	2	-	.00	.00	-
F	Senecio multilobatus	5	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	11	267	26	0.02	6.66	0.07
Total for Perennial Forbs		33	12	10	3	1	0.07	0.01	0.00
Total for Forbs		33	12	21	270	27	0.10	6.67	0.07

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

BROWSE TRENDS--

Management unit 25A, Study no: 10

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia nova	2	4	5	.00	.01	.00
B	Artemisia tridentata wyomingensis	83	83	89	9.25	7.77	9.66
B	Chrysothamnus viscidiflorus viscidiflorus	9	10	9	.15	.15	.15
B	Gutierrezia sarothrae	56	42	7	.38	.26	.04
B	Opuntia sp.	2	5	2	.03	.03	.03
B	Pediocactus simpsonii	3	2	0	.03	.03	-
Total for Browse		155	146	112	9.84	8.27	9.89

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 10

Species	Percent Cover	
	'04	'09
Artemisia nova	-	.15
Artemisia tridentata wyomingensis	11.51	14.94
Chrysothamnus viscidiflorus viscidiflorus	-	.10
Gutierrezia sarothrae	.30	.03
Opuntia sp.	.03	.10

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 10

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.8	0.9

BASIC COVER--

Management unit 25A, Study no: 10

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	1.50	4.50	23.21	18.60	16.25
Rock	6.00	8.00	9.06	7.65	3.79
Pavement	51.00	46.50	27.46	44.11	46.21
Litter	32.50	22.75	13.73	19.38	18.38
Cryptogams	0	0	.00	0	.01
Bare Ground	9.00	18.25	20.26	23.65	16.10

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 10, Study Name: Cedarless Flat

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.1	7.4	43.3	25.4	31.3	2.6	7	112	0.6

PELLET GROUP DATA--

Management unit 25A, Study no: 10

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	9	40	59	-	-	-
Elk	6	2	5	21 (52)	5 (12)	15 (38)
Deer	8	17	14	7 (17)	33 (81)	51 (126)
Cattle	3	1	1	4 (10)	3 (7)	2 (5)
Antelope	-	2	-	-	-	-

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 10

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
99	80	0	100	0	-	0	0	0	6/15
04	200	0	100	0	-	10	0	0	10/19
09	120	0	67	33	20	0	0	17	9/14
<i>Artemisia tridentata wyomingensis</i>									
85	8798	12	60	28	533	37	8	2	18/20
91	6599	20	66	14	933	22	4	0	12/15
99	5440	31	65	4	40	52	15	3	13/22
04	4320	5	57	38	320	36	10	27	13/23
09	5240	10	75	15	220	33	11	7	13/23
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
85	0	0	0	0	-	0	0	0	-/-
91	66	100	0	0	-	0	0	0	-/-
99	240	0	92	8	-	17	8	8	7/12
04	240	0	100	0	80	0	0	0	7/13
09	260	8	92	0	20	0	0	0	6/11
<i>Gutierrezia sarothrae</i>									
85	599	22	78	-	-	0	0	0	8/4
91	0	0	0	-	-	0	0	0	-/-
99	4240	52	48	-	100	0	0	0	4/4
04	1720	5	95	-	-	0	0	0	5/7
09	160	13	88	-	-	0	0	0	5/5
<i>Opuntia sp.</i>									
85	66	0	0	100	66	0	0	0	-/-
91	399	33	67	0	-	0	0	0	2/4
99	80	25	75	0	-	0	0	0	3/10
04	100	20	80	0	-	0	0	0	2/9
09	40	50	50	0	-	0	0	100	2/9

		Age class distribution						Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)		
Pediocactus simpsonii											
85	0	0	0	-	-	0	0	0	-/-		
91	0	0	0	-	-	0	0	0	-/-		
99	60	33	67	-	-	0	0	0	2/4		
04	40	0	100	-	-	0	0	0	1/3		
09	0	0	0	-	-	0	0	0	-/-		

FORSYTH RESERVOIR - TREND STUDY NO. 25A-11-09

Vegetation Type: Black Sagebrush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,400 ft (2,560 m)

Aspect: Southwest

Slope: 12%

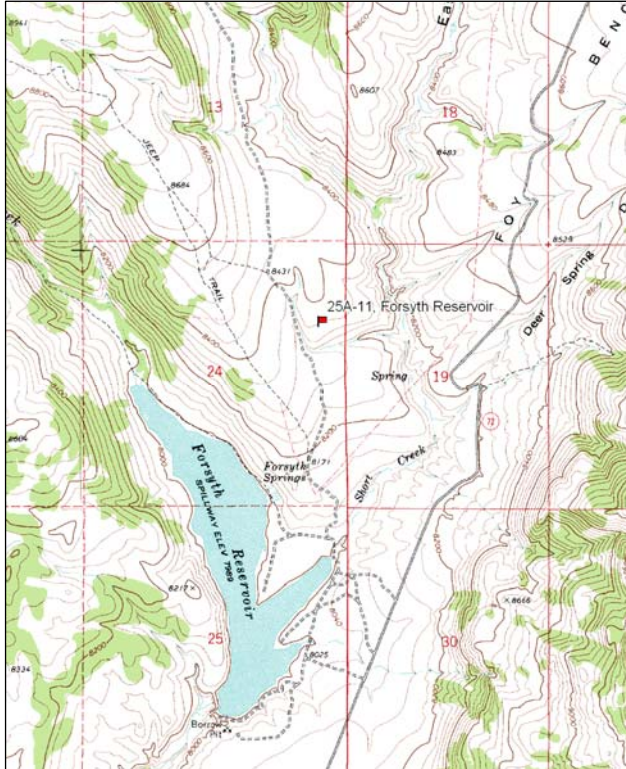
Transect bearing: 165 degrees magnetic

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

Directions:

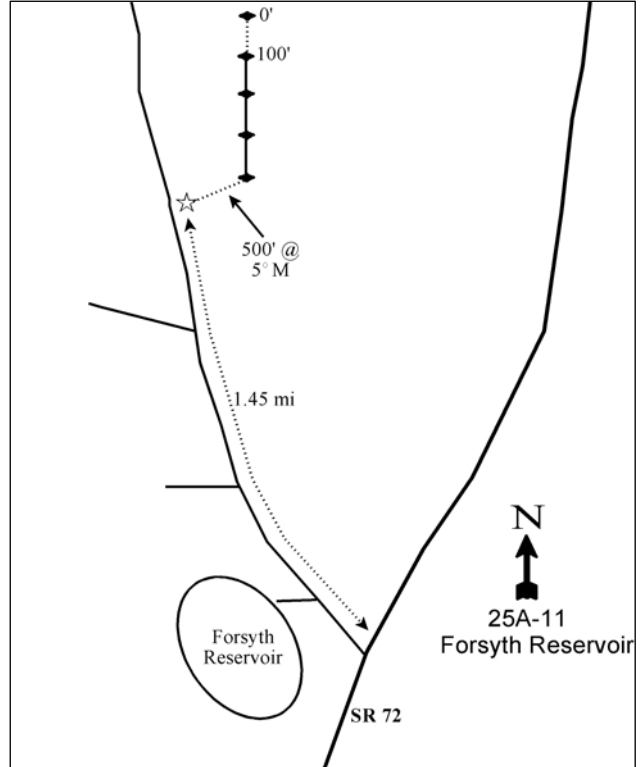
Between Lyman and Loa, turn north towards Fremont to connect with SR 72. Travel up SR 72 until you cross a Forest Service boundary cattleguard (about 5 miles from Fremont). Continue another 2.7 miles to Forsyth Reservoir. Turn at the Forsyth Reservoir sign and drive down 0.3 miles to a fork. Turn right and continue 0.1 miles to where the road crosses Short Creek (which empties into the east cove of Forsyth). From Short Creek, go up 0.1 miles to a fork. Turn right and go 0.25 miles to a cattleguard. Continue 0.15 miles beyond the cattleguard to a fork. Take the right fork and go 0.55 miles to a draw below a ridge to the northeast. There is a steel rebar witness post on the right side of the road. The last baseline stake is located 500 feet away at a bearing of 5°M on top of the ridge. The 0-foot baseline stake is 400 feet due north, and has a red browse tag #7062 attached.

Map Name: Forsyth Reservoir, Utah



Township: 26S, Range: 3E, Section: 24

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 454121 E 4265787 N

FORSYTH RESERVOIR - TREND STUDY NO. 25A-11

Site Information

Site Description: The study is located on the top of a hill north of Forsyth Reservoir. The area is managed by the Fish Lake National Forest as part of the Tidwell cattle allotment. Historically, the area has received heavy grazing by cattle and sheep, but with an especially high impact within the vicinity of the reservoir. A large area was sprayed with 2,4-D in the spring of 1976 to reduce shrub competition and release the grasses and forbs. A drought after the spraying impaired growth, but five years after the spraying it was noted by Forest Service personnel that there was fair grass production with good vigor. Pellet group data estimated heavy use by elk in 1999, light use in 2004, and moderate use in 2009. Estimated deer and cattle use has been light since 1999 (Table - Pellet Group Data).

Browse: The dominant browse on the site is black sagebrush (*Artemisia nova*) which provides almost all of the browse cover and the majority of vegetation cover on the site (Table - Browse Trends). Black sagebrush has an extremely dense population of small statured, mostly mature plants. Decadence is moderately high in the black sagebrush population, but vigor is mostly good. Recruitment of young sagebrush plants comprised a large proportion of the population from 1985 to 1999, but recruitment has been nominal since 2004. There was a large die-off of black sagebrush between the 1999 and 2004 sample years that is attributed to drought, winter injury, and intraspecific competition in this dense population. Utilization has been mostly light since 2004. There are some scattered mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plants on the site, which are more heavily hedged because of their higher preference. Other common shrubs found on the site include fringed sage (*Artemisia frigida*) and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*). Both of these species have steadily decreased in density since 1999 (Table - Browse Characteristics).

Herbaceous Understory: Grasses on the site are fairly diverse and abundant providing an average of 10% cover since 1999. The dominant grass is the warm season grass blue grama (*Bouteloua gracilis*) with other perennial grasses such as mutton bluegrass (*Poa fendleriana*), bottlebrush squirreltail (*Sitanion hystrix*), and Letterman needlegrass (*Stipa lettermani*) also being fairly abundant. Forbs are less abundant providing only 1% or less cover since 1999 and have steadily decreased in sum of nested frequency since 1985. Perennial forbs are limited to a few low growing, poor forage value species like lobeleaf groundsel (*Senecio multilobatus*), low fleabane (*Erigeron pumilus*), and longleaf phlox (*Phlox longifolia*) (Table - Herbaceous Trends).

Soil: Soil texture is a clay loam with a neutral pH. Phosphorus has limited availability for plant growth and development at 2.6 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Rock and pavement cover are high on the surface and the profile contains abundant gravel. Bare ground cover is low ranging from 1% to 6% since 1985 (Table - Basic Cover). The soil erosion condition was classified as stable in 2009.

Trend Assessments

Browse:

- **1985 to 1991 - up (+2):** The density of the primary browse species, black sagebrush, increased by 36%. The population of black sagebrush is extremely dense at 21,131 plants/acre. Recruitment of young sagebrush plants increased from 37% to 50% of the population.
- **1991 to 1999 - stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Decadence of black sagebrush increased from 13% to 29% and recruitment of young plants decreased to 27%, but both values are still considered good.

- **1999 to 2004 - down (-2):** The density of black sagebrush decreased by 54% to 13,080 plants/acre and cover decreased from 19% to 16%. Decadence of black sagebrush increased to 40% and poor vigor increased from 2% to 19%. Recruitment of young black sagebrush plants was nominal.
- **2004 to 2009 - slightly up (+1):** Black sagebrush density increased by 16% to 15,180 plants/acre, but there was little change in cover. Recruitment of young black sagebrush plants increased slightly, but is still low. Decadence and poor vigor of black sagebrush remained relatively high.

Grass:

- **1985 to 1991 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1991 to 1999 - stable (0):** Perennial grass sum of nested frequency remained similar.
- **1999 to 2004 - stable (0):** The sum of nested frequency of perennial grasses changed little, but cover nearly doubled from 7% to 13%.
- **2004 to 2009 - stable (0):** Perennial grass sum of nested frequency remained similar, though cover decreased to 10%.

Forb:

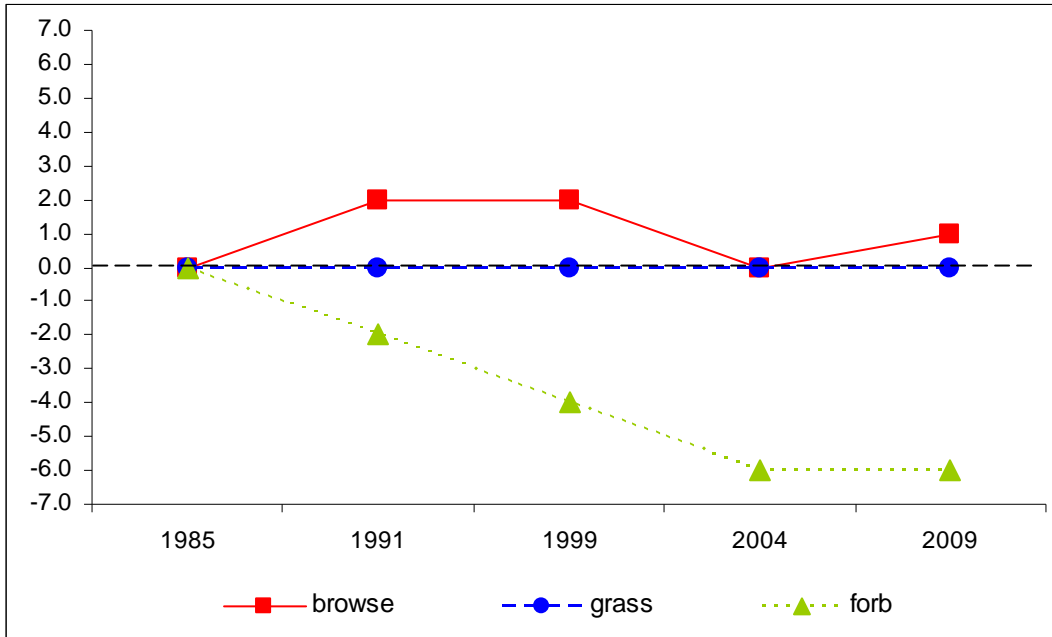
- **1985 to 1991 - down (-2):** Perennial forb sum of nested frequency decreased by 32% with a significant decrease in the nested frequency of longleaf phlox and rockcress (*Arabis demissa*).
- **1991 to 1999 - down (-2):** There was a 35% decrease in the sum of nested frequency of perennial forbs with a significant decrease in the nested frequency of low fleabane and rockcress.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 44%. Forbs are now rare on the site.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, but cover decreased to less than 1%. Forbs remain rare on the site.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 25A, study no: 11

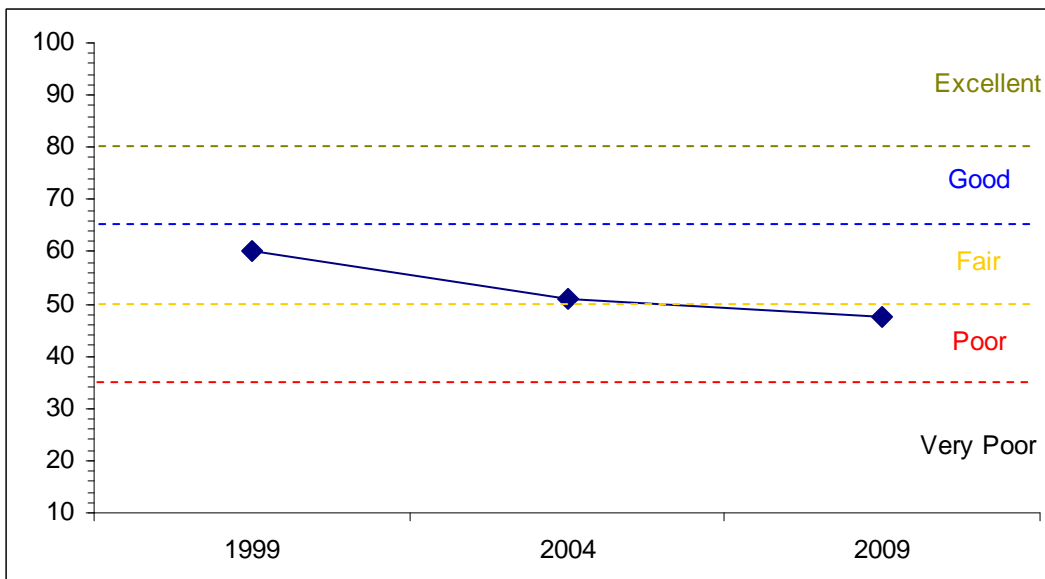
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	24.5	6.4	13.4	13.6	0.0	2.1	0.0	60.1	Fair
04	19.8	3.2	0.1	25.6	0.0	2.1	0.0	50.9	Poor-Fair
09	18.9	4.3	4.0	20.0	0.0	0.5	0.0	47.6	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25A Study no: 11



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 25A, Study no: 11



HERBACEOUS TRENDS--

Management unit 25A, Study no: 11

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron spicatum	-	-	-	1	-	-	.03	-
G	Agropyron trachycaulum	b14	ab4	ab9	a-	a-	.04	-	-
G	Bouteloua gracilis	a140	b184	ab166	b178	b189	2.44	5.97	5.56
G	Carex sp.	a6	a6	b33	b42	b36	.14	.46	.18
G	Poa fendleriana	102	113	120	129	126	2.00	3.46	2.34
G	Sitanion hystrix	b156	b161	a85	a78	a63	.66	1.36	.59
G	Stipa comata	a1	a-	b35	ab11	ab15	.37	.15	.10
G	Stipa lettermani	102	102	85	74	89	1.14	1.37	1.18
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		521	570	533	513	518	6.82	12.82	9.98
Total for Grasses		521	570	533	513	518	6.82	12.82	9.98
F	Androsace septentrionalis (a)	-	-	3	2	-	.03	.00	-
F	Arabis demissa	c143	b74	a25	a9	a9	.05	.02	.03
F	Astragalus lentiginosus	3	-	-	-	-	-	-	-
F	Astragalus sp.	-	-	-	3	-	-	.00	-
F	Chaenactis douglasii	a2	b14	a3	ab5	a-	.00	.06	-
F	Erigeron pumilus	c137	c110	b66	a20	b58	.19	.07	.18
F	Gayophytum ramosissimum(a)	-	-	-	2	-	-	.01	-
F	Hymenoxys richardsonii	a1	a-	b17	a-	a-	.70	-	-
F	Pedicularis centranthera	-	-	1	4	4	.00	.03	.01
F	Penstemon sp.	-	1	9	-	-	.02	-	-
F	Phlox austromontana	-	-	2	-	-	.01	-	-
F	Phlox longifolia	c60	b33	ab19	a2	a4	.05	.01	.01
F	Polygonum douglasii (a)	-	-	-	2	-	-	.00	-
F	Senecio multilobatus	a-	a3	a10	b42	a3	.02	.86	.00
Total for Annual Forbs		0	0	3	6	0	0.03	0.01	0
Total for Perennial Forbs		346	235	152	85	78	1.07	1.06	0.24
Total for Forbs		346	235	155	91	78	1.11	1.08	0.24

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

BROWSE TRENDS--

Management unit 25A, Study no: 11

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia frigida	31	25	21	.16	.29	.09
B	Artemisia nova	96	96	96	19.44	15.63	15.02
B	Artemisia tridentata vaseyana	2	2	2	.00	.00	.00
B	Chrysothamnus nauseosus	1	0	1	.00	-	.00
B	Chrysothamnus viscidiflorus viscidiflorus	29	28	23	1.60	1.58	.86
B	Coryphantha vivipara arizonica	2	1	0	.06	.00	-
B	Eriogonum microthecum	9	7	7	.03	.09	.00
B	Gutierrezia sarothrae	4	12	9	.01	.18	.03
B	Leptodactylon pungens	2	2	2	.00	.00	.00
B	Pediocactus simpsonii	2	3	1	.03	.01	.01
B	Pinus edulis	1	1	1	.00	.00	.00
B	Tetradymia canescens	1	1	0	.00	.00	-
Total for Browse		180	178	163	21.35	17.80	16.02

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 11

Species	Percent Cover	
	'04	'09
Artemisia frigida	.58	.18
Artemisia nova	14.89	17.23
Artemisia tridentata vaseyana	.65	.96
Chrysothamnus viscidiflorus viscidiflorus	2.01	1.03
Eriogonum microthecum	-	.01
Gutierrezia sarothrae	.30	-
Pinus edulis	.03	.05

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 11

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	1.4	0.5

BASIC COVER--

Management unit 25A, Study no: 11

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	5.75	10.75	32.02	31.75	28.87
Rock	6.25	2.75	14.71	9.88	8.81
Pavement	49.50	57.00	38.54	47.79	47.76
Litter	32.00	27.75	7.75	20.64	22.36
Cryptogams	4.75	.75	1.71	1.78	.64
Bare Ground	1.75	1.00	3.56	4.67	6.38

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 11, Study Name: Forsyth Reservoir

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.4	7	41.3	35.4	23.3	2.2	2.6	89.6	0.5

PELLET GROUP DATA--

Management unit 25A, Study no: 11

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	6	10	47	-	-	-
Grouse	-	-	-	-	-	139 pellets/acre
Elk	19	16	26	60 (148)	14 (35)	34 (84)
Deer	5	3	1	2 (5)	2 (5)	-
Cattle	2	1	3	7 (17)	4 (11)	10 (25)

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 11

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia frigida									
85	23199	60	40	0	4866	0	0	0	2/4
91	20398	16	76	8	199	30	14	.65	2/3
99	2240	13	88	0	40	8	0	0	4/6
04	1780	6	93	1	-	2	0	0	7/9
09	960	19	81	0	120	0	0	2	5/7
Artemisia nova									
85	15465	37	54	9	9466	19	2	.43	7/10
91	21131	50	37	13	-	15	7	5	6/11
99	28180	27	43	29	120	37	.63	2	7/16
04	13080	0	60	40	240	0	0	19	8/15
09	15180	8	56	36	4540	5	0	16	8/15
Artemisia tridentata vaseyana									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	40	0	100	-	-	50	50	0	11/25
04	40	0	100	-	-	0	0	0	18/34
09	40	0	100	-	80	0	0	0	16/34
Chrysothamnus nauseosus									
85	66	0	100	-	-	0	0	0	2/2
91	0	0	0	-	-	0	0	0	-/-
99	20	0	100	-	-	0	100	0	7/9
04	0	0	0	-	-	0	0	0	31/35
09	20	0	100	-	-	0	0	0	27/28

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
85	11731	24	74	2	799	0	0	.56	7/8	
91	11931	17	64	18	133	19	9	4	3/4	
99	1900	5	91	4	-	2	1	2	6/11	
04	1560	8	85	8	-	0	0	1	6/11	
09	1200	20	70	10	20	0	0	8	6/9	
<i>Coryphantha vivipara arizonica</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	120	0	100	-	-	0	0	0	1/2	
04	20	0	100	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
<i>Cowania mexicana stansburiana</i>										
85	0	0	0	-	66	0	0	0	-/-	
91	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	-/-	
<i>Eriogonum microthecum</i>										
85	66	0	100	0	-	0	0	0	5/5	
91	199	67	0	33	-	33	0	0	-/-	
99	220	18	64	18	-	36	0	18	5/9	
04	200	0	100	0	-	0	40	0	6/9	
09	180	0	100	0	-	0	0	0	5/7	
<i>Gutierrezia sarothrae</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	80	0	100	-	-	0	0	0	6/7	
04	340	6	94	-	-	0	0	0	7/8	
09	180	22	78	-	-	0	0	0	6/6	
<i>Leptodactylon pungens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	120	0	100	-	-	0	0	0	7/9	
04	120	0	100	-	-	0	0	0	5/6	
09	40	0	100	-	-	0	0	0	2/5	
<i>Pediocactus simpsonii</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	40	50	50	-	-	0	0	0	1/3	
04	60	0	100	-	-	0	0	0	1/2	
09	20	0	100	-	-	0	0	0	0/2	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Pinus edulis</i>										
85	0	0	0	-	66	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	20	100	0	-	-	0	0	0	-/-	
04	20	100	0	-	-	100	0	0	-/-	
09	20	100	0	-	-	0	0	0	-/-	
<i>Tetradymia canescens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	-	0	0	0	7/10	
04	20	0	100	-	-	0	0	0	10/21	
09	0	0	0	-	-	0	0	0	13/31	

EAST TIDWELL - TREND STUDY NO. 25A-12-09

Vegetation Type: Alpine-Mixed

Range Type: Crucial Deer Summer, Crucial Elk Summer

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 10,000 ft (3,048 m)

Aspect: Southwest

Slope: 7%-12%

Transect bearing: 173 degrees magnetic

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

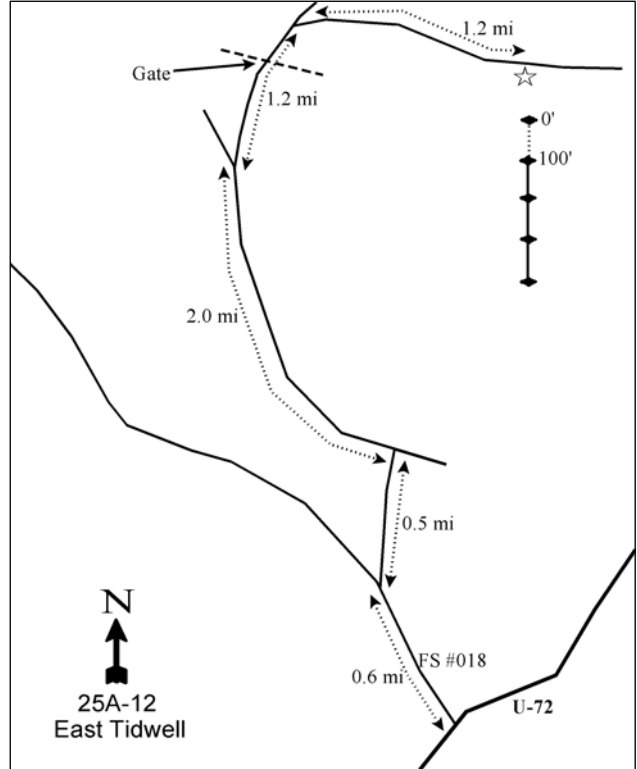
Directions:

Traveling north on U-72 from Fremont, turn west on Forest Service road #018 (between the cattleguard and mile marker #16). Go 0.6 miles (crossing a cattleguard) to a fork in the road, go right. One-half mile later you'll come to a "T" in the road, stay to the left. Go 2.0 miles and turn right at a fork that goes up a steep hill. After 0.1 miles there is a faint intersection. Stay on the main road heading north for 0.9 miles to a gate. Go through the gate and go 0.2 miles to a fork in the road. Stay to the right and go through a grove of trees, up a steep and rocky road. Here the road becomes very faint, but travel 1.2 miles to a witness post. The 0 foot baseline stake is easy to see, and has browse tag #9078 attached.

Map Name: Geyser Peak



Diagrammatic Sketch:



Township: 25S, Range: 4E, Section: 20

GPS: NAD 83, UTM 12S 456537 E 4274079 N

EAST TIDWELL - TREND STUDY NO. 25A-12

Site Information

Site Description: The study is located on high elevation summer range east of East Tidwell Canyon. The study is in a community that consists entirely of low growing shrubs, forbs, and grasses. Large aspen (*Populus tremuloides*) groves grow to the north and west of the site and provide good cover. The area is managed by the Forest Service as part of the Solomon allotment. Pellet group data estimated heavy elk use in 1999 and 2009, with more moderate use in 2004. Estimated deer use has been light since 1999 and estimated cattle use has been light since 2004 (Table - Pellet Group Data). There is a water trough about 600 feet south of the site which is fed by a pipe that goes to a fenced spring about half mile to the north. There was no water in the trough in any sample year since 1999 and it appeared that the pipeline is not functioning.

Browse: The dominant browse species on the site is Parry rabbitbrush (*Chrysothamnus parryi*), which has fluctuated in cover since 1999 (Table - Browse Trends). The population of Parry rabbitbrush is mostly mature and healthy with low decadence, good vigor, and good recruitment of young plants over the sample years. Utilization of rabbitbrush has been mostly light since 1991. There is a small population of black sagebrush (*Artemisia nova*) that has been steadily increasing in density since 1999. There is also a small population of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) that has displayed moderate use over the sample years. Several other shrubs occur in relatively small numbers including: fringed sagebrush (*Artemisia frigida*), stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), and gray horsebrush (*Tetradymia canescens*). It appears that the stickyleaf low rabbitbrush was identified as Parry rabbitbrush in 1991 (Table - Browse Characteristics).

Herbaceous Understory: Due to the high elevation of this site, the herbaceous understory is the key forage source for big game and livestock. Grasses are diverse and moderately abundant. Prairie junegrass (*Koeleria cristata*), slender wheatgrass (*Agropyron trachycaulum*), mutton bluegrass (*Poa fendleriana*), bottlebrush squirreltail (*Sitanion hystrix*), and letterman needlegrass (*Stipa lettermani*) are the most common grasses. Forbs are also diverse and are abundant on the site. There are several useful species on the site, although many of the common forbs are low growing less desirable types such as rose pussytoes (*Antennaria rosea*), low fleabane (*Erigeron pumilus*), Eaton fleabane (*E. eatonii*), trailing fleabane (*E. flagellaris*), pingue hymenoxys (*Hymenoxys richardsonii*), and elegant cinquefoil (*Potentilla concinna*) (Table - Herbaceous Trends).

Soil: The soil is a loam with a slightly alkaline pH (Table - Soil Analysis Data). Parent material is basalt. Bare ground cover is low due to the well armored nature of the soil surface with high amounts of rock and pavement cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1991 to 1999 - stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. There was little change in the browse component on the site.
- **1999 to 2004 - stable (0):** Density of the primary browse species, Parry rabbitbrush decreased by 44%, but cover increased substantially. The more preferred browse species, black sagebrush and mountain big sagebrush, both increased slightly in density.
- **2004 to 2009 - slightly up (+1):** The density of Parry rabbitbrush increased by nearly three-fold, but cover decreased to 1999 levels. Black sagebrush and mountain big sagebrush density both increased markedly due to the high recruitment of young plants.

Grass:

- **1991 to 1999 - stable (0):** There was a slight decrease in the sum of nested frequency of perennial grasses.
- **1999 to 2004 - stable (0):** Perennial grass sum of nested frequency and cover remained similar.
- **2004 to 2009 - down (-2):** The sum of nested frequency of perennial grasses decreased by 23% and cover decreased from 9% to 6%. Prairie junegrass decreased significantly in nested frequency.

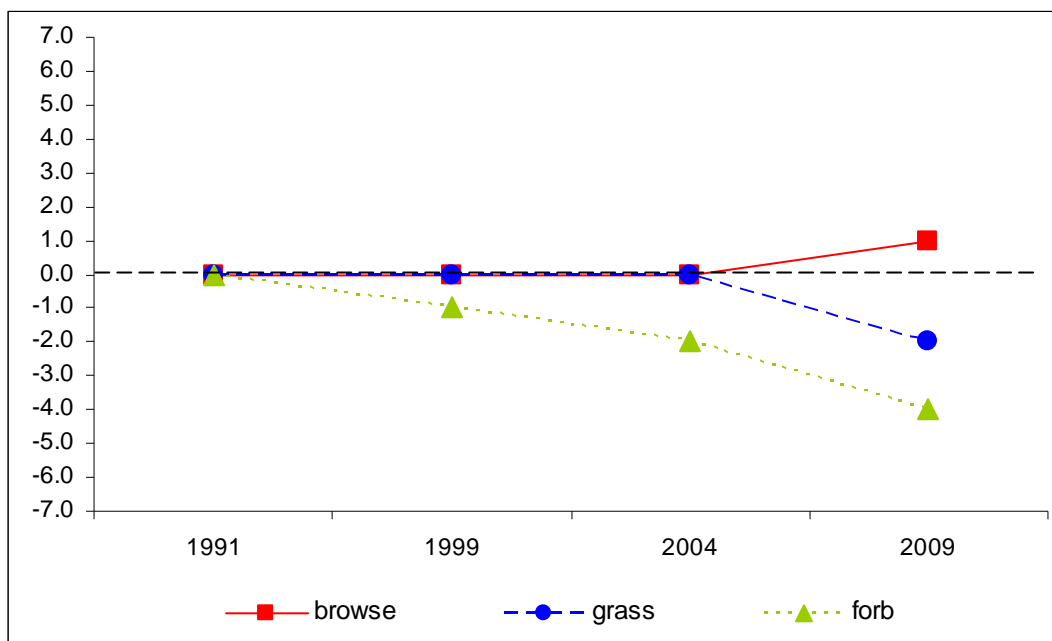
Forb:

- **1991 to 1999 - slightly down (-1):** Perennial forb sum of nested frequency decreased by 19%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial forbs continued to decrease by a further 19%, but cover remained similar.
- **2004 to 2009 - down (-2):** There was a 19% decrease in the sum of nested frequency of perennial forbs and cover decreased from 13% to 6%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 25A Study no: 12



HERBACEOUS TRENDS--

Management unit 25A, Study no: 12

Type	Species	Nested Frequency				Average Cover %		
		'91	'99	'04	'09	'99	'04	'09
G	Agropyron trachycaulum	a-	b24	c79	c56	.32	1.04	.52
G	Bouteloua gracilis	ab24	ab14	a2	b30	.03	.00	.52
G	Carex sp.	b49	a9	a15	ab27	.10	.16	.13
G	Festuca ovina	b59	b77	a19	a2	.70	.10	.00
G	Koeleria cristata	b132	b159	b165	a71	2.15	3.16	.72
G	Poa fendleriana	a89	c170	ab103	bc141	2.92	1.53	2.28
G	Sitanion hystrix	c128	b84	ab66	a40	1.22	.98	.48

Type	Species	Nested Frequency				Average Cover %		
		'91	'99	'04	'09	'99	'04	'09
G	<i>Stipa comata</i>	a ⁻	b ¹⁰	a ¹	a ⁻	.06	.04	-
G	<i>Stipa lettermani</i>	c ¹⁸⁴	a ⁶⁸	b ¹²⁶	a ⁶⁶	1.35	2.29	1.22
G	<i>Stipa pinetorum</i>	-	-	-	11	-	-	.09
G	<i>Vulpia octoflora</i> (a)	-	-	-	4	-	-	.01
Total for Annual Grasses		0	0	0	4	0	0	0.01
Total for Perennial Grasses		665	615	576	444	8.88	9.32	5.98
Total for Grasses		665	615	576	448	8.88	9.32	6.00
F	<i>Agoseris glauca</i>	b ⁴⁶	ab ²⁰	ab ⁴	a ⁻	.15	.09	-
F	<i>Androsace septentrionalis</i> (a)	-	b ³¹	a ¹	a ⁻	.11	.00	-
F	<i>Antennaria rosea</i>	70	62	67	63	1.21	2.53	1.40
F	<i>Aster</i> sp.	b ³⁸	a ⁷	a ¹	a ⁵	.01	.00	.01
F	<i>Astragalus</i> sp.	76	55	61	59	1.55	.76	.24
F	<i>Chaenactis douglasii</i>	5	7	10	13	.01	.17	.10
F	<i>Comandra pallida</i>	-	9	7	-	.10	.04	-
F	<i>Delphinium</i> sp.	2	-	-	-	-	-	-
F	<i>Erigeron eatonii</i>	a ⁷	a ¹⁴	a ¹²	b ⁴⁴	.32	.08	.66
F	<i>Erigeron flagellaris</i>	a ⁻	a ⁵	a ⁷	b ²⁶	.01	.18	.10
F	<i>Erigeron pumilus</i>	a ⁵	b ⁵⁶	c ⁷⁹	b ⁴¹	1.10	1.79	.27
F	<i>Eriogonum alatum</i>	-	5	10	11	.06	.09	.07
F	<i>Eriogonum umbellatum</i>	19	29	32	14	.52	.46	.23
F	<i>Gayophytum ramosissimum</i> (a)	-	-	-	4	-	-	.00
F	<i>Gentiana calycosa</i>	b ³⁴	b ¹⁸	a ⁻	a ⁻	.25	-	-
F	<i>Geranium caespitosum</i>	c ¹⁷⁴	ab ¹⁰³	b ¹¹⁴	a ⁶⁶	1.65	1.73	.38
F	<i>Hymenoxys richardsonii</i>	b ⁸²	b ⁶⁸	a ⁴⁶	a ³⁶	1.59	1.08	.85
F	<i>Ivesia gordonii</i>	b ²⁹	a ⁶	a ⁻	a ⁻	.04	-	-
F	<i>Lesquerella wardii</i>	b ⁵⁸	a ¹³	a ⁴	a ⁻	.05	.01	-
F	<i>Linum lewisii</i>	a ²²	b ⁵⁶	ab ²⁹	a ¹⁰	.86	.57	.14
F	<i>Lupinus argenteus</i>	4	7	6	11	.39	.40	.06
F	<i>Lychnis drummondii</i>	a ⁻	b ¹³	a ⁻	a ⁻	.06	-	-
F	<i>Lygodesmia</i> sp.	-	-	-	-	-	.00	-
F	<i>Machaeranthera canescens</i>	b ⁹⁰	a ⁷	a ¹⁴	a ³³	.07	.24	.39
F	<i>Oxytropis lambertii</i>	ab ¹⁴	b ⁴⁵	a ⁴	a ⁻	.49	.30	-
F	<i>Penstemon</i> sp.	b ⁹⁵	b ⁸⁰	a ³⁹	ab ⁶³	.43	.33	.28
F	<i>Phlox longifolia</i>	b ¹²¹	a ⁴⁹	a ⁶⁶	a ⁵⁹	.17	.29	.26
F	<i>Polygonum douglasii</i> (a)	-	2	-	-	.00	-	-
F	<i>Potentilla concinna</i>	b ¹³⁴	a ³⁹	a ²⁶	a ²⁶	.75	.83	.14
F	<i>Potentilla gracilis</i>	a ⁻	b ²⁶	c ⁶¹	b ¹⁶	.06	.72	.10
F	<i>Senecio multilobatus</i>	a ⁴¹	c ¹⁵⁸	b ⁷⁸	a ³⁷	1.60	.64	.11
F	<i>Taraxacum officinale</i>	b ²⁶	ab ¹⁴	a ⁸	a ⁻	.10	.02	-
F	Unknown forb-perennial	2	-	-	-	-	-	-
Total for Annual Forbs		0	33	1	4	0.11	0.00	0.00
Total for Perennial Forbs		1194	971	785	633	13.69	13.43	5.87
Total for Forbs		1194	1004	786	637	13.80	13.44	5.87

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

BROWSE TRENDS--

Management unit 25A, Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia frigida	40	33	27	.37	.79	.54
B	Artemisia nova	5	11	22	.53	.78	.80
B	Artemisia tridentata vaseyana	2	9	22	.15	.19	.90
B	Chrysothamnus parryi	81	97	89	5.82	10.76	5.35
B	Chrysothamnus viscidiflorus viscidiflorus	47	44	50	.71	1.06	.50
B	Gutierrezia sarothrae	27	71	11	.06	1.82	.07
B	Symphoricarpos oreophilus	1	0	3	.00	-	.00
B	Tetradymia canescens	43	54	45	.95	1.93	.59
Total for Browse		246	319	269	8.61	17.35	8.77

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 12

Species	Percent Cover	
	'04	'09
Artemisia frigida	.83	.51
Artemisia nova	.33	.66
Artemisia tridentata vaseyana	.56	1.11
Chrysothamnus parryi	16.39	5.08
Chrysothamnus viscidiflorus viscidiflorus	3.25	.71
Gutierrezia sarothrae	2.50	.01
Tetradymia canescens	2.29	1.04

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 12

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	1.3	0.8
Artemisia tridentata vaseyana	2.7	1.4

BASIC COVER--

Management unit 25A, Study no: 12

Cover Type	Average Cover %			
	'91	'99	'04	'09
Vegetation	10.50	30.06	34.51	24.17
Rock	13.25	10.85	9.94	8.51
Pavement	44.25	43.96	54.81	42.78
Litter	22.25	6.19	8.01	11.38
Cryptogams	.25	.18	.24	.01
Bare Ground	9.50	4.02	8.05	11.56

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 12, Study Name: East Tidwell

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16	7.5	47.3	29.4	23.3	3.1	21	166.4	0.6

PELLET GROUP DATA--

Management unit 25A, Study no: 12

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	12	34	33	-	-	-
Grouse	-	-	1	-	-	-
Elk	37	25	40	68 (168)	35 (86)	52 (129)
Deer	17	15	14	15 (37)	16 (40)	20 (50)
Cattle	2	1	1	1 (2)	5 (13)	7 (18)

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 12

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Artemisia frigida										
91	1132	82	18	-	66	18	6	0	2/5	
99	4520	14	86	-	80	1	0	0	5/7	
04	1240	5	95	-	-	8	2	0	8/11	
09	1100	0	100	-	-	5	0	0	4/9	
Artemisia nova										
91	0	0	0	-	-	0	0	0	-/-	
99	140	29	71	-	-	0	0	0	10/28	
04	380	32	68	-	80	0	0	0	10/20	
09	2280	60	40	-	1160	0	0	0	6/16	
Artemisia tridentata vaseyana										
91	399	0	83	17	-	17	67	0	4/5	
99	40	0	100	0	-	50	0	0	8/20	
04	240	8	92	0	120	42	8	0	13/28	
09	1320	56	36	8	280	8	0	5	9/16	
Chrysothamnus parryi										
91	38865	28	44	28	4333	36	22	5	4/6	
99	13140	9	87	4	120	.76	0	1	5/8	
04	7420	5	93	1	120	2	.53	.26	5/9	
09	19960	15	85	0	460	0	0	0	4/8	
Chrysothamnus viscidiflorus viscidiflorus										
91	0	0	0	0	-	0	0	0	-/-	
99	2220	10	86	5	-	0	.90	4	5/9	
04	2480	4	91	5	-	0	0	4	7/12	
09	2520	6	93	1	-	0	0	0	4/8	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Gutierrezia sarothrae</i>										
91	599	44	56	-	-	11	0	0	3/3	
99	960	10	90	-	20	0	0	0	4/6	
04	3860	0	100	-	-	0	0	0	5/8	
09	280	0	100	-	-	0	0	0	4/6	
<i>Symphoricarpos oreophilus</i>										
91	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	-	100	0	0	8/30	
04	0	0	0	-	-	0	0	0	10/31	
09	60	0	100	-	-	0	0	0	10/24	
<i>Tetradymia canescens</i>										
91	1331	15	50	35	66	40	25	5	4/5	
99	2280	27	68	4	80	9	0	.87	6/9	
04	3120	9	90	1	-	7	2	3	6/11	
09	2320	19	80	1	140	0	0	3	5/8	

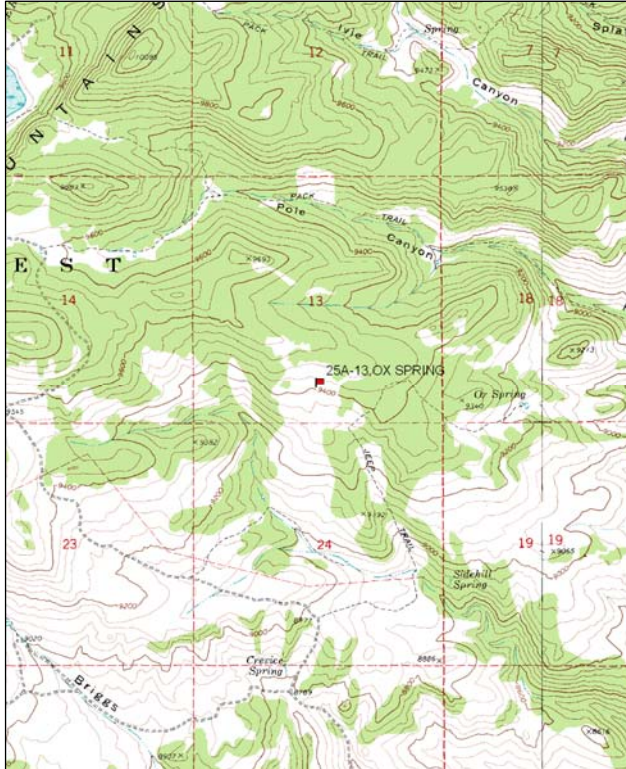
OX SPRING - TREND STUDY NO. 25A-13-09

Vegetation Type: Burned Mountain Big Sagebrush
Range Type: Crucial Deer Summer, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 9,400 ft (2,865 m)
Aspect: South
Slope: 10%-12%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

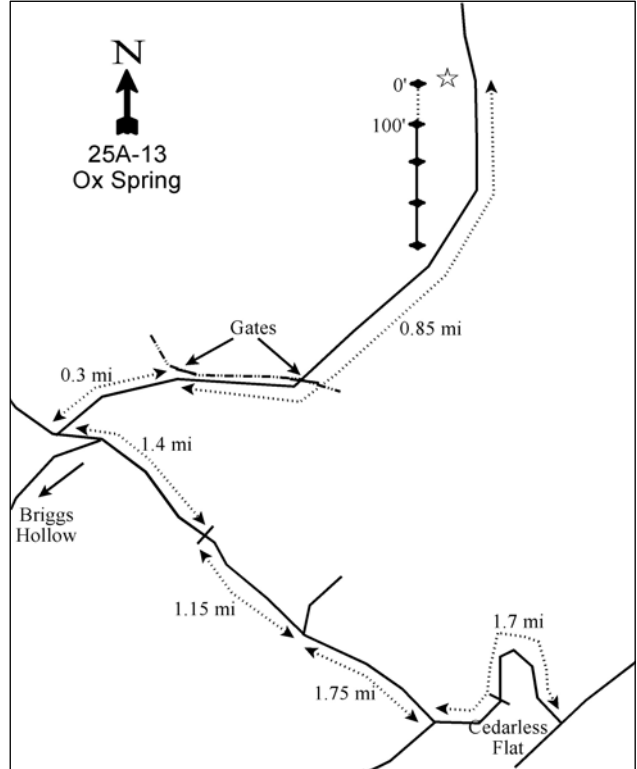
Turn west off of SR 72 onto the Mill Meadow Road north of Fremont. Go past the lake and up the Johnson Reservoir Road for 3.8 miles. Turn west off the paved road and go 1.1 miles to a cattleguard at the head of Cedarless Flat. Continue 0.6 miles to a fork in the road. Go right for 1.75 miles to the Ox Spring trail turnoff. Stay left (on the main road) for 1.15 miles to another cattleguard. Go another 1.05 miles to the Briggs Hollow turnoff. Stay right for 0.35 miles, turn right off the Mytoge Road, and go 0.3 miles. Before the gate turn right and follow the fence line 0.2 miles to another gate. Drive another 0.85 miles (passing through two more gates) to a half high witness post among some rocks, 11 paces off the left (west) side of the road. From the witness post, the white-topped 0 foot baseline stake is 7 paces away at an azimuth of 284°M.

Map Name: Fish Lake, Utah



Township: 26S, Range: 2E, Section: 24

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 444004 E 4266336 N

OX SPRING - TREND STUDY NO. 25A-13

Site Information

Site Description: The study is located about one mile west of Ox Spring in a prescribed burn on a high elevation mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community. The burn occurred in either 1989 or 1990. The land is administered by the U.S. Forest Service as part of the Seven Mile allotment. Pellet group data from a nearby Utah Division of Wildlife Resources pellet group transect estimated 19 deer and 46 elk days use/acre in 1991 (46 ddu/ha, 114 edu/ha). An enclosure nearby is used to monitor spring elk utilization. Pellet group data taken along the study site baseline has estimated heavy elk use and light deer and cattle use since 1999 (Table - Pellet Group Data).

Browse: The less desirable species stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) is the most abundant browse species on the site, and provides the majority of the browse cover (Table - Browse Trends). The density of low rabbitbrush has steadily increased since 1999. The population is mostly mature and has been mostly healthy in the past, but decadence and poor vigor increased substantially in 2009. Density of mountain big sagebrush has been low, but increased substantially in 2009 with high recruitment of young plants. The mountain big sagebrush population is mostly healthy with no decadence and very good vigor. Utilization of mountain big sagebrush has been mostly light over the study years. Other browse species on the site include rubber rabbitbrush (*Chrysothamnus nauseosus*), Woods rose (*Rosa woodsii*), and snowberry (*Symphoricarpos oreophilus*) (Table - Browse Characteristics).

Herbaceous Understory: Native grasses are diverse and prevalent on the site, but there was a large decrease in the sum of nested frequency of grasses between 1999 and 2004. The most abundant grass is mutton bluegrass (*Poa fendleriana*) with other common species including bottlebrush squirreltail (*Sitanion hystrix*), prairie junegrass (*Koeleria cristata*), pinewoods needlegrass (*Stipa pinetorum*), and bluebunch wheatgrass (*Agropyron spicatum*). Native forbs were diverse and abundant at the outset of the study, but have steadily decreased in sum of nested frequency and cover, and were only moderately abundant in 2009. Common forbs include Watson penstemon (*Penstemon watsonii*), lupine (*Lupinus* sp.), aster (*Aster* sp.), and rose pussytoes (*Antennaria rosea*) (Table - Herbaceous Trends).

Soil: The soil has a loam texture with a neutral pH (7.3). The soil is dark in color with a relatively high organic matter content (Table - Soil Analysis Data). The surface has a high percentage of pavement and rock cover with low amounts of exposed bare ground cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1991 to 1999 - stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. There was little change in the browse community. However, mountain big sagebrush was sampled for the first time with the larger sample area.
- **1999 to 2004 - slightly down (-1):** The density of stickyleaf low rabbitbrush increased by 45% and cover increased from 14% to 20%. Mountain big sagebrush also increased in density and cover, but is still not abundant on the site.
- **2004 to 2009 - stable (0):** The density of stickyleaf low rabbitbrush continued to increase by 31%, but cover decreased to 14%. The density of the more desirable species, mountain big sagebrush, also increased in density by six-fold, though cover is still less than 1%.

Grass:

- **1991 to 1999 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.

- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 34% and cover decreased from 23% to 16%. There was a significant decrease in the nested frequency of all of the grass species except for bluebunch wheatgrass and pinewoods needlegrass.
- **2004 to 2009 - stable (0):** Perennial grass sum of nested frequency changed little, though cover decreased to 11%.

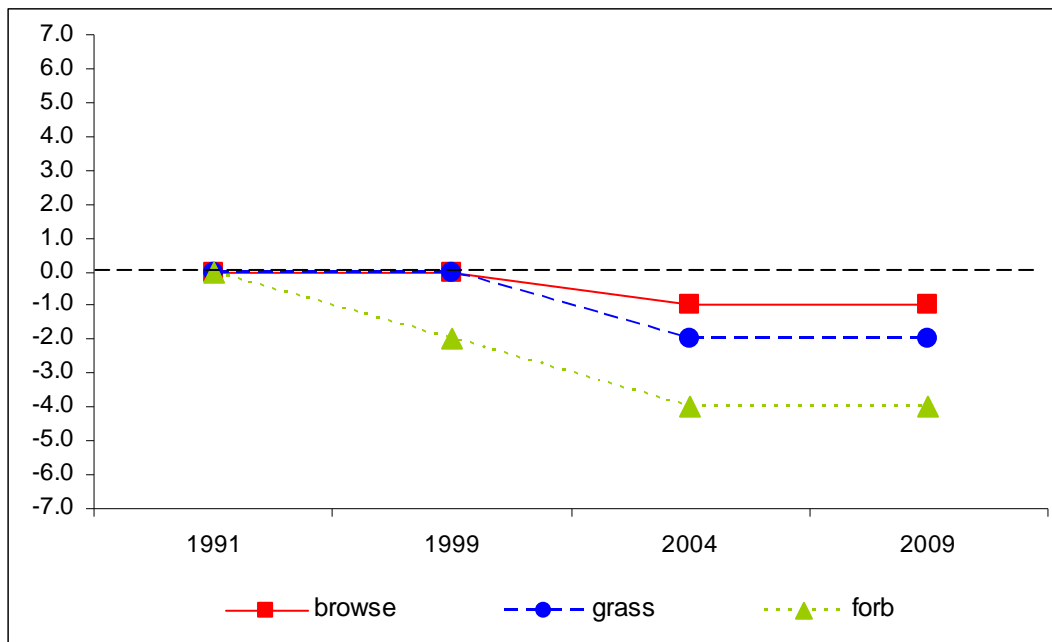
Forb:

- **1991 to 1999 - down (-2):** Perennial forb sum of nested frequency decreased by 36%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs continued to decrease by 50% and cover decreased from 16% to 5%.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, but cover decreased to 4%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 25A Study no: 13



HERBACEOUS TRENDS--

Management unit 25A, Study no: 13

Type	Species	Nested Frequency				Average Cover %		
		'91	'99	'04	'09	'99	'04	'09
G	Agropyron smithii	b ¹¹⁰	a ⁴⁸	ab ⁷²	b ⁹²	.72	1.27	.42
G	Agropyron spicatum	a ⁻	b ⁸⁵	b ⁸³	b ⁹³	2.27	4.11	2.69
G	Bromus anomalus	a ⁻	b ³⁸	a ¹	a ⁻	.60	.00	-
G	Carex obtusata	b ⁷⁵	c ⁹⁴	a ¹⁶	a ³	2.68	.25	.07
G	Koeleria cristata	b ¹²⁹	b ¹²⁵	a ⁴¹	a ¹⁵	2.82	.84	.10
G	Poa fendleriana	bc ²⁵⁸	c ²⁷⁵	a ²¹²	ab ²²⁰	10.56	6.57	4.54
G	Sitanion hystrix	c ¹³⁸	c ¹⁰²	b ⁵⁷	a ²⁰	1.87	1.12	.25
G	Sporobolus cryptandrus	-	1	-	-	.03	-	-

Type	Species	Nested Frequency				Average Cover %		
		'91	'99	'04	'09	'99	'04	'09
G	<i>Stipa comata</i>	-	4	6	-	.03	.06	-
G	<i>Stipa pinetorum</i>	_a 78	_{ab} 65	_a 62	_b 94	1.81	2.01	2.83
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		788	837	550	537	23.44	16.27	10.92
Total for Grasses		788	837	550	537	23.44	16.27	10.92
F	<i>Agoseris glauca</i>	_b 74	_a -	_a 4	_a 7	-	.03	.04
F	<i>Androsace septentrionalis</i> (a)	-	_b 84	_a -	_a -	.44	-	-
F	<i>Antennaria rosea</i>	_b 105	_b 124	_a 71	_a 63	5.07	.99	1.47
F	<i>Arabis drummondii</i>	_b 10	_a -	_a -	_a -	-	-	-
F	<i>Artemisia dracunculus</i>	_b 37	_a -	_a -	_a -	-	-	-
F	<i>Aster chilensis</i>	_c 98	_c 52	_b 28	_a -	1.57	.22	-
F	<i>Astragalus argophyllus</i>	_b 12	_a -	_b 13	_a -	-	.13	-
F	<i>Astragalus serpens</i>	_b 17	_a -	_a -	_a -	-	-	-
F	<i>Astragalus</i> sp.	_a 6	_b 38	_a 3	_{bc} 15	.22	.03	.06
F	<i>Castilleja linariaefolia</i>	10	7	2	-	.07	.00	-
F	<i>Chenopodium album</i> (a)	-	-	12	4	-	.09	.00
F	<i>Chenopodium leptophyllum</i> (a)	-	_a -	_b 35	_b 23	-	.23	.05
F	<i>Comandra pallida</i>	_a -	_a -	_a 6	_b 34	-	.01	.19
F	<i>Crepis acuminata</i>	_b 41	_a 5	_a -	_a -	.02	-	-
F	<i>Erigeron eatonii</i>	_b 18	_a -	_b 16	_b 26	-	.08	.33
F	<i>Erigeron flagellaris</i>	-	-	-	3	-	-	.03
F	<i>Erigeron pumilus</i>	-	8	4	16	.09	.01	.10
F	<i>Eriogonum racemosum</i>	57	74	63	62	1.66	1.62	.82
F	<i>Eriogonum umbellatum</i>	8	6	2	9	.08	.04	.12
F	<i>Fritillaria atropurpurea</i>	_b 21	_a -	_a -	_a -	-	-	-
F	<i>Gayophytum ramosissimum</i> (a)	-	_a -	_b 19	_b 10	-	.06	.02
F	<i>Lappula occidentalis</i> (a)	-	-	4	-	-	.01	-
F	<i>Lotus utahensis</i>	_{ab} 13	_b 26	_a 5	_a 8	.50	.07	.02
F	<i>Lupinus argenteus</i>	_b 116	_b 109	_a 5	_a 3	3.48	.04	.03
F	<i>Lychnis drummondii</i>	-	9	5	-	.07	.01	-
F	<i>Machaeranthera canescens</i>	1	2	-	1	.03	-	.00
F	<i>Penstemon watsonii</i>	_c 131	_b 63	_{ab} 58	_a 31	1.88	1.73	.43
F	<i>Phlox austromontana</i>	4	-	3	1	-	.03	.00
F	<i>Phlox longifolia</i>	_b 97	_a -	_a 8	_a 7	-	.07	.01
F	<i>Potentilla concinna</i>	3	9	5	-	.33	.07	-
F	<i>Taraxacum officinale</i>	_b 69	_b 79	_a 3	_a -	1.31	.03	-
F	<i>Tragopogon dubius</i>	-	1	-	-	.03	-	-
F	Unknown forb-perennial	2	-	-	-	-	-	-
F	<i>Viguiera multiflora</i>	-	1	-	-	.00	-	-
Total for Annual Forbs		0	84	70	37	0.43	0.40	0.08
Total for Perennial Forbs		950	613	304	286	16.46	5.25	3.71
Total for Forbs		950	697	374	323	16.90	5.66	3.80

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

BROWSE TRENDS--

Management unit 25A, Study no: 13

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Amelanchier utahensis	0	0	1	-	-	.00
B	Artemisia tridentata vaseyana	5	9	16	.00	.60	.91
B	Chrysothamnus nauseosus	24	38	34	.87	1.68	1.41
B	Chrysothamnus viscidiflorus viscidiflorus	88	92	94	13.89	20.17	13.79
B	Mahonia repens	2	2	1	.06	.15	.15
B	Rosa woodsii	6	4	5	.09	.03	.06
B	Symphoricarpos oreophilus	13	13	17	1.01	1.27	1.56
Total for Browse		138	158	168	15.93	23.93	17.90

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 13

Species	Percent Cover	
	'04	'09
Artemisia tridentata vaseyana	.55	1.39
Chrysothamnus nauseosus	1.36	2.70
Chrysothamnus viscidiflorus viscidiflorus	24.70	14.93
Mahonia repens	.05	-
Symphoricarpos oreophilus	1.71	2.15

BASIC COVER--

Management unit 25A, Study no: 13

Cover Type	Average Cover %			
	'91	'99	'04	'09
Vegetation	17.00	56.81	44.18	36.27
Rock	7.00	5.75	7.89	3.42
Pavement	14.50	12.86	24.80	23.11
Litter	45.25	35.65	25.22	33.93
Cryptogams	0	0	.03	0
Bare Ground	16.25	9.22	9.74	11.45

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 13, Study Name: Ox Spring

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.5	7.3	33.3	43.4	23.3	5.2	20.5	428.8	0.7

PELLET GROUP DATA--

Management unit 25A, Study no: 13

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	4	6	49	-	-	-
Horse	1	-	-	-	-	-
Elk	57	61	60	97 (240)	112 (276)	91 (225)
Deer	7	3	7	9 (22)	5 (13)	11 (26)
Cattle	8	1	5	25 (62)	-	14 (34)

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 13

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
91	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	100	0	8/13
<i>Artemisia frigida</i>									
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	14/15
09	0	0	0	-	-	0	0	0	-/-
<i>Artemisia tridentata vaseyana</i>									
91	0	0	0	-	-	0	0	0	-/-
99	160	50	50	-	-	0	0	0	22/38
04	260	46	54	-	3140	38	0	0	14/20
09	1580	51	49	-	460	6	1	0	10/15
<i>Chrysothamnus nauseosus</i>									
91	0	0	0	0	-	0	0	0	-/-
99	960	0	100	0	-	4	0	0	9/14
04	1740	1	99	0	-	2	0	0	8/12
09	1520	8	86	7	-	0	4	11	7/12
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
91	12465	56	43	1	-	43	8	0	5/10
99	7240	13	86	2	-	0	0	1	13/21
04	10520	9	90	1	8740	.19	0	.57	11/19
09	13800	20	48	32	940	0	0	37	8/16
<i>Cowania mexicana stansburiana</i>									
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	9/17
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)	
Mahonia repens										
91	0	0	0	-	-	0	0	0	-/-	
99	260	38	62	-	-	0	0	0	3/6	
04	900	24	76	-	-	0	0	0	4/3	
09	160	0	100	-	-	0	0	0	3/2	
Rosa woodsii										
91	0	0	0	0	-	0	0	0	-/-	
99	260	31	69	0	-	0	0	0	9/9	
04	220	36	45	18	-	0	0	18	6/4	
09	320	25	75	0	20	0	0	0	7/4	
Symphoricarpos oreophilus										
91	665	70	30	0	-	70	20	0	6/10	
99	440	27	68	5	-	0	0	0	19/32	
04	360	6	83	11	-	6	6	11	15/26	
09	460	9	91	0	-	9	30	22	15/28	
Tetradymia canescens										
91	66	100	0	-	-	100	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	10/15	
09	0	0	0	-	-	0	0	0	5/8	

TOMMY HOLLOW - TREND STUDY NO. 25A-16-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 7,800 ft (2,377 m)

Aspect: Northeast

Slope: 1%-2%

Transect bearing: 167 degrees magnetic

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

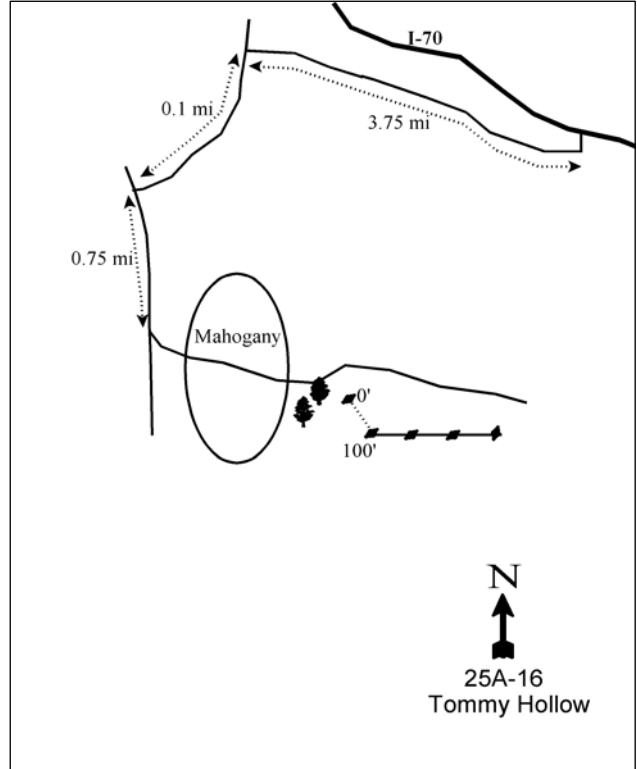
Directions:

Take I-70 east for about 37.5 miles from Salina to a rest area exit. From the exit, turn right once, then right again to go west on the frontage road paralleling the freeway. Drive on the frontage road for 3.75 miles to a road (FS #013) turning left. Take this left turn and proceed 0.1 miles to a "T" in the road, turn left again and go south for 0.75 miles to the crest of the second hill. On the crest there is an old jeep trail turning left and going down the top of the hill. This road goes through a small clearing at the intersection, then through a thick patch of mahogany and junipers. The transect begins in the next sage clearing beyond the trees, about 50 feet past two pinyons standing beside each other near the edge of the clearing. The transect is marked with 2-1/2 foot tall rebar. The 0-foot baseline stake has a red browse tag #7193 attached.

Map Name: Old Woman Plateau, Utah



Diagrammatic Sketch:



Township: 23S, Range: 4E, Section: 32

GPS: NAD 83, UTM 12S 457783 E 4290680 N

TOMMY HOLLOW - TREND STUDY NO. 25A-16

Site Information

Site Description: The study is located on the low rolling mountains about one mile south of Emigrant Pass on I-70. It samples a flat that is dominated by sagebrush (*Artemisia spp.*) and grass, surrounded by pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*) and curlleaf mountain mahogany (*Cercocarpus ledifolius*). The area is managed by the Forest Service as part of the Beaver Dams allotment. Cattle were seen on site in July of 1985. In 1985, there were also signs to indicate that elk and deer use the site in winter. Pellet group data in 1991 estimated 42 deer and 15 elk days use/acre (103 ddu/ha, 38 edu/ha). Pellet group data estimated heavy deer use in 1999, but deer use was light in 2004 and 2009. Estimated elk use has fluctuated with heavy use in 1999, light use in 2004, and more moderate use in 2009. Estimated cattle use has been light since 1999. Rabbit sign has also been very common (Table - Pellet Group Data).

Browse: The key species in the flat are mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), black sagebrush (*A. nova*), and antelope bitterbrush (*Purshia tridentata*). Mountain big sagebrush is the dominant browse species in cover, but has steadily decreased since 1999 (Table - Browse Trends). The population of mountain big sagebrush has displayed high to moderate levels of decadence with many plants displaying poor vigor. Recruitment of young mountain big sagebrush plants was good in the early years of the study, but has been low since 2004. Utilization of mountain big sagebrush has been mostly moderate to heavy over the study years. Black sagebrush occurs at higher density than mountain big sagebrush, but displays only light use. Black sagebrush recruitment was also good at the outset of the study, but has been poor since 2004. Bitterbrush density has steadily increased since 1999 and is common on the site. Decadence in the bitterbrush population has also steadily decreased since 1991. Bitterbrush has displayed moderate to heavy utilization in the past, but use was light in 2009 (Table - Browse Characteristics).

Several other desirable browse species available on or near the site include winterfat (*Ceratoides lanata*), curlleaf mountain mahogany, and Utah serviceberry (*Amelanchier utahensis*). Besides providing variety in forage, the nearby curlleaf mountain mahogany and pinyon-juniper stands provide good protective cover. It appears there was some confusion with identification of stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) and broom snakeweed (*Gutierrezia sarothrae*) in 1985 and 1991. Both species occur at fairly high densities (Table- Browse Characteristics) and have provided a moderate amount of combined cover since 1999 (Table - Browse Trends).

Herbaceous Understory: The understory vegetation is composed of a variety of grasses and forbs. The dominant grass species on the site is mutton bluegrass (*Poa fendleriana*) and other common species include bottlebrush squirreltail (*Sitanion hystrix*), blue grama (*Bouteloua gracilis*), sedge (*Carex sp.*), Letterman needlegrass (*Stipa lettermani*), and western wheatgrass (*Agropyron smithii*). There was a large decrease in the nested frequency and cover of many of the common grass species in 2009. Forbs are diverse but most species occur only occasionally. The most common perennial forbs include rose pussytoes (*Antennaria rosea*), redroot eriogonum (*Eriogonum racemosum*), and scarlet globemallow (*Sphaeralcea coccinea*).

Soil: The soil is a sandy clay loam with a slightly acid pH. Phosphorus has limited availability for plant growth and development at only 4.1 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately low, but there is a high amount of bare soil exposed in the shrub interspaces. Most of the protective ground cover is provided by litter cover with a fairly high amount of cryptogam cover (Table - Basic Cover). The soil erosion condition was classified as moderate in 2004 due to a high amount of pedestaling, but was classified as stable in 2009.

Trend Assessments

Browse:

- **1985 to 1991 - slightly down (-1):** There may have been some identification problems between black sagebrush and mountain big sagebrush. The density of black sagebrush decreased by 12% and the density of mountain big sagebrush increased more than two-fold. Decadence of both species increased to over 50% and recruitment of young plants decreased, but remained very good. The density of bitterbrush increased by 33%, but all of the sampled plants were decadent.
- **1991 to 1999 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Decadence of the three key species, mountain big sagebrush, black sagebrush, and bitterbrush, decreased to more moderate levels.
- **1999 to 2004 - down (-2):** The density of mountain big sagebrush decreased by 37% and the density of black sagebrush decreased by 19%. Recruitment of young plants in both species decreased substantially and was poor in 2004.
- **2004 to 2009 - up (+2):** The density of bitterbrush increased almost three-fold, the density of black sagebrush increased 28%, and the density of mountain big sagebrush increased 12%. Decadence remained similar in black and mountain big sagebrush, but continued to decrease in bitterbrush. Recruitment of all three species remained poor.

Grass:

- **1985 to 1991 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1991 to 1999 - stable (0):** Perennial grass sum of nested frequency changed little, though composition changed with a significant decrease in the nested frequency of sedge and bottlebrush squirreltail and a significant increase in mutton bluegrass.
- **1999 to 2004 - stable (0):** The sum of nested frequency and cover of perennial grasses changed little, but mutton bluegrass and sedge increased significantly in nested frequency while blue grama and bottlebrush squirreltail decreased significantly.
- **2004 to 2009 - down (-2):** There was a 22% decrease in the sum of nested frequency of perennial grasses and cover decreased from 13% to 11%. There was a significant decrease in the nested frequency of sedge and bottlebrush squirreltail, and the cover of blue grama decreased substantially.

Forb:

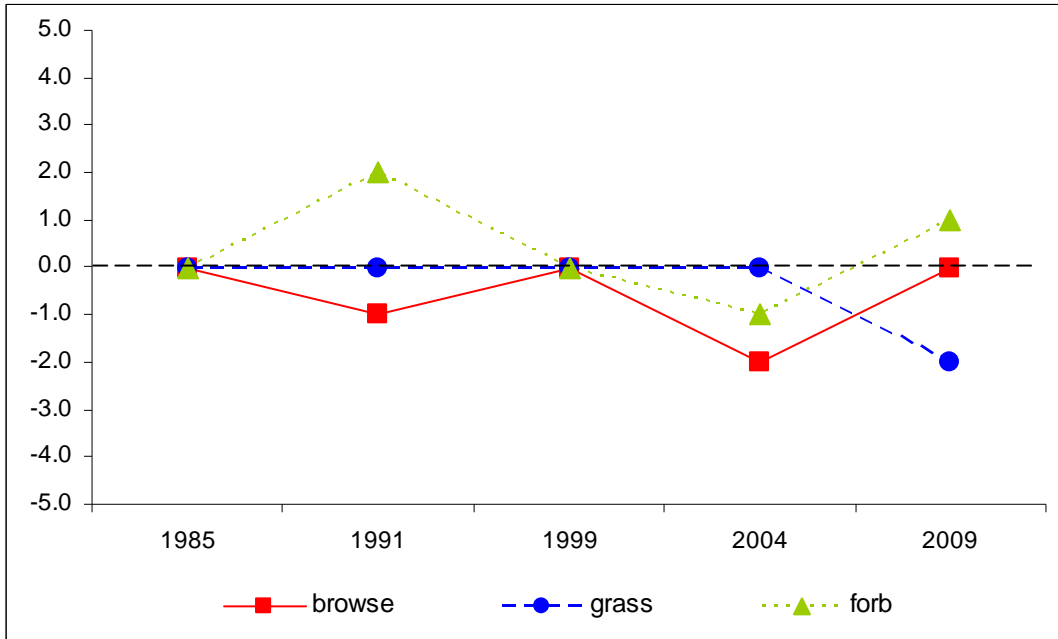
- **1985 to 1991 - up (+2):** The sum of nested frequency of perennial forbs increased by 21% with a significant increase in the nested frequency of pussytoes.
- **1991 to 1999 - down (-2):** Perennial forb sum of nested frequency decreased by 46%.
- **1999 to 2004 - slightly down (-1):** There was a 14% decrease in the sum of nested frequency of perennial forbs and cover decreased from 4% to 1%.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased by 37% and cover increased to 3%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 25A, study no: 16

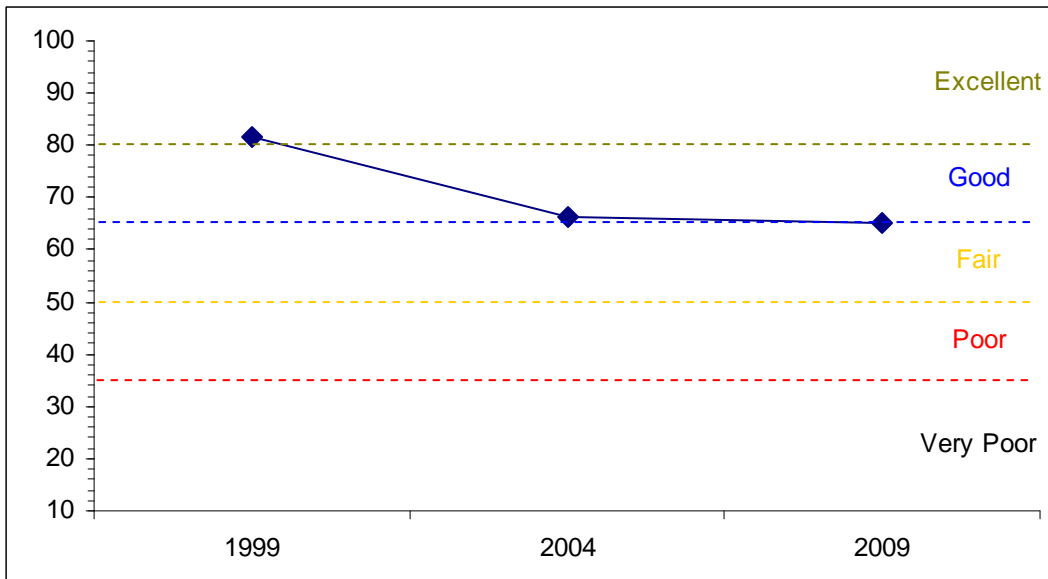
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	26.5	8.8	13.5	24.8	0.0	7.9	0.0	81.5	Good-Excellent
04	27.9	6.4	3.0	26.1	0.0	2.9	0.0	66.2	Fair-Good
09	27.5	8.7	2.2	21.3	0.0	5.5	0.0	65.3	Fair-Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 25A Study no: 16



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 25A, Study no: 16



HERBACEOUS TRENDS--
Management unit 25A, Study no: 16

T y P e	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron smithii	a19	b84	b109	b90	b85	1.16	1.09	1.24
G	Bouteloua gracilis	b116	b117	b91	a51	a32	1.48	1.08	.54
G	Bromus tectorum (a)	-	-	2	-	-	.00	-	-
G	Carex sp.	d269	d264	a27	c153	b72	.69	1.56	.40
G	Festuca ovina	bc11	a-	b62	a4	a-	.84	.06	-
G	Oryzopsis hymenoides	b72	a8	a4	a-	a-	.01	-	-
G	Poa fendleriana	a23	a30	b174	c220	c250	4.87	6.17	7.28
G	Poa pratensis	-	-	-	9	-	-	.12	-
G	Poa secunda	9	-	2	17	18	.00	.06	.11
G	Sitanion hystrix	cd142	d166	c110	b68	a19	2.10	2.15	.19
G	Stipa comata	8	5	5	-	-	.07	.00	-
G	Stipa lettermani	a8	a14	b52	b49	b41	1.18	.71	.89
Total for Annual Grasses		0	0	2	0	0	0.00	0	0
Total for Perennial Grasses		677	688	636	661	517	12.42	13.03	10.67
Total for Grasses		677	688	638	661	517	12.43	13.03	10.67
F	Agoseris glauca	-	5	-	-	-	-	-	-
F	Allium sp.	1	-	2	-	-	.03	-	-
F	Androsace septentrionalis (a)	-	-	b28	b20	a1	.07	.08	.00
F	Antennaria rosea	a14	b74	a27	a16	a8	2.40	.20	.21
F	Arabis demissa	b47	b116	a13	a2	a8	.03	.00	.03
F	Astragalus convallarius	-	-	1	6	1	.03	.03	.00
F	Astragalus sp.	1	1	9	4	3	.22	.03	.00
F	Astragalus utahensis	-	-	-	2	-	-	.00	-
F	Calochortus nuttallii	ab23	b50	a5	a-	a-	.01	-	-
F	Castilleja chromosa	1	1	3	-	2	.01	-	.00
F	Collinsia parviflora (a)	-	-	a-	a6	b27	-	.01	.06
F	Crepis acuminata	-	2	-	-	-	-	-	-
F	Cymopterus sp.	-	3	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	-	1	-	-	.00	-
F	Erigeron eatonii	ab6	a1	abc13	c22	bc25	.08	.09	.30
F	Erigeron flagellaris	a-	a-	a-	a4	b28	-	.01	.32
F	Erigeron pumilus	c110	b39	a14	ab13	a17	.03	.09	.09
F	Eriogonum racemosum	a3	a-	ab13	ab10	b22	.13	.13	.52
F	Hymenoxys richardsonii	a-	a-	b13	b17	b18	.18	.18	.33
F	Ipomopsis aggregata	-	-	3	-	-	.03	-	-
F	Machaeranthera canescens	-	1	2	-	-	.01	-	-
F	Microsteris gracilis (a)	-	-	-	3	6	-	.01	.01
F	Penstemon comarrhenus	-	-	-	3	5	-	.01	.04
F	Penstemon pachyphyllus	3	2	2	-	-	.06	-	-
F	Penstemon sp.	-	-	8	5	13	.07	.06	.27
F	Phlox austromontana	a2	a-	b21	ab10	ab14	.22	.22	.30
F	Phlox longifolia	-	-	-	3	3	-	.00	.01
F	Polygonum douglasii (a)	-	-	9	24	19	.02	.05	.06

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
F	Potentilla gracilis	-	-	3	-	-	.00	-	-
F	Ranunculus testiculatus (a)	-	-	a ⁻	a ⁶	b ¹¹³	-	.01	.55
F	Sphaeralcea coccinea	b ⁸³	ab ⁶⁰	a ³⁴	a ⁴⁵	ab ⁵⁷	.34	.37	.26
F	Taraxacum officinale	-	-	4	3	-	.01	.01	-
F	Unknown forb-perennial	-	-	2	-	-	.00	-	-
F	Zigadenus paniculatus	-	-	-	-	2	-	-	.00
Total for Annual Forbs		0	0	37	60	166	0.09	0.17	0.70
Total for Perennial Forbs		294	355	192	165	226	3.94	1.47	2.74
Total for Forbs		294	355	229	225	392	4.03	1.64	3.44

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

BROWSE TRENDS--

Management unit 25A, Study no: 16

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Amelanchier utahensis	4	5	3	.38	.41	.00
B	Artemisia frigida	0	0	1	-	-	.15
B	Artemisia nova	69	65	56	3.59	6.27	5.61
B	Artemisia tridentata tridentata	1	2	1	.15	.66	.15
B	Artemisia tridentata vaseyana	85	79	79	13.40	10.92	8.73
B	Ceratoides lanata	5	8	12	.00	.07	.09
B	Chrysothamnus depressus	5	10	20	.03	.09	1.27
B	Chrysothamnus viscidiflorus viscidiflorus	84	95	55	5.66	7.72	2.59
B	Echinocereus triglochidatus	0	1	0	-	.00	-
B	Gutierrezia sarothrae	53	43	28	.93	1.83	.23
B	Juniperus osteosperma	0	1	0	-	.00	-
B	Opuntia sp.	15	21	15	.26	.42	.35
B	Pinus edulis	2	3	3	.00	.03	.81
B	Purshia tridentata	8	10	18	2.97	3.17	5.02
B	Symphoricarpos oreophilus	4	4	3	.21	.00	.15
B	Tetradymia canescens	3	4	5	.00	.00	.00
Total for Browse		338	351	299	27.61	31.63	25.19

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 16

Species	Percent Cover	
	'04	'09
Amelanchier utahensis	.63	.06
Artemisia nova	11.01	7.66
Artemisia tridentata tridentata	1.26	.36
Artemisia tridentata vaseyana	14.75	9.16
Ceratoides lanata	-	.03
Chrysothamnus depressus	-	1.85
Chrysothamnus viscidiflorus viscidiflorus	13.63	4.13
Gutierrezia sarothrae	3.00	.23
Opuntia sp.	.15	.06
Pinus edulis	.06	.60
Purshia tridentata	1.91	7.65
Symphoricarpos oreophilus	.13	.58
Tetradymia canescens	.05	.03

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 16

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	1.0	0.4
Artemisia tridentata vaseyana	1.4	0.7

POINT-QUARTER TREE DATA--

Management unit 25A, Study no: 16

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	6	<18	<18	6.5	-	-
Pinus edulis	12	<18	<18	4.7	-	-

BASIC COVER--

Management unit 25A, Study no: 16

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	13.50	9.75	45.80	44.76	39.38
Rock	.25	0	.04	.05	.01
Pavement	1.50	1.75	.53	2.88	.77
Litter	43.25	46.00	36.16	38.02	44.73
Cryptogams	0	8.50	6.69	9.32	5.21
Bare Ground	41.50	34.00	27.71	25.63	26.80

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 16, Study Name: Tommy Hollow

Effective rooting depth (in)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.8	6.5	52.9	15.8	31.3	1.6	4.1	163.2	0.6

PELLET GROUP DATA--

Management unit 25A, Study no: 16

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	67	65	63	-	-	-
Elk	32	17	12	93 (229)	13 (33)	34 (83)
Deer	15	21	4	96 (237)	12 (30)	5 (13)
Cattle	3	3	3	9 (22)	9 (21)	8 (20)

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 16

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
85	0	0	0	0	-	0	0	0	-/-
91	132	50	0	50	-	50	0	0	-/-
99	100	40	60	0	-	40	40	0	38/29
04	120	50	50	0	20	33	33	0	15/15
09	60	0	100	0	-	67	33	0	11/13
<i>Artemisia frigida</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	120	0	100	-	-	100	0	0	-/-
<i>Artemisia nova</i>									
85	10865	45	48	7	799	4	2	.61	8/11
91	9531	25	20	55	599	37	37	13	7/10
99	7800	24	67	9	140	17	.25	4	9/16
04	6280	1	82	17	100	0	0	6	8/17
09	8100	4	75	21	700	16	2	13	6/14
<i>Artemisia tridentata tridentata</i>									
85	0	0	0	0	-	0	0	0	-/-
91	132	50	0	50	-	50	50	0	-/-
99	20	0	0	100	-	0	0	0	-/-
04	40	0	0	100	-	0	0	50	69/69
09	20	0	0	100	-	100	0	100	52/67
<i>Artemisia tridentata vaseyana</i>									
85	7731	49	45	6	2466	10	2	.86	11/11
91	16532	36	13	51	8466	36	33	18	11/18
99	6880	29	51	21	260	31	.29	3	21/32
04	4340	7	56	37	180	29	26	24	18/28
09	4880	8	57	35	280	41	6	25	19/25

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Ceratoides lanata</i>										
85	2731	15	78	7	66	0	0	0	4/3	
91	3332	8	88	4	133	2	94	2	1/2	
99	220	0	91	9	20	27	73	0	3/3	
04	360	6	94	0	-	50	44	6	4/3	
09	360	6	94	0	-	0	0	0	3/4	
<i>Cercocarpus ledifolius</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	20	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	34/44	
09	0	0	0	-	-	0	0	0	47/35	
<i>Chrysothamnus depressus</i>										
85	66	0	0	100	-	0	0	0	-/-	
91	798	8	83	8	-	17	83	0	2/2	
99	180	0	100	0	-	33	33	0	3/5	
04	400	25	75	0	-	0	25	0	4/8	
09	2500	0	100	0	-	32	0	0	3/7	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	24732	27	70	3	533	33	23	1	5/5	
99	12580	3	95	2	-	.31	0	0	4/9	
04	7120	1	98	1	360	0	0	.28	5/10	
09	7680	10	89	1	-	0	0	2	5/9	
<i>Echinocereus triglochidatus</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	20	0	100	-	-	0	0	0	2/3	
09	0	0	0	-	-	0	0	0	-/-	
<i>Gutierrezia sarothrae</i>										
85	17932	17	83	-	1199	0	0	0	5/7	
91	133	0	100	-	-	0	0	0	4/5	
99	5780	14	86	-	40	0	0	0	6/7	
04	2060	0	100	-	-	0	0	0	6/8	
09	1360	0	100	-	-	0	12	0	4/5	
<i>Juniperus osteosperma</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	20	100	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)	
<i>Opuntia</i> sp.										
85	0	0	0	0	-	0	0	0	-/-	
91	399	67	33	0	66	0	0	0	2/1	
99	580	28	66	7	-	0	0	7	3/12	
04	920	2	98	0	-	0	0	0	2/7	
09	700	31	69	0	20	0	0	0	2/8	
<i>Pinus edulis</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	40	100	0	0	20	0	0	0	-/-	
04	60	67	0	33	-	0	0	0	-/-	
09	60	100	0	0	-	0	0	0	-/-	
<i>Purshia tridentata</i>										
85	199	33	67	0	-	33	33	0	20/23	
91	266	0	0	100	-	0	75	100	-/-	
99	180	22	44	33	-	33	33	0	20/48	
04	280	7	79	14	20	0	93	7	16/44	
09	800	0	100	0	-	0	10	3	22/38	
<i>Symphoricarpos oreophilus</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	120	33	67	0	-	0	0	0	14/27	
04	100	40	40	20	-	20	0	0	9/14	
09	80	0	100	0	-	0	0	0	13/21	
<i>Tetradymia canescens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	60	67	33	-	-	0	33	0	12/15	
04	160	88	13	-	-	0	0	0	3/8	
09	100	0	100	-	-	0	0	0	5/7	

ELK CAMP - TREND STUDY NO. 25A-18-09

Vegetation Type: Mixed Mountain Brush
Range Type: Crucial Deer Summer, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,700 ft (2,652 m)
Aspect: South
Slope: 30%-35% at 0' stake, 10%-15% further up the baseline.
Transect bearing: Line 1 - 170°M, Lines 2-4 - 352°M
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

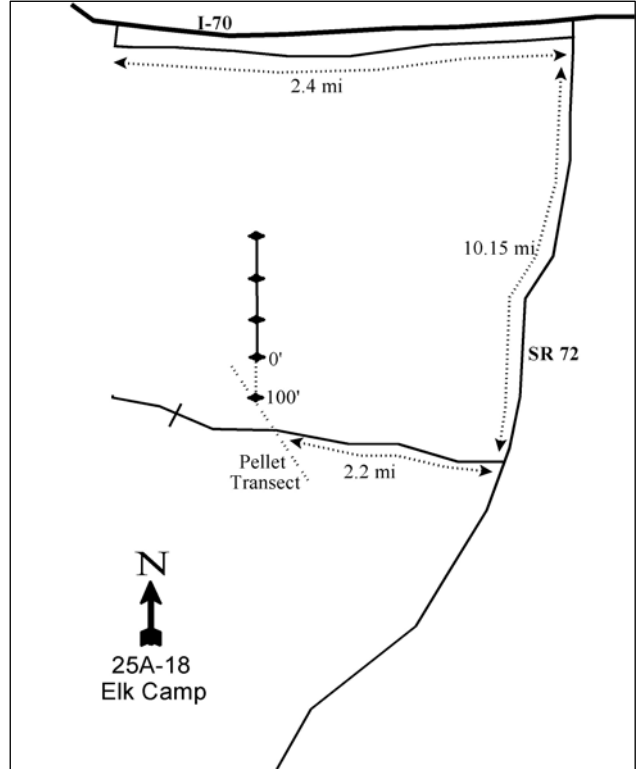
Go east from Salina on I-70 for approximately 37.5 miles to the rest area. From the exit, go 2.4 miles east on the frontage road to the junction with SR72. Travel south on SR 72 for 10.15 miles to a gravel road to the right with a sign for Last Chance Road. Turn and go 2 miles to the Elk Camp Road, and continue straight for another 0.2 miles. Stop here, approximately 90 yards short of a cattleguard, and look for a small yellow stake 10 feet off the south side of the road. The yellow pellet group transect stakes run northwest, with one stake every 30 feet. Follow the yellow stakes 90 feet up from the road to a large rebar which marks the 100-foot end of the frequency baseline. The 0-foot baseline stake is 100 feet north and is tagged #7040.

Map Name: John's Peak, Utah



Township: 25S, Range: 4E, Section: 9

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 458264 E 4278340 N

ELK CAMP - TREND STUDY NO. 25A-18

Site Information

Site Description: The study is located alongside a DWR pellet group transect on the south side of a hill overlooking Elk Campground and South Last Chance Creek. The surrounding gentle hills are covered by open sagebrush, grass slopes, scattered pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and patches of aspen (*Populus tremuloides*). The vegetation community of the study site is a mixed mountain brush dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *tridentata*). There was a prescribed burn in 1999 that was spotty over the area and affected one of the frequency/density belts. Pellet group counts demonstrate that deer use varies greatly from year to year (Jense et al. 1985, 1991). Elk use is low but it has increased steadily since 1980 (Jense et al. 1985, 1991). In the past, the area was grazed by sheep, but in 1978 the permits were converted to cattle and it became a part of the Last Chance Cattle Allotment (Fish Lake National Forest). However, sheep were noted on a hillside nearby the study transect in July of 1985. The area is within the Lower Last Chance pasture of the Last Chance allotment. Grazing use is light on the slope, but heavier in the valley below along the riparian corridor. Pellet group data taken along the study site baseline has estimated increasing deer use since 1999 and indicated very heavy use in 2009. Estimated elk use was moderate in 1999 and 2009, but no elk pellets were sampled in 2004. Estimated cattle use has been light since 1999 (Table - Pellet Group Data). A fawn that had recently died was found near the site in 1999.

Browse: There are several species of shrubs present on the site. The key browse species are black sagebrush (*Artemisia nova*), mountain big sagebrush, and bitterbrush (*Purshia tridentata*). Black sagebrush was the dominant browse species at the outset of the study in 1985, but has steadily decreased in density since 1999 while mountain big sagebrush has steadily increased in density (Table - Browse Characteristics) and cover over the same period. Mountain big sagebrush is now the dominant browse species in cover on the site (Table - Browse Trends). The mountain big sagebrush occurs in larger numbers further up the slope where it levels out and the soil is deeper. Both sagebrush populations consist of mostly mature plants that displayed moderate to high decadence in the early years of the study, but decadence had decreased and was more normal in 2009. Recruitment of young mountain big sagebrush plants has been very good over the sample years and utilization has been mostly moderate to heavy. Recruitment of young black sagebrush plants has been fairly poor over the course of the study and use of black sagebrush has decreased from moderate to heavy use in the early years of the study to light use in 2009. The most preferred browse on the site is bitterbrush which has a low spreading growth form on this site. Bitterbrush has been classified as heavily utilized each time this site has been sampled. This population has steadily declined in density since 1985. There is a variety of other browse on the site such as snowberry (*Symphoricarpos oreophilus*), gray horsebrush (*Tetradymia canescens*), Wood's rose (*Rosa woodsii*), broom snakeweed (*Gutierrezia sarothrae*), and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) (Table - Browse Characteristics).

Herbaceous Understory: The site supports a variety of grasses and forbs. The most abundant grasses include mutton bluegrass (*Poa fendleriana*), sedge (*Carex* sp.), Letterman needlegrass (*Stipa lettermani*), and blue grama (*Bouteloua gracilis*). Blue grama is abundant on the south facing slopes, while the sedge is abundant on the north facing slopes. Forbs are diverse but not very abundant. The more frequently encountered species are low growing and offer little forage.

Soil: Soil on the site is a loam with a slightly acid pH (Table - Soil Analysis Data). There are many large rocks on the surface and throughout the soil. These rocks are of volcanic origin, as is the soil. Infiltration of water is good, but minor sheet erosion has removed some of the top soil leaving an erosion pavement. Bare ground cover is moderately low, but has increased steadily since 1999. Pedestaling and terracing is evident on the steeper slopes but erosion is minimal and the soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 - slightly down (-1):** The density of bitterbrush decreased by 31% and decadence increased from 1% to 90%. Black sagebrush density decreased by 6% and decadence increased from 56% to 70%. Mountain big sagebrush density increased by more than two-fold, but decadence increased from 21% to 31%.
- **1991 to 1999 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Decadence of the all three key species, mountain big sagebrush, black sagebrush, and bitterbrush, decreased substantially.
- **1999 to 2004 - slightly down (-1):** Density of all three key species decreased slightly with the largest decrease in the preferred browse species, bitterbrush. There was a slight increase in cover of all three species, but there was also a decrease in the recruitment of young plants in all three species. Recruitment was still good for mountain big sagebrush, but was poor for black sagebrush and bitterbrush. Broom snakeweed density increased more than three-fold.
- **2004 to 2009 - stable (0):** The density of bitterbrush decreased by 26% and cover decreased from 6% to 4%, but the density of mountain big sagebrush increased by 36%.

Grass:

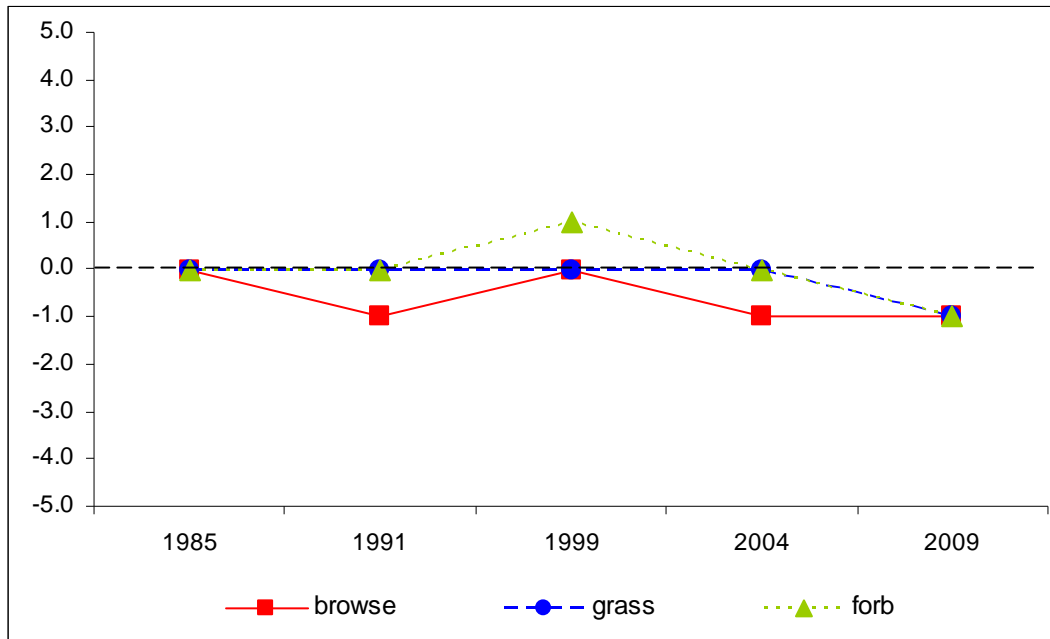
- **1985 to 1991 - stable (0):** There was little change in the sum of nested frequency or composition of perennial grasses.
- **1991 to 1999 - stable (0):** Perennial grass sum of nested frequency changed little.
- **1999 to 2004 - stable (0):** The sum of nested frequency and cover of perennial grasses remained similar.
- **2004 to 2009 - slightly down (-1):** There was an 18% decrease in the sum of nested frequency of perennial grasses and cover decreased from 11% to 8%. Sedge decreased significantly in nested frequency.

Forb:

- **1985 to 1991 - stable (0):** There was little change in the sum of nested frequency of perennial forbs.
- **1991 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 13%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 14%, though there was little change in cover.
- **2004 to 2009 - slightly down (-1):** Perennial forb sum of nested frequency decreased by 19% and cover decreased from 2% to 1%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25A Study no: 18



HERBACEOUS TRENDS--
Management unit 25A, Study no: 18

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron smithii	a-	b13	b18	bc32	c51	.11	.25	.57
G	Bouteloua gracilis	b73	b76	b96	ab67	a37	3.65	2.12	.78
G	Carex sp.	ab112	a88	ab106	b147	a103	3.25	2.18	1.17
G	Festuca ovina	2	4	9	3	-	.09	.15	-
G	Poa fendleriana	b192	ab186	b194	a138	ab148	3.56	3.93	3.90
G	Sitanion hystrix	c83	c109	b47	ab32	a7	.42	.59	.15
G	Stipa comata	-	-	-	5	-	-	.07	-
G	Stipa lettermani	a20	ab46	ab46	b61	b53	.90	1.95	1.18
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		482	522	516	485	399	12.00	11.26	7.78
Total for Grasses		482	522	516	485	399	12.00	11.26	7.78
F	Agoseris glauca	a-	b14	a-	a-	a-	-	-	-
F	Allium sp.	-	2	7	11	-	.03	.02	-
F	Androsace septentrionalis (a)	-	-	5	-	-	.01	-	-
F	Antennaria rosea	bc23	a9	c36	ab18	ab15	.83	.78	.27
F	Arabis demissa	12	8	7	-	-	.18	-	-
F	Artemisia ludoviciana	2	3	-	-	-	-	-	-
F	Aster sp.	-	-	-	-	3	-	-	.00
F	Astragalus sp.	a-	a-	b22	a9	a6	.14	.05	.01
F	Castilleja chromosa	b13	b13	a-	a-	a-	-	-	-

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
F	Chaenactis douglasii	2	-	-	3	3	-	.00	.00
F	Chenopodium sp. (a)	-	-	-	8	-	-	.05	-
F	Cirsium sp.	a ⁻	a ⁻	ab ⁴	b ⁷	a ²	.18	.09	.00
F	Collinsia parviflora (a)	-	-	9	-	-	.02	-	-
F	Comandra pallida	-	-	5	7	3	.06	.04	.01
F	Cryptantha sp.	-	2	-	-	-	-	-	-
F	Erigeron eatonii	-	-	-	5	4	-	.03	.01
F	Erigeron pumilus	-	-	6	8	10	.18	.04	.05
F	Eriogonum racemosum	25	34	24	31	26	.27	.52	.12
F	Eriogonum umbellatum	b ¹⁶	ab ¹¹	ab ⁴	a ⁻	a ³	.01	-	.03
F	Gayophytum ramosissimum(a)	-	-	-	5	-	-	.03	-
F	Hymenoxys richardsonii	b ¹⁸	a ⁷	a ⁻	a ⁻	a ⁻	-	.00	-
F	Lappula occidentalis (a)	-	-	-	4	-	-	.01	-
F	Lithospermum incisum	-	3	-	1	-	-	.03	-
F	Lupinus argenteus	-	-	-	2	1	-	.03	.00
F	Machaeranthera canescens	ab ¹¹	a ³	ab ¹²	b ¹⁵	a ⁻	.05	.17	-
F	Machaeranthera grindelioides	a ⁻	a ⁻	a ⁻	a ²	b ¹³	-	.03	.13
F	Penstemon sp.	-	2	10	5	3	.05	.01	.01
F	Phlox austromontana	a ⁻	a ⁻	b ³²	b ²⁴	b ³⁰	.35	.48	.38
F	Phlox longifolia	b ¹⁹	c ⁴⁸	a ⁴	a ⁶	a ²	.01	.01	.03
F	Polygonum douglasii (a)	-	-	a ¹	b ¹⁸	a ⁻	.00	.05	-
F	Senecio multilobatus	2	-	7	-	2	.04	-	.00
F	Sphaeralcea coccinea	6	3	3	-	-	.00	-	-
F	Unknown forb-perennial	b ¹⁴	a ⁻	a ⁻	a ³	a ¹	-	.03	.03
F	Zigadenus paniculatus	3	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	15	35	0	0.03	0.15	0
Total for Perennial Forbs		166	162	183	157	127	2.42	2.39	1.11
Total for Forbs		166	162	198	192	127	2.46	2.55	1.11

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

BROWSE TRENDS--

Management unit 25A, Study no: 18

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	<i>Artemisia frigida</i>	4	5	2	.00	.06	.15
B	<i>Artemisia nova</i>	52	51	41	5.33	5.49	3.75
B	<i>Artemisia tridentata vaseyana</i>	58	61	61	7.46	9.98	10.09
B	<i>Chrysothamnus nauseosus hololeucus</i>	7	13	3	.48	.51	.04
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	69	69	65	3.28	7.94	4.53
B	<i>Coryphantha vivipara</i>	2	2	0	.00	.00	-
B	<i>Gutierrezia sarothrae</i>	12	28	26	.70	1.05	1.00
B	<i>Mahonia repens</i>	7	9	7	.04	.15	.05
B	<i>Opuntia sp.</i>	0	3	4	-	.00	.06
B	<i>Pediocactus simpsonii</i>	0	5	2	-	.00	.00
B	<i>Pinus edulis</i>	3	4	3	2.51	1.69	2.67
B	<i>Purshia tridentata</i>	49	46	35	6.53	5.57	3.84
B	<i>Rosa woodsii</i>	17	12	11	1.89	.69	.34
B	<i>Symphoricarpos oreophilus</i>	23	27	22	.75	.88	1.54
B	<i>Tetradymia canescens</i>	11	15	6	.06	.09	.53
Total for Browse		314	350	288	29.08	34.14	28.62

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 18

Species	Percent Cover		
	'99	'04	'09
<i>Artemisia frigida</i>	-	.11	-
<i>Artemisia nova</i>	-	5.73	3.81
<i>Artemisia tridentata vaseyana</i>	-	9.53	12.91
<i>Chrysothamnus nauseosus hololeucus</i>	-	.68	.28
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	-	7.61	1.78
<i>Gutierrezia sarothrae</i>	-	.95	1.68
<i>Mahonia repens</i>	-	.13	-
<i>Opuntia sp.</i>	-	-	.01
<i>Pinus edulis</i>	4.19	4.30	4.11
<i>Purshia tridentata</i>	-	8.36	6.00
<i>Rosa woodsii</i>	-	1.26	.33
<i>Symphoricarpos oreophilus</i>	-	2.38	2.23
<i>Tetradymia canescens</i>	-	.75	.23

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 18

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.9	1.3
Purshia tridentata	6.2	1.2

POINT-QUARTER TREE DATA--

Management unit 25A, Study no: 18

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus scopulorum	10	24	25	3.8	3.8	4.7
Pinus edulis	10	26	23	3.8	6.4	2.1

BASIC COVER--

Management unit 25A, Study no: 18

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	5.50	13.00	42.04	45.70	37.63
Rock	17.25	21.50	15.66	16.39	13.93
Pavement	7.00	.75	2.48	3.81	2.59
Litter	60.75	44.25	33.96	31.74	37.47
Cryptogams	.25	0	.06	.04	.03
Bare Ground	9.25	20.50	14.08	19.52	24.99

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 18, Study Name: Elk Camp

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11	6.5	50.9	29.8	19.3	3	16.8	211.2	0.5

PELLET GROUP DATA--

Management unit 25A, Study no: 18

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Sheep	-	-	1	-	-	-
Rabbit	23	27	20	-	-	-
Elk	18	4	7	21 (52)	-	39 (96)
Deer	27	49	21	53 (130)	66 (162)	105 (260)
Cattle	4	1	6	11 (27)	4 (9)	2 (5)

BROWSE CHARACTERISTICS--
Management unit 25A, Study no: 18

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
85	0	0	0	-	-	0	0	0	-/-
91	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	16/17
<i>Artemisia frigida</i>									
85	665	10	90	-	-	0	0	0	3/2
91	0	0	0	-	-	0	0	0	-/-
99	120	33	67	-	-	33	0	0	3/8
04	240	8	92	-	-	50	8	0	6/7
09	100	0	100	-	-	0	0	0	4/6
<i>Artemisia nova</i>									
85	8531	12	31	56	199	47	3	11	10/16
91	7998	6	24	70	-	37	44	13	11/16
99	3560	10	69	21	60	35	7	2	10/20
04	3200	4	70	26	300	23	13	10	9/19
09	3020	10	81	9	40	0	0	7	10/19
<i>Artemisia tridentata vaseyana</i>									
85	931	36	43	21	66	57	0	7	18/20
91	1931	34	34	31	66	52	7	17	22/23
99	2740	23	61	15	180	44	3	7	27/37
04	2600	18	64	18	13140	40	22	9	19/31
09	3540	29	65	6	420	18	2	3	18/30
<i>Chrysothamnus nauseosus hololeucus</i>									
85	66	0	0	100	-	0	100	0	-/-
91	0	0	0	0	-	0	0	0	-/-
99	280	7	93	0	-	7	21	0	9/13
04	360	0	100	0	-	39	0	0	12/18
09	80	25	75	0	-	0	0	0	10/7
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
85	8065	23	76	1	66	0	0	0	5/10
91	10865	25	71	4	-	31	21	.61	3/7
99	4060	12	85	2	-	5	1	.98	6/12
04	6440	2	97	1	-	0	0	.31	9/15
09	5020	16	84	0	-	0	0	.79	7/13

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Coryphantha vivipara</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	40	0	100	-	-	0	0	0	3/2	
04	40	0	100	-	-	0	0	0	2/3	
09	0	0	0	-	-	0	0	0	-/-	
<i>Eriogonum microthecum</i>										
85	133	0	100	-	-	0	0	0	1/4	
91	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	-/-	
<i>Gutierrezia sarothrae</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	580	0	100	0	-	0	0	0	5/7	
04	1860	0	100	0	-	0	0	0	9/10	
09	1160	3	95	2	-	5	0	2	6/8	
<i>Juniperus scopulorum</i>										
85	66	0	100	-	-	0	0	0	46/41	
91	66	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	-/-	
<i>Mahonia repens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	780	18	82	-	-	0	0	0	2/2	
04	1100	0	100	-	-	0	0	0	3/4	
09	520	0	100	-	-	0	0	0	2/3	
<i>Opuntia sp.</i>										
85	599	11	89	0	-	0	0	0	2/1	
91	398	17	67	17	-	0	0	0	2/5	
99	0	0	0	0	-	0	0	0	2/5	
04	80	50	50	0	-	0	0	0	3/8	
09	80	0	100	0	-	0	0	0	3/7	
<i>Pediocactus simpsonii</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	120	67	33	-	-	0	0	0	3/5	
09	40	0	100	-	-	0	0	0	3/5	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Pinus edulis</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	60	33	67	-	-	0	0	0	-/-
04	80	50	50	-	-	0	0	0	-/-
09	60	67	33	-	-	0	0	0	-/-
<i>Purshia tridentata</i>									
85	5598	42	57	1	333	30	46	0	13/21
91	3865	0	10	90	-	2	97	40	6/16
99	2560	14	80	5	20	32	57	3	13/29
04	2060	5	86	9	-	9	90	7	13/31
09	1520	5	91	4	-	32	57	39	10/26
<i>Rosa woodsii</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	1480	42	58	-	60	0	0	0	12/14
04	1320	3	97	-	-	0	0	0	8/8
09	760	32	68	-	-	5	21	0	10/9
<i>Symphoricarpos oreophilus</i>									
85	865	31	69	0	-	38	0	0	18/16
91	1265	11	84	5	-	11	53	0	19/16
99	560	18	82	0	20	39	18	0	18/30
04	800	13	88	0	20	8	0	0	16/32
09	640	9	91	0	-	3	0	16	15/31
<i>Tetradymia canescens</i>									
85	398	17	33	50	-	17	0	0	7/5
91	465	14	29	57	-	14	43	29	13/10
99	260	8	62	31	-	54	0	8	10/10
04	320	19	81	0	-	38	6	0	11/12
09	120	0	100	0	-	0	0	0	9/11
<i>Yucca sp.</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	7/9
09	0	0	0	-	-	0	0	0	7/6

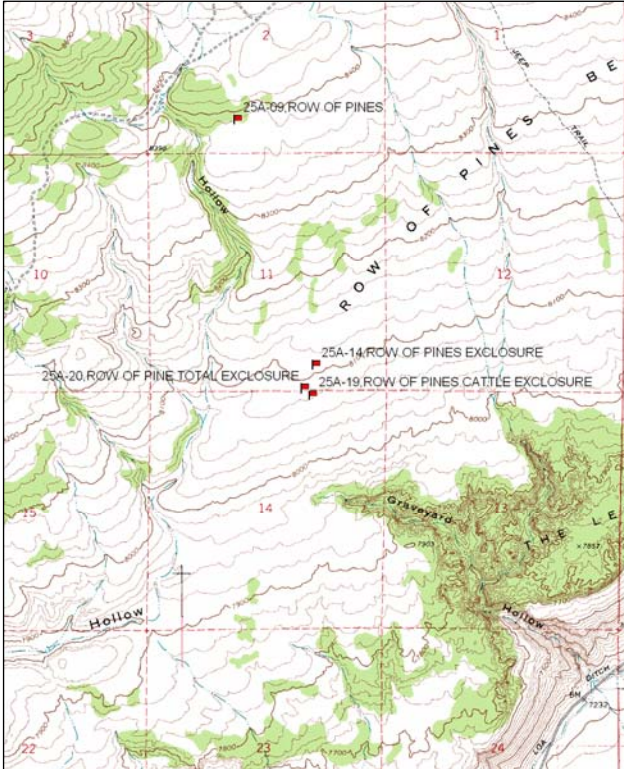
ROW OF PINES ENCLOSURE- TREND STUDY NO. 25A-14-09

Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 8,050 ft (2,454 m)
Aspect: Southeast
Slope: 3%-5%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

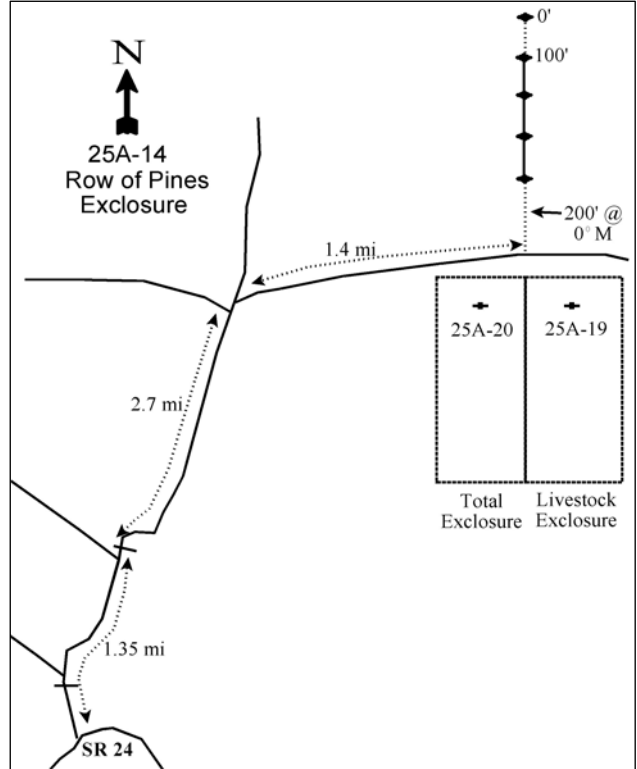
From the Chappell Cheese Factory northwest of Loa on SR 24, go west 2.6 miles to a side road on the north where the highway makes a sharp turn (0.95 miles west of mile marker #49). Take this road 0.65 miles and turn right after crossing a cattleguard. After 0.7 more miles, turn right at the fork and cross another cattleguard. Go 2.7 miles to another fork where you will again turn right. After ~60', turn right (east) and go 1.4 miles to an enclosure. Stop at the middle of the enclosure and walk 200 feet at an azimuth of 0°M to the 400' stake. The 0' stake is 400 feet to the north in front of a large rock.

Map Name: Loa, Utah



Township: 27S, Range: 2E, Section: 14

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 442669 E 4258250 N

ROW OF PINES EXCLOSURE - TREND STUDY NO. 25A-14

Site Information

Site Description: The study is located just outside of the Row of Pines enclosure. The enclosure was built in the late 1980's by the BLM and DWR after the area was chained and seeded. The study samples a sagebrush-grass community within the BLM Seven Mile allotment. The area was retreated with a dixie harrow as part of the Seven Mile WRI project ([Project# 594](#)) in the fall of 2006 to rejuvenate the sagebrush and improve the grass/forb composition with a native/non-native seed mix of grass, forb, and shrubs (Table - Seed Mix). Deer sign and remains were found in 1991 and large amounts of sage grouse droppings were also encountered on the area during study site establishment in 1991. Pellet group data has estimated moderate deer use in 1999 and 2009, with heavier use in 2004. Estimated cattle use has been light since 1999. Estimated elk use was light in 1999 and 2004 with no pellets sampled in 2009 (Table - Pellet Group Data). Escape cover is about a half mile from the study transect.

Browse: The dominant browse species on the site was Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), but in 2009 the cover of sagebrush was reduced and the cover of broom snakeweed (*Gutierrezia sarothrae*) increased to become the co-dominant browse species following the 2006 treatment (Table - Browse Trends). Prior to the treatment, the sagebrush population was mostly mature with high amounts of decadence and poor vigor. In 2009, following the treatment, much of the population was comprised of young plants, and decadence and poor vigor had decreased to normal levels. Utilization of sagebrush was moderate to heavy prior to the treatment, but was light in 2009 after the treatment (Table - Browse Characteristics). Other browse species are fairly limited on the site.

Herbaceous Understory: Seeded grasses, crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), and Russian wildrye (*Elymus junceus*), have become established since the initial chaining treatment, but in low numbers. The dominant grass has been the native species blue grama (*Bouteloua gracilis*) with bottlebrush squirreltail (*Sitanion hystrix*) being common at the outset of the study. Bottlebrush squirreltail and crested wheatgrass nested frequency declined significantly in 2004. Forb composition and abundance is poor with all forbs combined providing less than 1% cover (Table - Herbaceous Trends).

Soil: The soil texture is a sandy clay loam to a loam with a neutral pH (Table - Soil Analysis Data). Soil parent material is basalt. Bare ground cover is moderately high on the site with the majority of protective ground cover provided by a high amount of rock and pavement cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1991 to 1999 - stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Decadence of Wyoming big sagebrush remained similar, though poor vigor increased slightly.
- **1999 to 2004 - slightly down (-1):** The density of Wyoming big sagebrush decreased by 14% from 5,580 plants/acre to 4,780 plants/acre, and cover decreased from 13% to 11%. Decadence of sagebrush increased from 29% to 42% and poor vigor increased from 14% to 19%.
- **2004 to 2009 - slightly up (+1):** Following the treatment, Wyoming big sagebrush density increased by 38% to 6,640 plants/acre. However, the treatment also reduced the cover of sagebrush to just 2%. Recruitment of young sagebrush plants increased from 2% of the population to 38%. Decadence of sagebrush decreased to 6% and poor vigor decreased to 7%. The density of broom snakeweed increased substantially and is now the co-dominant browse species on the site.

Grass:

- **1991 to 1999 - slightly up (+1):** Perennial grass sum of nested frequency increased by 17% with a significant increase in the nested frequency of Russian wildrye.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 39% and cover decreased from 9% to 6%. Crested wheatgrass and bottlebrush squirreltail decreased significantly in nested frequency.
- **2004 to 2009 - stable (0):** Following the treatment, there was little change in the sum of nested frequency of perennial grasses, though cover increased to 10%.

Forb:

- **1991 to 1999 - slightly up (+1):** There was an increase in the sum of nested frequency of perennial forbs, but provide less than 1% cover.
- **1999 to 2004 - down (-2):** Perennial forb sum of nested frequency decreased substantially with forbs being very rare in 2004.
- **2004 to 2009 - slightly down (-1):** Following the treatment, the sum of nested frequency of perennial forbs continued to decrease and forbs are extremely rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 25A, 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
99	16.4	6.3	3.0	17.7	0.0	1.2	0.0	44.6	Fair-Good
04	13.9	2.4	1.0	11.4	0.0	0.4	0.0	29.1	Fair
09	2.8	0.0	0.0	20.7	0.0	0.1	0.0	23.6	Poor-Fair

SEED MIX

Management unit 25A; study no. 14

Project name: Seven Mile - Low elevation

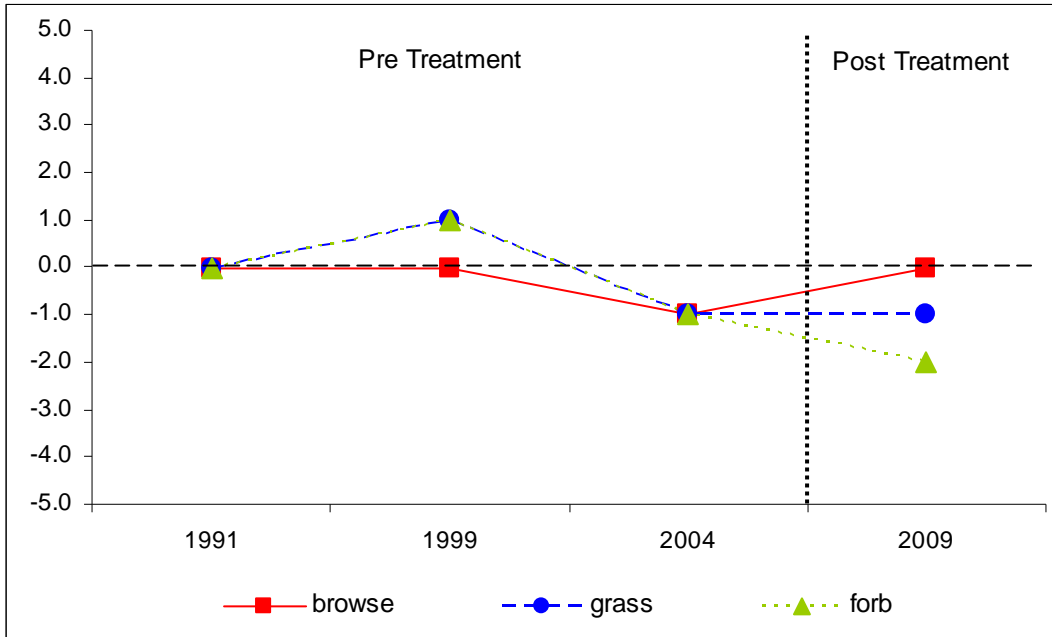
WRI Database #: 594

Mix lot # sr-tt-smle-07 Size (acre): 4400

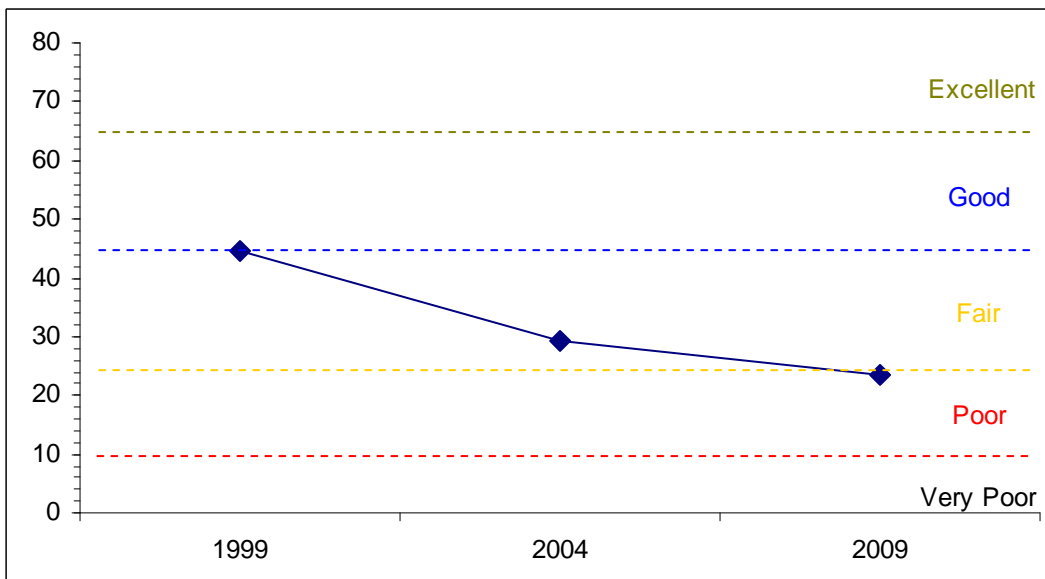
Seed type	lbs in mix	lbs/acre
Crested Wheatgrass 'Ephraim'	2200	0.50
Crested Wheatgrass 'Hycrest'	2220	0.50
Pubescent Wheatgrass	2200	0.50
Big Bluegrass 'Sherman'	1169	0.27
Great Basin Wildrye 'Trailhead'	3535	0.80
Russian Wildrye	70	0.02
Sheep Fescue	1100	0.25
Yellow Sweetclover	1100	0.25
Blue Flax	1433	0.33
Alfalfa 'Ladak'	2200	0.50
Sandberg Bluegrass 'Toole MT'	1094	0.25
Small Burnet 'Delar'	8800	2.00
Annual Sunflower--Millard UT	140	0.03
Russian Wildrye	4350	0.99
TOTAL:	31611	7.18

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25A Study no: 14



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 25A, Study no: 14



HERBACEOUS TRENDS--

Management unit 25A, Study no: 14

T y p e	Species	Nested Frequency				Average Cover %		
		'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	b32	b36	a7	a2	.22	.06	.01
G	Bouteloua gracilis	a122	ab149	ab150	b150	6.48	4.82	9.14
G	Bromus inermis	4	9	3	-	.07	.03	-
G	Elymus junceus	a1	b19	ab10	b21	.18	.21	.29
G	Oryzopsis hymenoides	33	18	18	31	.11	.10	.50
G	Sitanion hystrix	b135	b152	a47	a41	1.73	.46	.41
G	Stipa comata	2	1	-	-	.00	-	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		329	384	235	245	8.83	5.70	10.36
Total for Grasses		329	384	235	245	8.83	5.70	10.36
F	Androsace septentrionalis (a)	-	b12	a-	a-	.02	-	-
F	Arabis demissa	2	-	3	2	-	.15	.00
F	Astragalus lentiginosus	ab4	ab6	b16	a2	.01	.03	.00
F	Chenopodium fremontii (a)	-	-	2	-	-	.15	-
F	Chenopodium leptophyllum(a)	-	-	3	-	-	.03	-
F	Descurainia pinnata (a)	-	4	5	13	.01	.04	.08
F	Erigeron pumilus	a7	b63	a-	a6	.38	-	.02
F	Eriogonum ovalifolium	7	3	-	-	.18	-	-
F	Phlox longifolia	12	5	4	-	.01	.01	-
F	Sphaeralcea coccinea	b13	ab5	a4	a3	.02	.01	.01
Total for Annual Forbs		0	16	10	13	0.03	0.21	0.07
Total for Perennial Forbs		45	82	27	13	0.61	0.21	0.03
Total for Forbs		45	98	37	26	0.64	0.43	0.11

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

BROWSE TRENDS--

Management unit 25A, Study no: 14

T y p e	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia frigida	5	3	1	.00	.00	.03
B	Artemisia tridentata wyomingensis	93	89	95	13.11	11.14	2.21
B	Chrysothamnus viscidiflorus stenophyllus	31	31	6	.45	.47	.06
B	Gutierrezia sarothrae	96	45	94	3.20	.27	2.65
B	Opuntia fragilis	14	20	1	.19	.06	.00
B	Pediocactus simpsonii	1	2	0	.00	.00	-
Total for Browse		240	190	197	16.96	11.96	4.97

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 14

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	9.55	4.28
Chrysothamnus viscidiflorus stenophyllus	.41	.05
Gutierrezia sarothrae	.71	2.59
Opuntia fragilis	.08	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 14

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.4	0.8

BASIC COVER--

Management unit 25A, Study no: 14

Cover Type	Average Cover %			
	'91	'99	'04	'09
Vegetation	4.00	25.65	18.32	17.32
Rock	11.50	13.64	13.11	14.96
Pavement	23.00	29.28	26.68	16.49
Litter	27.00	18.03	21.06	24.18
Cryptogams	0	.24	.13	.01
Bare Ground	34.50	21.60	34.99	31.70

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 14, Study Name: Row of Pines Enclosure

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.2	7	47.3	27.4	25.3	1.6	8.5	163.2	0.6

PELLET GROUP DATA--

Management unit 25A, Study no: 14

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	34	45	65	-	-	-
Grouse	-	2	-	-	-	-
Elk	5	3	-	15 (37)	3 (7)	-
Deer	16	29	10	29 (72)	77 (190)	27 (68)
Cattle	3	4	1	15 (37)	4 (11)	5 (13)
Antelope	-	-	1	-	-	-

BROWSE CHARACTERISTICS--
Management unit 25A, Study no: 14

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia frigida</i>									
91	0	0	0	-	-	0	0	0	-/-
99	200	10	90	-	-	20	40	0	4/6
04	60	0	100	-	-	0	67	0	3/3
09	20	0	100	-	-	0	0	0	6/6
<i>Artemisia tridentata wyomingensis</i>									
91	6399	15	58	27	799	40	36	2	7/9
99	5580	6	65	29	60	45	17	14	13/24
04	4780	2	56	42	360	44	22	19	13/25
09	6640	38	56	6	440	7	0	7	8/11
<i>Chrysothamnus viscidiflorus stenophyllus</i>									
91	3265	16	61	22	66	45	31	2	4/6
99	1100	2	75	24	-	7	0	9	4/9
04	1060	6	85	9	60	8	0	6	5/11
09	160	0	100	0	-	25	0	0	5/7
<i>Eriogonum microthecum</i>									
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	4/6
09	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
91	6065	26	68	5	266	14	11	1	2/2
99	10000	10	88	2	520	0	0	1	7/8
04	1420	1	99	0	-	0	0	0	5/8
09	8640	8	92	0	40	0	1	.23	6/7
<i>Opuntia fragilis</i>									
91	0	0	0	0	66	0	0	0	-/-
99	540	7	89	4	-	0	0	4	2/8
04	720	6	94	0	-	0	0	0	2/7
09	20	0	100	0	20	0	0	0	2/5
<i>Pediocactus simpsonii</i>									
91	0	0	0	-	-	0	0	0	-/-
99	20	100	0	-	-	0	0	0	-/-
04	40	0	100	-	-	0	0	0	1/2
09	0	0	0	-	-	0	0	0	-/-

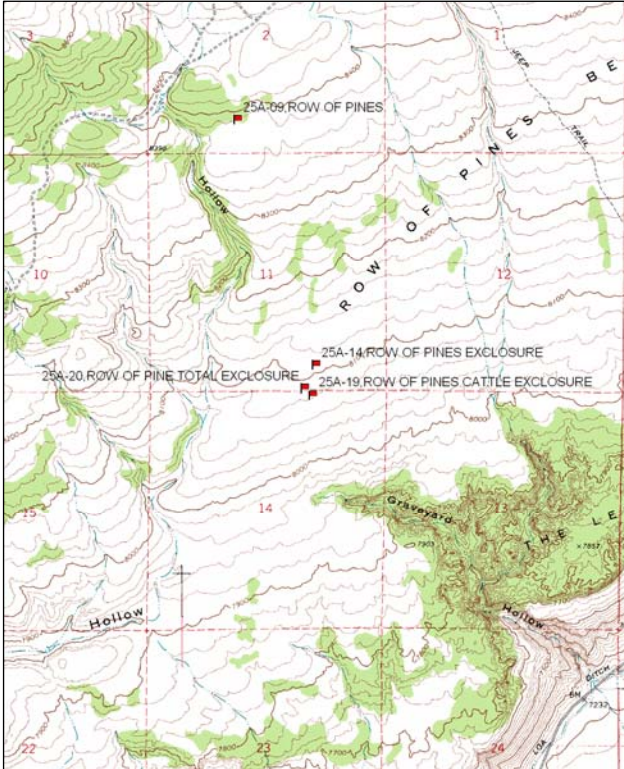
ROW OF PINES LIVESTOCK EXCLOSURE- TREND STUDY NO.25A-19-09

Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 8,050 ft (2,454 m)
Aspect: Southeast
Slope: 3%-5%
Transect bearing: 210 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

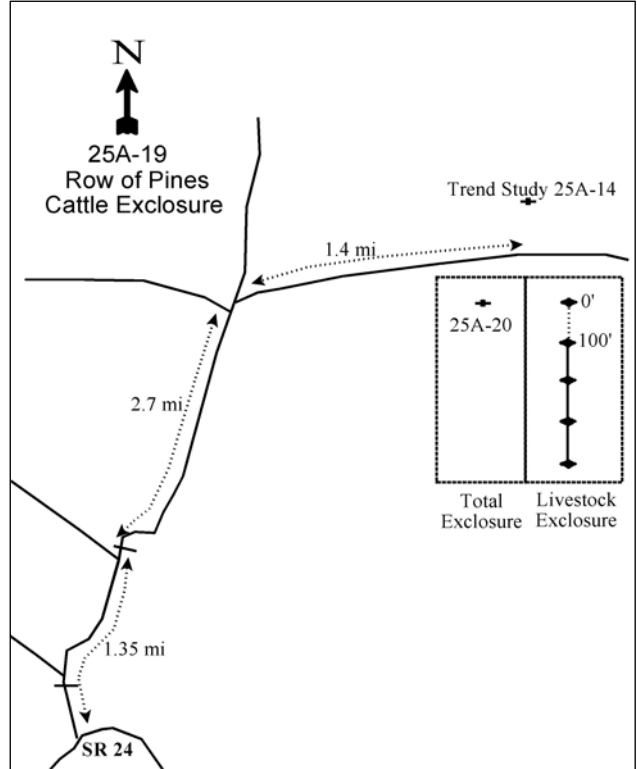
From the Chappell Cheese Factory northwest of Loa on SR 24, go west 2.6 miles to a side road on the north where the highway makes a sharp turn (0.95 miles west of mile marker #49). Take this road 0.65 miles and turn right after crossing a cattleguard. After 0.7 more miles, turn right at the fork and cross another cattleguard. Go 2.7 miles to another fork where you will again turn right. After ~60', turn right (east) and go 1.4 miles to an enclosure. The baseline runs down through the middle of the livestock enclosure (east side), with the 0 ft stake having browse tag #409 attached.

Map name: Loa, Utah



Township: 27S, Range: 2E, Section: 14

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 442646 E 425051 N

ROW OF PINES LIVESTOCK EXCLOSURE - TREND STUDY NO. 25A-19

Site Information

Site Description: The study was established in 1999 inside the Row of Pines livestock enclosure built in the late 1980's after the area was chained and seeded. Trend study 25A-14 is about 200 feet to the north of the enclosure. The area supports a sagebrush-grass community which is managed by the BLM as part of the Seven Mile allotment. Pellet group data has estimated heavy deer use since 1999, with the heaviest use in 2004. Estimated elk use has steadily decreased from heavy use in 1999 to light use in 2009 (Table - Pellet Group Data).

Browse: The key browse species in this area is Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), but cover (Table - Browse Trends) and density have steadily decreased since 1999. The decadence of sagebrush is moderately high with very high decadence noted in 2004. The percent of sagebrush plants displaying poor vigor increased in 2004 and has remained fairly high. Recruitment of young sagebrush plants has been poor over the study period and the population has displayed moderate to very heavy use since 1999. The only other common shrubs found in the enclosure are increasers, narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) and broom snakeweed (*Gutierrezia sarothrae*), though both species decreased substantially in density since 1999 (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is dominated by grasses which are diverse for a Wyoming big sagebrush site. Common species include seeded species such as crested wheatgrass (*Agropyron cristatum*) and Russian wildrye (*Elymus junceus*), and native species like blue grama (*Bouteloua gracilis*) and bottlebrush squirreltail (*Sitanion hystrix*). Crested wheatgrass and bottlebrush squirreltail declined significantly in nested frequency in 2004. Forbs are rare and produce less 1% cover (Table - Herbaceous Trends).

Soil: Soil is a sandy clay loam to a loam with a neutral pH (Table - Soil Analysis Table). Soil parent material is basalt. The soil surface is mostly a combination of pavement and rock cover with a moderate amount of bare ground cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1999 to 2004 - slightly down (-1):** Density of Wyoming big sagebrush decreased by 16% from 5,820 plants/acre to 4,900 plants/acre and cover decreased from 8% to 5%. Decadence of sagebrush increased from 27% to 69% and poor vigor increased from 18% to 35%.
- **2004 to 2009 - slightly down (-1):** The density of Wyoming big sagebrush decreased by 17% to 4,080 plants/acre and cover remained similar. Decadence decreased to 32%, but is still moderately high.

Grass:

- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 42% and cover decreased from 10% to 8%. There was a significant decrease in the nested frequency of crested wheatgrass and bottlebrush squirreltail.
- **2004 to 2009 - up (+2):** Perennial grass sum of nested frequency increased by 30% and cover increased to 10%. There was a significant increase in the nested frequency of blue grama and Indian ricegrass (*Oryzopsis hymenoides*).

Forb:

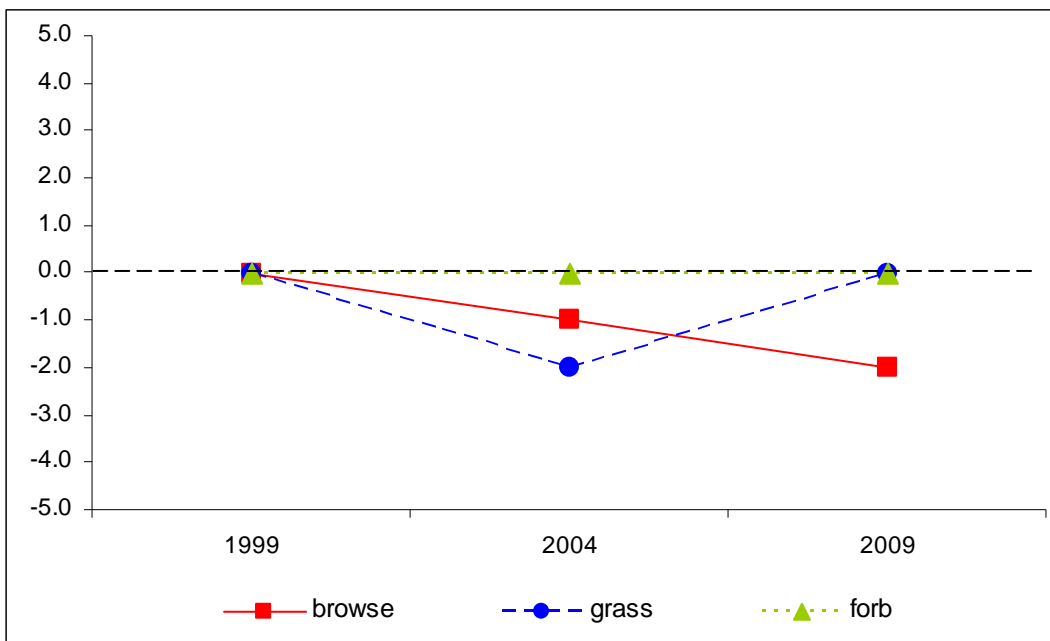
- **1999 to 2009 - stable (0):** Forbs are very rare on the site.
- **2004 to 2009 - stable (0):** Forbs remain very rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
 Management unit 25A, study no: 19

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	10.3	6.9	1.5	20.7	0.0	0.6	0.0	39.9	Fair
04	6.6	-5.7	1.0	15.9	0.0	0.5	0.0	18.3	Poor
09	6.2	0.0	0.0	21.0	0.0	0.2	0.0	27.4	Fair

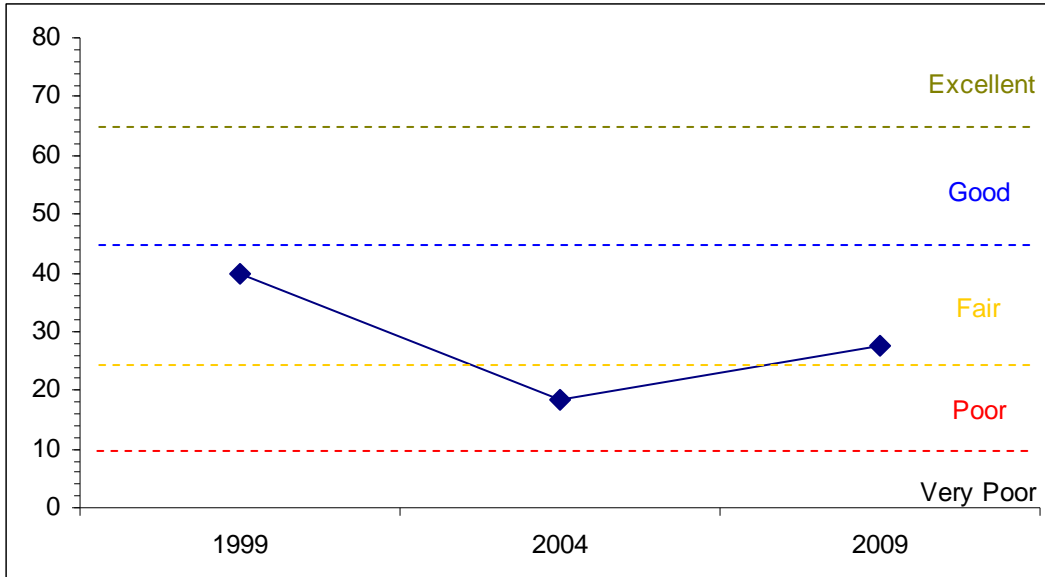
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 25A Study no: 19



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 25A, Study no: 19



HERBACEOUS TRENDS--

Management unit 25A, Study no: 19

Type	Species	Nested Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	b130	a66	a86	2.66	2.07	2.25
G	Agropyron intermedium	1	-	-	.00	-	-
G	Bouteloua gracilis	a91	a99	b121	3.86	2.81	5.09
G	Bromus inermis	10	1	-	.09	.03	-
G	Elymus junceus	40	42	35	1.20	1.77	.89
G	Elymus salina	-	-	-	-	-	.00
G	Oryzopsis hymenoides	a10	a7	b36	.27	.24	1.04
G	Sitanion hystrix	b136	a25	a31	2.01	.80	.91
G	Stipa comata	1	2	7	.06	.03	.30
G	Stipa pinetorum	2	2	-	.15	.15	-
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		421	244	316	10.33	7.94	10.50
Total for Grasses		421	244	316	10.33	7.94	10.50
F	Androsace septentrionalis (a)	2	-	-	.01	-	-
F	Astragalus sp.	3	5	-	.00	.00	-
F	Chenopodium leptophyllum(a)	a-	b15	a-	-	.51	-
F	Cryptantha sp.	3	-	-	.03	-	-
F	Descurainia pinnata (a)	-	3	-	-	.00	-
F	Erigeron pumilus	b32	a3	b24	.15	.00	.09
F	Eriogonum ovalifolium	1	-	3	.03	-	.00
F	Phlox longifolia	-	-	2	-	-	.00
F	Salsola iberica (a)	-	1	-	-	.00	-
F	Sphaeralcea coccinea	ab10	b14	a-	.04	.25	-
F	Unknown forb-perennial	4	-	-	.03	-	-

T y P e	Species	Nestled Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
	Total for Annual Forbs	2	19	0	0.00	0.52	0
	Total for Perennial Forbs	53	22	29	0.30	0.25	0.10
	Total for Forbs	55	41	29	0.31	0.78	0.10

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

BROWSE TRENDS--

Management unit 25A, Study no: 19

T y P e	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	<i>Artemisia tridentata wyomingensis</i>	91	78	77	8.23	5.31	4.99
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	28	25	10	.11	.25	.30
B	<i>Gutierrezia sarothrae</i>	67	23	20	1.06	.22	.29
B	<i>Opuntia fragilis</i>	6	11	2	.18	.06	.00
B	<i>Pediocactus simpsonii</i>	0	2	0	-	.00	-
	Total for Browse	192	139	109	9.59	5.86	5.59

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 19

Species	Percent Cover	
	'04	'09
<i>Artemisia tridentata wyomingensis</i>	6.11	8.78
<i>Chrysothamnus viscidiflorus stenophyllus</i>	.18	.11
<i>Gutierrezia sarothrae</i>	.26	.03
<i>Opuntia fragilis</i>	.06	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 19

Species	Average leader growth (in)	
	'04	'09
<i>Artemisia tridentata wyomingensis</i>	1.1	0.7

BASIC COVER--

Management unit 25A, Study no: 19

Cover Type	Average Cover %		
	'99	'04	'09
Vegetation	21.47	13.96	16.50
Rock	12.68	15.14	12.57
Pavement	22.53	40.84	30.45
Litter	11.73	19.00	19.38
Cryptogams	.00	.03	.02
Bare Ground	22.28	21.76	27.02

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 19, Study Name: Row of Pines Cattle Exclosure

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.2	7	47.3	27.4	25.3	1.6	8.5	163.2	0.6

PELLET GROUP DATA--

Management unit 25A, Study no: 19

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	1	8	62	-	-	-
Elk	24	11	-	58 (143)	11 (28)	3 (7)
Deer	22	38	31	48 (119)	126 (312)	58 (142)
Cattle	-	1	-	-	-	-

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 19

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)	
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor		
Artemisia tridentata wyomingensis										
99	5820	3	70	27	-	49	46	18	12/23	
04	4900	2	29	69	-	38	60	35	10/20	
09	4080	1	67	32	80	29	15	34	12/21	
Chrysothamnus viscidiflorus stenophyllus										
99	880	2	93	5	-	18	5	5	5/8	
04	800	5	88	8	20	0	0	5	5/11	
09	260	0	92	8	-	0	0	0	5/9	
Gutierrezia sarothrae										
99	2380	3	97	0	20	0	0	0	7/8	
04	540	7	93	0	-	0	0	0	5/7	
09	740	16	81	3	20	0	0	0	5/6	
Opuntia fragilis										
99	200	0	100	-	-	0	0	0	2/5	
04	440	18	82	-	-	0	0	0	2/8	
09	60	33	67	-	-	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										
99	0	0	0	-	-	0	0	0	-/-	
04	40	0	100	-	-	0	0	0	1/2	
09	0	0	0	-	-	0	0	0	-/-	

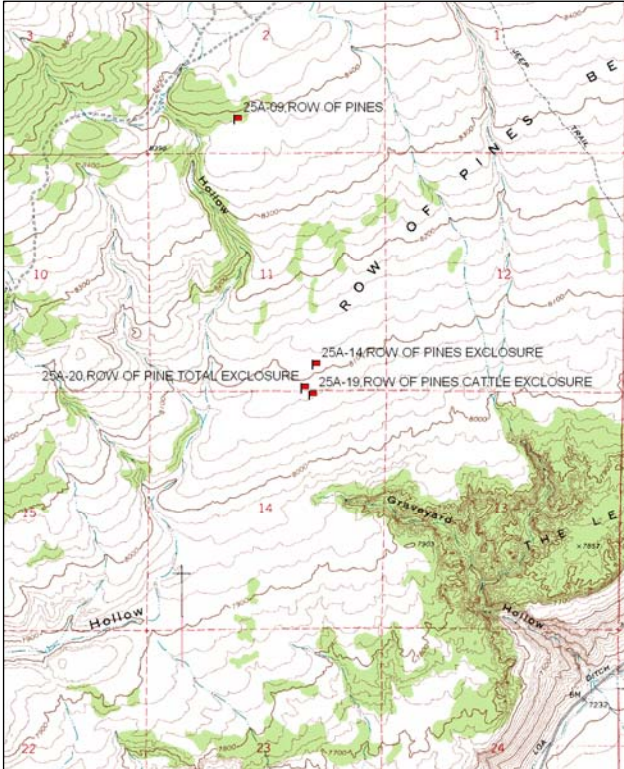
ROW OF PINES TOTAL EXCLOSURE - TREND STUDY NO. 25A-20-09

Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: BLM
Elevation: 8,050 ft (2,454 m)
Aspect: Southeast
Slope: 3%-5%
Transect bearing: 205 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

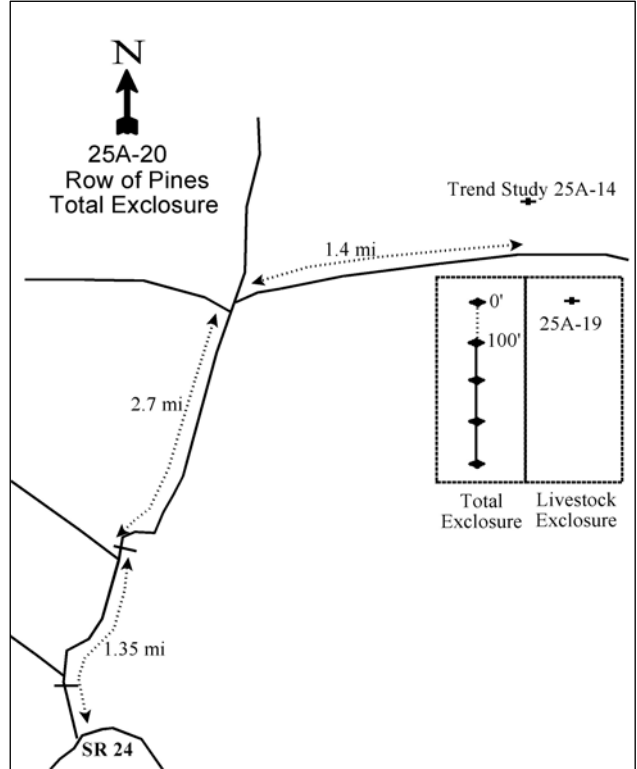
From the Chappell Cheese Factory northwest of Loa on SR 24, go west 2.6 miles to a side road on the north where the highway makes a sharp turn (0.95 miles west of mile marker #49). Take this road 0.65 miles and turn right after crossing a cattleguard. After 0.7 more miles, turn right at the fork and cross another cattleguard. Go 2.7 miles to another fork where you will again turn right. After ~60', turn right (east) and go 1.4 miles to an enclosure. The baseline runs down through the middle of the total enclosure (west side), with the 0 ft stake having browse tag #410 attached.

Map name: Loa, Utah



Township: 27S, Range: 2E, Section: 14

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 442593 E 4258092 N

ROW OF PINES TOTAL ENCLOSURE - TREND STUDY NO. 25A-20

Site Information

Site Description: The study was established in 1999 inside the Row of Pines livestock enclosure built in the late 1980's after the area was chained and seeded. Trend study 25A-14 is about 200 feet to the north of the enclosure. The area supports a sagebrush-grass community which is managed by the BLM as part of the Seven Mile allotment. The total enclosure excludes wildlife and livestock from grazing. The general area is used by deer and elk in the winter and early spring and by cattle in the spring and summer. One old cattle pat was encountered in 1999 within the total enclosure, but the fences appeared to be in good repair.

Browse: The key browse species is Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) which provides nearly all of the browse cover inside the enclosure (Table - Browse Trends). The population of sagebrush is mostly mature and has displayed moderate to high decadence with moderately high poor vigor since 1999. Since the sagebrush is not utilized within the total enclosure, this high decadence is likely caused by drought or winter injury, or a combination of both. Seedlings of sagebrush have been rare and recruitment of young plants has been low since 1999. The only other browse species of note are the increaser species narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) and broom snakeweed (*Gutierrezia sarothrae*). Both of these species have decreased in density since 1999 and had fairly low densities in 2009 (Table - Browse Characteristics).

Herbaceous Understory: The total enclosure supports a similar perennial grass understory as the livestock enclosure. The seeded species crested wheatgrass (*Agropyron cristatum*) and Russian wildrye (*Elymus junceus*) are the most abundant grass species, while blue grama (*Bouteloua gracilis*) is the most abundant native grass, but not as abundant as it is in the livestock enclosure. Forbs are very rare and provide less than 1% cover. Low fleabane (*Erigeron pumilus*) is the most abundant forb, but declined significantly in 2004 (Table - Herbaceous Trends).

Soil: The soil texture is a sandy clay loam to a loam with a neutral pH (Table - Soil Analysis Data)). Soil parent material is basalt. Bare ground cover is fairly low with good protective cover provided primarily by pavement and rock cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1999 to 2004 - stable (0):** The density of Wyoming big sagebrush increased from 6,160 plants/acre to 7,400 plants/acre, but decadence increased from 27% to 52% and poor vigor increased from 19% to 31%. Recruitment of young sagebrush plants remained poor at around 5% of the population.
- **2004 to 2009 - slightly down (-1):** Wyoming big sagebrush density decreased by 16% to 6,220 plants/acre and cover decreased from 13% to 9%. Decadence of sagebrush decreased slightly to 37% and poor vigor decreased slightly to 27%. Recruitment of young sagebrush plants decreased to just 1% of the population. The density of the two less desirable species, narrowleaf low rabbitbrush and broom snakeweed, have also decreased substantially since 1999.

Grass:

- **1999 to 2004 - down (-2):** Perennial grass sum of nested frequency decreased by 32%, though cover remained similar. There was a significant decrease in the nested frequency of bottlebrush squirreltail (*Sitanion hystrix*) and a significant increase in Russian wildrye.
- **2004 to 2009 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased from 8% to 11%.

Forb:

- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased by 57% with a significant decrease in the nested frequency of low fleabane. Forbs are very rare on the site.
- **2004 to 2009 - stable (0):** Forbs remained very rare.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

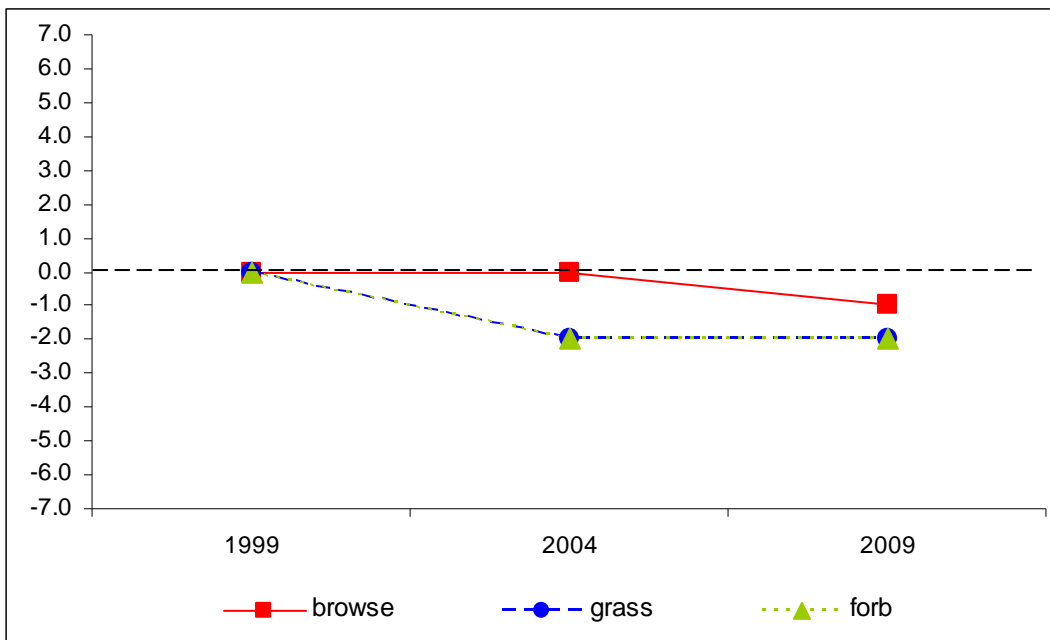
Management unit 25A, study no: 20

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	17.5	6.9	2.5	18.0	0.0	1.9	0.0	46.7	Fair-Good
04	16.7	-0.6	2.5	16.8	0.0	0.4	0.0	35.7	Fair
09	11.3	3.9	0.5	21.1	0.0	0.3	0.0	37.1	Fair

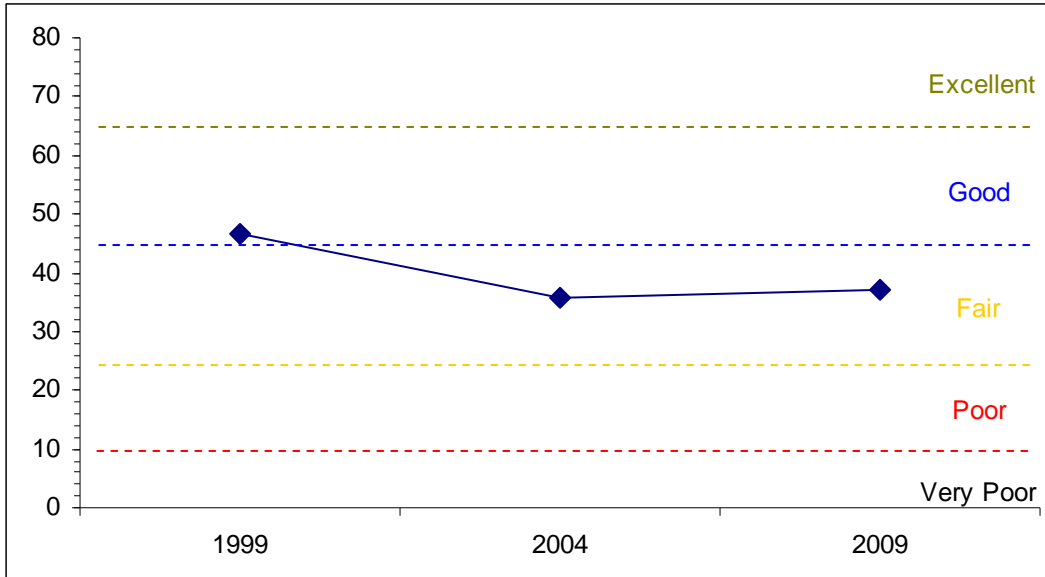
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 25A Study no: 20



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 25A, Study no: 20



HERBACEOUS TRENDS--
 Management unit 25A, Study no: 20

Type	Species	Nested Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	99	58	89	2.69	1.43	4.94
G	Agropyron intermedium	2	-	-	.00	-	-
G	Bouteloua gracilis	49	50	42	1.08	1.02	1.01
G	Bromus inermis	4	-	-	.05	-	-
G	Elymus junceus	_a 63	_b 110	_{ab} 73	2.51	5.40	3.70
G	Oryzopsis hymenoides	18	24	18	.62	.51	.78
G	Sitanion hystrix	_b 125	_a 3	_a 9	2.01	.01	.10
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		360	245	231	8.99	8.38	10.55
Total for Grasses		360	245	231	8.99	8.38	10.55
F	Androsace septentrionalis (a)	5	-	-	.01	-	-
F	Astragalus sp.	-	2	-	-	.01	-
F	Castilleja sp.	3	-	-	.00	-	-
F	Chenopodium leptophyllum(a)	-	2	-	-	.03	-
F	Cryptantha sp.	-	-	3	-	-	.03
F	Erigeron pumilus	_b 54	_a 12	_a 26	.92	.07	.12
F	Phlox longifolia	-	3	1	-	.00	.00
F	Sphaeralcea coccinea	10	12	2	.02	.10	.00
Total for Annual Forbs		5	2	0	0.00	0.03	0
Total for Perennial Forbs		67	29	32	0.94	0.19	0.15
Total for Forbs		72	31	32	0.95	0.22	0.15

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

BROWSE TRENDS--

Management unit 25A, Study no: 20

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia tridentata wyomingensis	91	94	93	13.97	13.35	9.02
B	Chrysothamnus viscidiflorus stenophyllus	25	27	9	.25	.45	.07
B	Gutierrezia sarothrae	85	26	12	3.00	.10	.19
B	Opuntia fragilis	2	5	1	.00	.03	.00
B	Pediocactus simpsonii	0	0	1	-	-	.00
Total for Browse		203	152	116	17.23	13.94	9.29

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 20

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	12.58	14.03
Chrysothamnus viscidiflorus stenophyllus	.20	.18
Gutierrezia sarothrae	.18	.08

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 20

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.0	0.6

BASIC COVER--

Management unit 25A, Study no: 20

Cover Type	Average Cover %		
	'99	'04	'09
Vegetation	28.20	22.57	21.54
Rock	9.11	15.25	9.67
Pavement	31.69	40.29	28.30
Litter	10.99	18.40	23.58
Cryptogams	0	.06	.26
Bare Ground	20.04	16.37	23.98

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 20, Study Name: Row of Pines Total Exlosure

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.1	7	47.3	27.4	25.3	1.6	8.5	163.2	0.6

PELLET GROUP DATA--

Management unit 25A, Study no: 20

Type	Quadrat Frequency		
	'99	'04	'09
Rabbit	-	-	24
Cattle	1	-	-

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 20

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata wyomingensis</i>									
99	6160	5	68	27	-	0	0	19	11/21
04	7400	5	44	52	20	0	0	31	10/19
09	6220	1	62	37	80	0	3	27	12/21
<i>Chrysothamnus viscidiflorus stenophyllus</i>									
99	900	0	82	18	-	0	0	20	4/7
04	880	2	66	32	-	0	0	9	5/9
09	240	8	92	0	20	0	0	0	4/7
<i>Gutierrezia sarothrae</i>									
99	6320	4	96	1	-	0	0	2	7/9
04	620	13	84	3	-	0	0	0	5/7
09	320	13	88	0	20	0	0	0	6/6
<i>Opuntia fragilis</i>									
99	40	50	50	0	-	0	0	0	-/-
04	100	0	100	0	-	0	0	0	2/9
09	20	0	0	100	-	0	0	100	1/6
<i>Pediocactus simpsonii</i>									
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	20	0	100	-	-	0	0	0	1/5

ROW OF PINES EXCLOSURE COMPARISON
TREND STUDY NO. 25A-14, 25A-19 & 25A-20

Study Information

Site Description: The Row of Pines enclosure complex was built in the late 1980's after the area was chained and seeded. The area outside the enclosure was retreated with a dixie harrow as part of the Seven Mile WRI project ([Project# 594](#)) in the fall of 2006 to rejuvenate the sagebrush and improve the grass/forb composition with a native/non-native seed mix of grass, forb, and shrubs. The area supports a sagebrush-grass community which is managed by the BLM as part of the Seven Mile allotment. Pellet group data indicates moderate deer use outside of the enclosure and much heavier use in the livestock enclosure. Estimated elk use has been low, but has decreased steadily both outside the enclosure and in the livestock enclosure since 1999 (Table 1).

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the predominant browse species on all three studies. Big sagebrush densities were similar in 1999, ranging from 5,580 plants/acre outside to 5,820 plants/acre in the livestock enclosure, and 6,160 in the total enclosure. In 2004, density outside the enclosure and inside the livestock enclosure declined by about 15% for each, however inside the total enclosure density increased by 20%. Following the harrow treatment in 2006 there was an attendant 38% increase in the density of big sagebrush outside the enclosure in 2009 that was primarily due to a large increase in the recruitment of young plants. Alternatively, in 2009 the density of sagebrush decreased by 17% and 16% in the livestock enclosure and total enclosure, respectively. The cover of sagebrush was 13% outside, 10% in the livestock and 14% in the total enclosure in 1999. Cover decreased slightly both outside and in the livestock enclosure in 2004, but remained similar in the total enclosure. Cover decreased markedly outside the enclosure following the treatment, remained similar in the livestock enclosure and decreased outside the enclosure in 2009. Decadence increased for each study from about 27% in 1999 to 42% outside, 69% in the livestock enclosure, and 52% in the total enclosure in 2004. There was a large decrease in the decadence in all three studies in 2009, but decadence was very low outside the enclosure following the harrow treatment. Recruitment of young plants has been poor in both the livestock and total enclosure since 1999. Recruitment was poor outside of the enclosure in 1999 and 2004, but increased to 38% of the population in 2009, following the treatment (Table - 2).

Density of the increaser, thinleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*), was similar between studies at about 900 plants/acre in 1999 and 2004, but decreased substantially on all three studies in 2009. Another increaser, broom snakeweed (*Gutierrezia sarothrae*), was extremely abundant outside of the enclosure at 10,000 plants/acre in 1999, decreased 86% to 1,420 in 2004, but increased to 8,640 plants/acre in 2009. Density also decreased for both enclosure transects to low amounts in 1999 and remained low in 2009.

Herbaceous Understory: The herbaceous understories are similar on all sites in composition, but abundance differs. Outside of the enclosure, the warm season species blue grama (*Bouteloua gracilis*) dominates the grass composition. Inside the livestock and total enclosures composition is similar, but no single species dominates. Crested wheatgrass (*Agropyron cristatum*) and bottlebrush squirreltail (*Sitanion hystrix*) each declined significantly in nested frequency in 2004 for all three studies and remained low in 2009. All three studies had an increase in the cover of perennial grasses from 2004 to 2009. Forbs are rare on all three studies (Table - 3).

Soil: Due to the study sites close proximity, soil conditions are nearly identical. The soil texture of the studies is a sandy clay loam to a loam with a neutral pH (7.0). Ground cover characteristics are similar between sites in that vegetation and litter cover are low and most of the ground cover is made up of rock and pavement. Bare ground cover is highest outside of the enclosure, but is moderate ranging from 22% to 35% since 1999. There is minimal soil movement occurring but the armored nature of the soil surface limits erosion.

Exclosure Complex Summary

Study Name	Year	Deer	Elk	Cattle
		<i>days use/acre (ha)</i>	<i>days use/acre (ha)</i>	<i>days use/acre (ha)</i>
Livestock Exclosure (25A-19)	1999	48 (119)	58 (143)	--
	2004	126 (312)	11 (28)	--
	2009	58 (143)	3 (7)	--
Outside Exclosure (25A-14)	1999	29 (72)	15 (37)	15 (37)
	2004	77 (190)	3 (7)	4 (11)
	2009	27 (68)	--	5 (13)

Table 1. Pellet group transect data estimated use for the Row of Pines exclosure complex.

Study Name	Year	Percent Cover	Density <i>Plants/acre</i>	Percent Young	Percent Mature	Percent Decadent	Ave. height/crown
				<i>(Plants/acre)</i>	<i>(Plants/acre)</i>	<i>(Plants/acre)</i>	<i>(in)</i>
Outside Exclosure (25A-14)	1999	13.11	5580	6 (340)	65 (3620)	29 (1620)	13/24
	2004	11.14	4780	2 (80)	56 (2700)	42 (2000)	13/25
	2009	2.21	6640	38 (2450)	56 (3720)	6 (380)	8/11
Livestock Exclosure (25A-19)	1999	8.23	5820	3 (160)	70 (4100)	27 (1560)	12/23
	2004	5.31	4900	2 (100)	29 (1440)	69 (3360)	10/20
	2009	4.99	4080	1 (40)	67 (2720)	32 (1320)	12/21
Total Exclosure (25A-20)	1999	13.97	6160	5 (320)	68 (4180)	27 (1660)	11/21
	2004	13.35	7340	5 (360)	44 (3200)	52 (3820)	10/19
	2009	9.02	6220	1 (80)	62 (3840)	37 (2300)	12/21

Table 2. Browse characteristics of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) for the 25A-14, 25A-19 and 25A-20 study sites.

Study Name	Year	Perennial Grass Species			Perennial Forb Species		
		<i>n</i>	<i>Sum of Nested Frequency</i>	<i>Percent Cover</i>	<i>n</i>	<i>Sum of Nested Frequency</i>	<i>Percent Cover</i>
Outside Exclosure (25A-14)	1999	7	384	8.83	5	82	0.61
	2004	6	235	5.7	4	27	0.21
	2009	5	245	10.36	4	13	0.03
Livestock Exclosure (25A-19)	1999	9	421	10.33	6	53	0.30
	2004	8	244	7.94	3	22	0.25
	2009	6	316	10.5	3	29	0.10
Total Exclosure (25A-20)	1999	7	360	8.99	3	67	0.94
	2004	5	245	8.38	4	29	0.19
	2009	5	231	10.55	4	32	0.15

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

GOOSEBERRY - TREND STUDY NO. 25R-1-09

Vegetation Type: Pinyon-Juniper

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 6,200 ft (1,890 m)

Aspect: Northwest

Slope: 5%-7%

Transect bearing: 140 degrees magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft)

Directions:

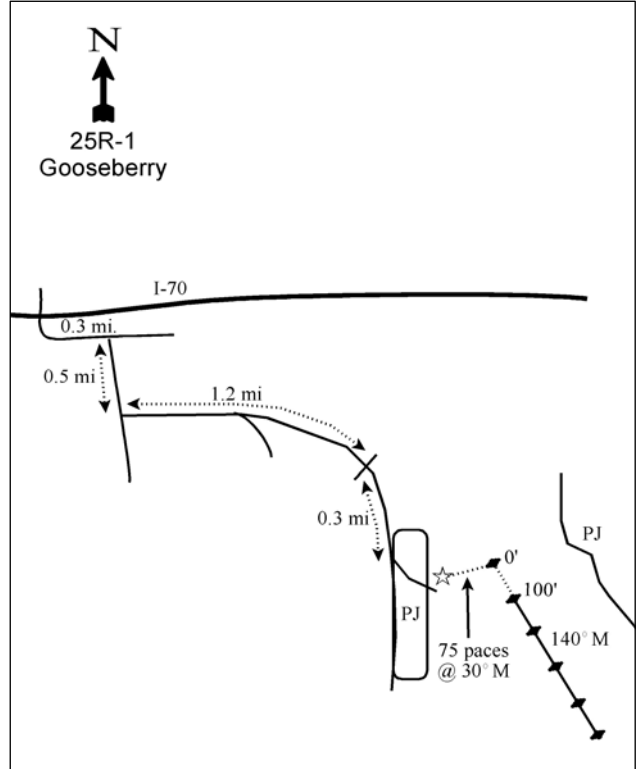
Take exit #61 from I-70 and turn south. Go 0.3 miles to a right turn. Take this turn and go 0.5 miles to a left (east) turn. Take this turn and go 0.6 miles to a fork. Take the left fork and go 0.6 miles to a gate. Go another 0.3 miles past the gate to a small road leading into the chaining. The half-high witness post is located inside the chaining where the road ends. The browse tag for the transect is #150.

Map name: Gooseberry Creek



Township: 22S, Range: 2E, Section: 32

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 438147 E 4306265 N

GOOSEBERRY - TREND STUDY NO. 25R-1

Site Information

Site Description: The study was established in the summer 1997 prior to being chained in the fall of 1997. The chaining was done to improve wildlife habitat to try and prevent deer from going onto nearby alfalfa fields to the west. Prior to treatment, the site was dominated by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). It presently supports a few heavily grazed seeded grasses and forbs. Pellet group data estimated light use by deer and elk in 1997 and 2009, with no pellets sampled in 2004. Estimated cattle use was moderate in 2004 and 2009 (Table - Pellet Group Data).

Browse: Pinyon and juniper was the dominate browse species before the chaining and accounted for the majority of the browse canopy cover. Following the chaining, there is still good cover of pinyon and juniper surrounding the site, but the trees provided no measurable cover on the study site (Table - Canopy Cover). Prior to the chaining, pinyon was estimated at 104 trees/acre with an average diameter of 5.4 inches. Juniper was estimated at 112 trees/acre with an average diameter of 19.1 inches. No preferred browse was observed before or after the chaining and only broom snakeweed (*Gutierrezia sarothrae*) was found after the chaining.

Herbaceous Understory: Prior to the chaining, the herbaceous understory was dominated by cheatgrass (*Bromus tectorum*) and a few native grasses such as Indian ricegrass (*Oryzopsis hymenoides*) and bottlebrush squirreltail (*Sitanion hystrix*) at low cover and frequency. Forbs consisted of a few small annual species. Following the treatment, perennial grasses such as crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*A. intermedium*) established well and became the dominant grass species on the site. Cheatgrass was still found on the site, but decreased significantly from 1997 observations. The introduced species alfalfa (*Medicago sativa*) is now the dominant perennial forb on the site (Table - Herbaceous Trends).

Soil: The soil is a light brown loam with a neutral pH (7.1) and is moderately high in organic matter (Table - Soil Analysis Data). Rock is prevalent on the surface and throughout the profile. Bare ground increased following the chaining with a large decrease in litter (Table - Basic Cover). Typically litter is greater after a chaining, but in this case the slash from the chaining was piled into clumps. Erosion is minimal due to the heavily armored surface from pavement and rock. The erosion condition class determined soil movement as stable in 2004 and 2006.

Trend Assessments

Browse:

- **1997 to 2004 - stable (0):** Pinyon and juniper trees were successfully removed from the site, but no preferred browse species are found on this site and the broom snakeweed on the site may rapidly become a weed problem.
- **2004 to 2009 - stable (0):** The density of broom snakeweed increased from 2,280 plants/acre to 3,360 plants/acre, but line-intercept, canopy cover remained similar.

Grass:

- **1997 to 2004 - up (+2):** Perennial grass sum of nested frequency increased nearly over two-fold and cover increased from 1% to 9%. Three seeded species, crested wheatgrass, intermediate wheatgrass and orchardgrass (*Dactylis glomerata*) were sampled following the treatment with crested and intermediate wheatgrass becoming the dominant species on the site. Cheatgrass nested frequency decreased significantly and cover decreased from 2% to less than 1%.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 15%, though cover remained identical. Sandberg bluegrass (*Poa secunda*) increased significantly in nested frequency. Cheatgrass decreased slightly in nested frequency and cover, though the decrease was not significant.

Forb:

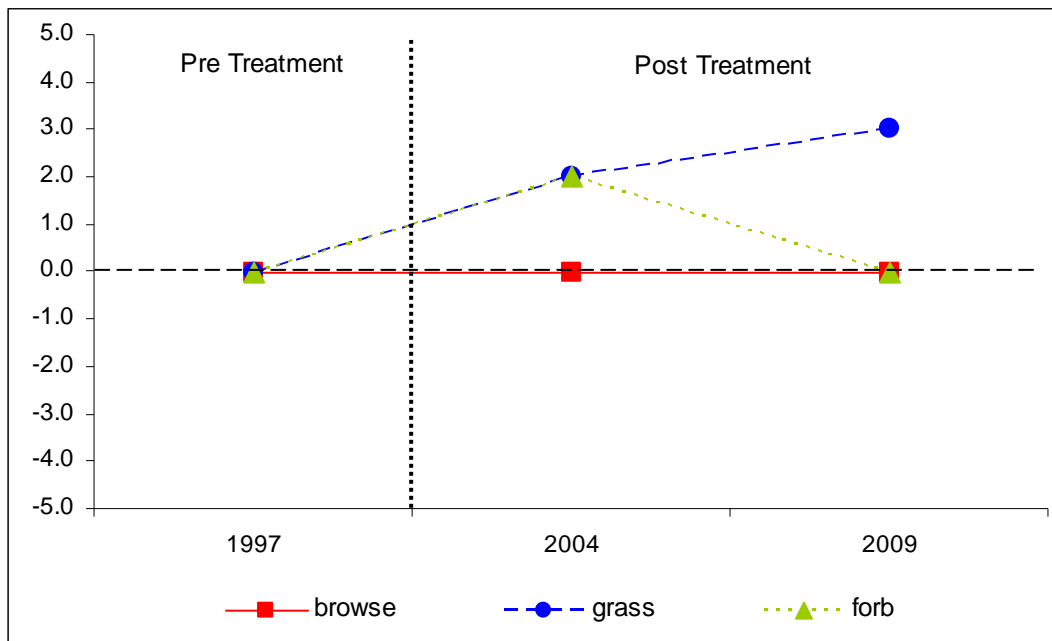
- **1997 to 2004 - up (+2):** The perennial forb sum of nested frequency increased by seven-fold and cover increased from less than 1% to over 5%. Two seeded species, alfalfa and small burnet (*Sanguisorba minor*), were sampled and alfalfa became the dominant perennial forb species on the site.
- **2004 to 2009 - down (-2):** There was a 31% decrease in the sum of nested frequency of perennial forbs, though cover remained good at over 4%. There was a significant decrease in the nested frequency of the dominant forb alfalfa. Although the trend is down, perennial forb sum of nested frequency and cover are improved over the pre-treatment condition.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 25R, 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
97	0.0	0.0	0.0	2.3	-1.2	1.2	0.0	2.3	Very Poor
04	0.0	0.0	0.0	17.2	-0.6	10.0	0.0	26.6	Very Poor
09	0.0	0.0	0.0	17.2	-0.5	8.9	0.0	25.6	Very Poor

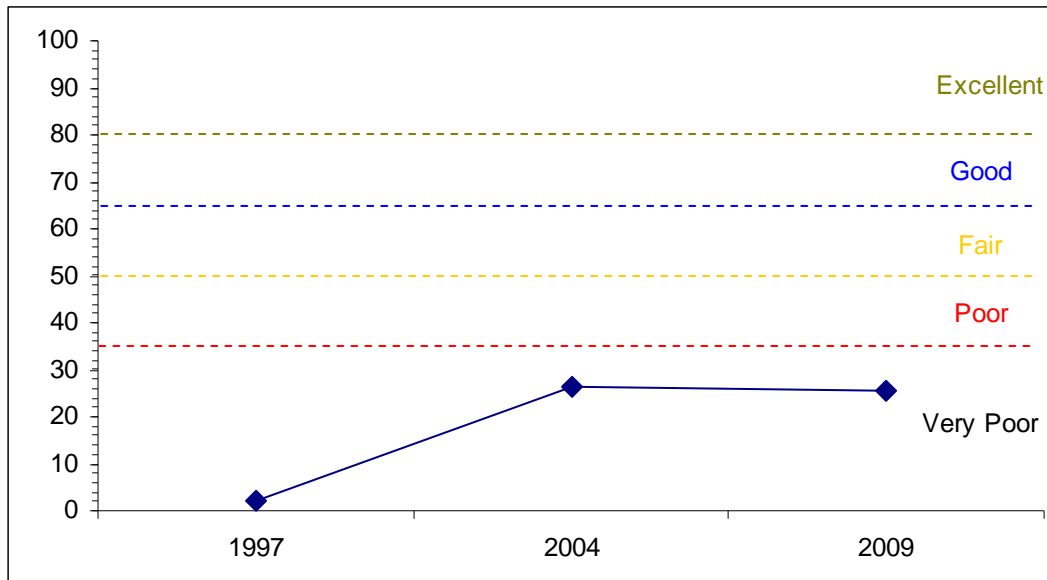
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25R Study no: 1



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL

Management unit 25R, Study no: 1



HERBACEOUS TRENDS--

Management unit 25R, Study no: 1

Type	Species	Nested Frequency			Average Cover %		
		'97	'04	'09	'97	'04	'09
G	Agropyron cristatum	a ⁻	b ¹³⁵	b ¹³⁵	-	4.57	4.15
G	Agropyron intermedium	a ⁻	b ¹¹²	b ¹²⁷	-	3.18	3.23
G	Bromus tectorum (a)	b ²³⁵	a ¹⁰⁰	a ⁷⁵	1.55	.82	.71
G	Carex sp.	b ¹⁵	a ⁻	a ⁻	.15	-	-
G	Dactylis glomerata	a ⁻	b ²¹	a ⁴	-	.16	.06
G	Oryzopsis hymenoides	b ⁵¹	a ⁴	a ⁶	.66	.05	.13
G	Poa fendleriana	a ⁻	a ⁻	b ⁶	-	.00	.16
G	Poa pratensis	-	-	-	-	.00	-
G	Poa secunda	a ²⁵	a ³⁸	b ⁶²	.14	.58	.66
G	Sitanion hystrix	b ²⁷	a ³	ab ²¹	.18	.03	.20
G	Vulpia octoflora (a)	b ¹⁹	a ⁻	a ⁻	.03	-	-
Total for Annual Grasses		254	100	75	1.59	0.81	0.71
Total for Perennial Grasses		118	313	361	1.14	8.59	8.59
Total for Grasses		372	413	436	2.74	9.40	9.31
F	Alyssum alyssoides (a)	b ²³⁵	a ⁸⁴	c ²⁹¹	1.11	.24	3.47
F	Arenaria sp.	-	-	4	-	-	.03
F	Chenopodium fremontii (a)	-	7	-	-	.04	-
F	Chorispora tenella (a)	-	-	3	-	-	.03
F	Cirsium sp.	-	1	5	-	.15	.09
F	Crepis acuminata	-	-	2	-	-	.00
F	Cryptantha sp.	b ²⁵	ab ¹⁷	a ¹	.53	.20	.00
F	Descurainia pinnata (a)	a ⁻	b ¹⁴	b ²¹	-	.14	.27
F	Erigeron pumilus	-	3	-	-	.00	-
F	Eriogonum cernuum (a)	5	-	-	.01	-	-

Type	Species	Nested Frequency			Average Cover %		
		'97	'04	'09	'97	'04	'09
F	Eriogonum inflatum	-	-	1	-	-	.00
F	Gilia sp. (a)	a ⁻	b ¹⁹	a ⁻	-	.08	-
F	Lappula occidentalis (a)	7	-	-	.01	-	-
F	Leucelene ericoides	7	-	-	.07	-	-
F	Medicago sativa	a ⁻	c ¹⁴⁸	b ¹⁰⁵	-	4.19	3.20
F	Phlox austromontana	-	2	3	-	.03	.15
F	Physaria sp.	-	3	3	-	.00	.01
F	Ranunculus testiculatus (a)	ab ⁵¹	b ⁷⁸	a ²⁷	.14	.49	.13
F	Sanguisorba minor	a ⁻	b ²⁵	b ¹⁷	-	.46	.72
F	Senecio integerrimus	-	2	-	-	.00	-
F	Senecio multilobatus	a ⁻	b ²⁸	a ¹	-	.10	.03
F	Streptanthus cordatus	-	2	-	-	.00	-
F	Tragopogon dubius	-	-	8	-	-	.09
F	Unknown forb-perennial	a ⁻	a ⁻	b ⁹	-	-	.13
Total for Annual Forbs		298	202	342	1.28	1.00	3.90
Total for Perennial Forbs		32	231	159	0.60	5.17	4.47
Total for Forbs		330	433	501	1.88	6.17	8.38

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

BROWSE TRENDS--

Management unit 25R, Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'97	'04	'09	'97	'04	'09
B	Gutierrezia sarothrae	15	28	38	.25	1.08	2.36
B	Juniperus osteosperma	2	0	0	5.34	-	-
B	Opuntia sp.	26	0	0	.47	-	-
B	Pinus edulis	4	1	0	6.31	-	-
Total for Browse		47	29	38	12.37	1.08	2.36

CANOPY COVER, LINE INTERCEPT--

Management unit 25R, Study no: 1

Species	Percent Cover		
	'97	'04	'09
Gutierrezia sarothrae	-	2.26	2.50
Juniperus osteosperma	14.00	-	-
Pinus edulis	12.39	-	-

POINT-QUARTER TREE DATA--

Management unit 25R, Study no: 1

Species	Trees per Acre	Average diameter (in)
	'97	'97
Juniperus osteosperma	112	19.1
Pinus edulis	104	5.4

BASIC COVER--

Management unit 25R, Study no: 1

Cover Type	Average Cover %		
	'97	'04	'09
Vegetation	18.26	14.71	26.04
Rock	7.30	6.22	3.86
Pavement	5.50	9.72	5.73
Litter	61.62	29.93	32.91
Cryptogams	.65	.18	1.30
Bare Ground	20.44	46.09	37.12

SOIL ANALYSIS DATA --

Management unit 25R, Study no: 1, Study Name: Gooseberry

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10.9	7.1	38	35.4	26.6	4	16.1	192	2.9

PELLET GROUP DATA--

Management unit 25R, Study no: 1

Type	Quadrat Frequency			Days use per acre (ha)		
	'97	'04	'09	'97	'04	'09
Rabbit	9	49	38	-	-	-
Elk	2	2	6	18 (45)	-	15 (36)
Deer	9	1	5	13 (33)	-	1 (2)
Cattle	-	10	9	-	40 (98)	29 (72)

BROWSE CHARACTERISTICS--

Management unit 25R, 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)	
Cercocarpus montanus										
97	40	0	100	-	-	0	100	0	21/21	
04	0	0	0	-	-	0	0	0	19/16	
09	0	0	0	-	-	0	0	0	28/33	
Ephedra viridis										
97	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	35/36	
Gutierrezia sarothrae										
97	1140	5	95	0	20	0	0	4	10/10	
04	2280	1	97	2	-	0	0	.87	9/11	
09	3360	2	98	0	-	0	0	0	8/10	
Juniperus osteosperma										
97	40	0	100	-	-	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)
Leptodactylon pungens									
97	0	0	0	0	-	0	0	0	-/-
04	0	0	0	0	-	0	0	0	-/-
09	60	0	67	33	-	0	0	0	5/7
Opuntia sp.									
97	980	0	98	2	-	0	0	2	3/5
04	0	0	0	0	-	0	0	0	-/-
09	0	0	0	0	-	0	0	0	-/-
Pinus edulis									
97	80	0	100	-	40	0	0	0	-/-
04	20	100	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-

SUMMARY
WILDLIFE MANAGEMENT UNIT 25A - PLATEAU, FISH LAKE

Community Types

There were eighteen Range Trend studies sampled in WMU 25A during the summer of 2009. Five of the studies [Triangle Mountain (25A-1), Black Mountain (25A-2), Durfee Homestead (25A-4), Lower Dog Flat (25A-8) and Gooseberry (25R-1)] sampled areas that had been chained and seeded in the past to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). All five of the studies are within crucial deer and substantial elk winter habitat. Seven study sites [Sage Flat (25A-3), Praetor Sloe (25A-5), Row of Pines (25A-9), Cedarless Flat (25A-10), Row of Pines Exclosure (25A-14), Row of Pines Livestock Exclosure (25A-19) and Row of Pines Total Exclosure (25A-20)] sample Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities that are all within crucial deer winter and substantial elk winter habitat. One study [Tommy Hollow 25A-16] samples a Wyoming big sagebrush and black sagebrush (*A. nova*) community that is within crucial deer and elk winter habitat. One study [Ox Spring (25A-13)] samples a burned mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass community that is within crucial deer summer and substantial elk winter habitat. One study [Forsyth Reservoir (25A-11)] samples a black sagebrush community and one study [Evans Reservoir (25A-7)] samples a mixed community of mountain big sagebrush and black sagebrush. Both studies are within crucial deer winter and substantial elk winter habitat. One study [Elk Camp (25A-18)] samples mixed mountain brush community that is crucial deer summer and substantial elk winter habitat. One study [East Tidwell (25A-12)] samples an alpine meadow that is within crucial deer and elk summer habitat.

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation data from this herd unit were compiled from the Salina 24E, Richfield Radio KSVC and Koosharem weather stations (Figures 1 and 2). The unit's 27 year annual mean was 10.33 inches, the 28 year spring (March to May) mean was 2.49 inches, and the 27 year fall (Sept. to Nov.) mean was 2.78 inches. The unit's annual precipitation was below 75% of the normal annual mean (drought conditions) in 2007 and 2008 (Figure 1). Spring precipitation was below 75% of normal in 1982, 1990, 1994, 2000, 2001, 2002, 2007 and 2008 (Figure 2). Fall precipitation was below 75% of normal in 1984, 1988, 1989, 1995, 1999, 2001, 2003, 2007 and 2008 (Figure 2) (Utah Climate Summary 2009).

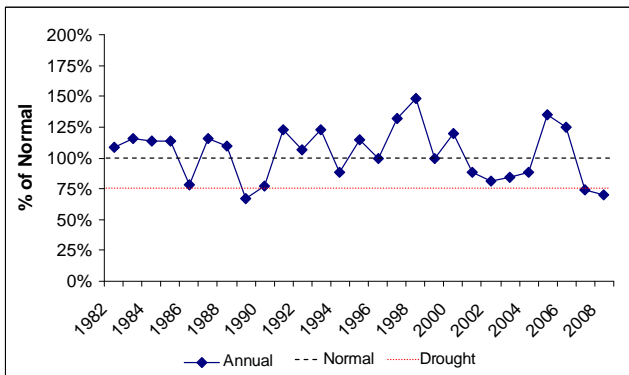


Figure 1. Percent annual precipitation based on the 27 year mean precipitation for WMU 25A, Plateau, Fish Lake. Precipitation data were collected at the Salina 24E, Richfield Radio KSVC and Koosharem weather stations (Utah Climate Summary 2009).

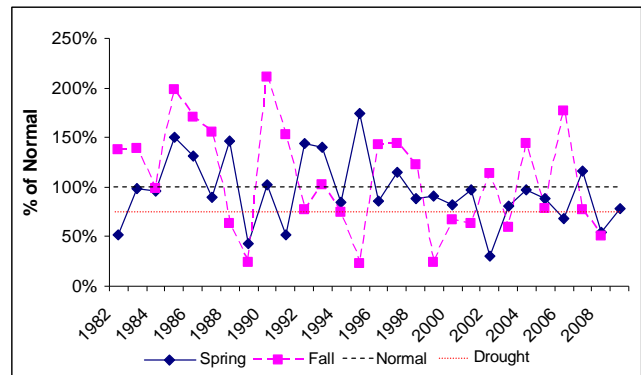


Figure 2. Percent annual precipitation based on the 27 year mean for spring (March-May) and fall (Sept.-Nov.) precipitation for WMU 25A, Plateau, Fish Lake. Precipitation data were collected at the Salina 24E, Richfield Radio KSVC and Koosharem weather stations (Utah Climate Summary 2009).

Browse

The median browse trend (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*). Black sagebrush was the most common species sampled and was sampled at nine study sites, 25A-1, 25A-2, 25A-7, 25A-9, 25A-10 and 25A-11, 25A-12, 25A-16 and 25A-18. The mean density of black sagebrush decreased significantly from 1999 and 2004 (Figure 3a). The mean cover of black sagebrush also decreased significantly from 1999 to 2004 then remained similar from 2004 to 2009 (Figure 3b). The mean black sagebrush population decadence increased significantly from 1999 to 2004 then increased again from 2004 to 2009, but the increase was not significant (Figure 3c).

Wyoming big sagebrush was sampled on eight sites in the unit, 25A-3, 25A-4, 25A-5, 25A-9, 25A-10, 25A-14, 25A-19 and 25A-20. The mean density and cover of Wyoming big sagebrush decreased significantly from 1999 to 2004 then remained similar from 2004 to 2009 (Figure 3a and 3b). The mean population decadence of Wyoming big sagebrush increased significantly from 24% in 1999 to 41% in 2004, then decreased significantly to 25% in 2009 (Figure 3c).

Mountain big sagebrush was sampled on seven studies in the unit, 25A-2, 25A-7, 25A-8, 25A-12, 25A-13, 25A-16 and 25A-18, and mean density and decadence followed similar trends as Wyoming big sagebrush on the unit (Figure 3a and 3c). The mean cover of mountain big sagebrush steadily decreased from 1999 to 2009 with a significant decrease from 1999 to 2009. Basin big sagebrush was sampled on only one study, 25A-16, at such low density and cover that it was not included in the unit summary. Some of the changes in sagebrush may be due to harrow treatments that occurred on the Praetor Slope (25A-5) study in 2002, and on the Lower Dog Flat (25A-8) and Row of Pines Enclosure (25A-14) studies in 2006.

Herbaceous Understory

The median grass trend (Figure 5). The mean perennial grass sum of nested frequency decreased significantly from 1999 to 2004 and remained similar from 2004 to 2009 (Figure 4a). However, the mean cover of perennial grass has had an opposite trend with a significant increase from 1999 to 2004 (Figure 4b). Cheatgrass (*Bromus tectorum*) was sampled on six studies in the unit, but was only abundant on one site, 25A-3. The mean nested frequency of cheatgrass decreased significantly from 1999 to 2004, but as with perennial grasses cover increased significantly from 1999 to 2004 (Figure 4a and 4b).

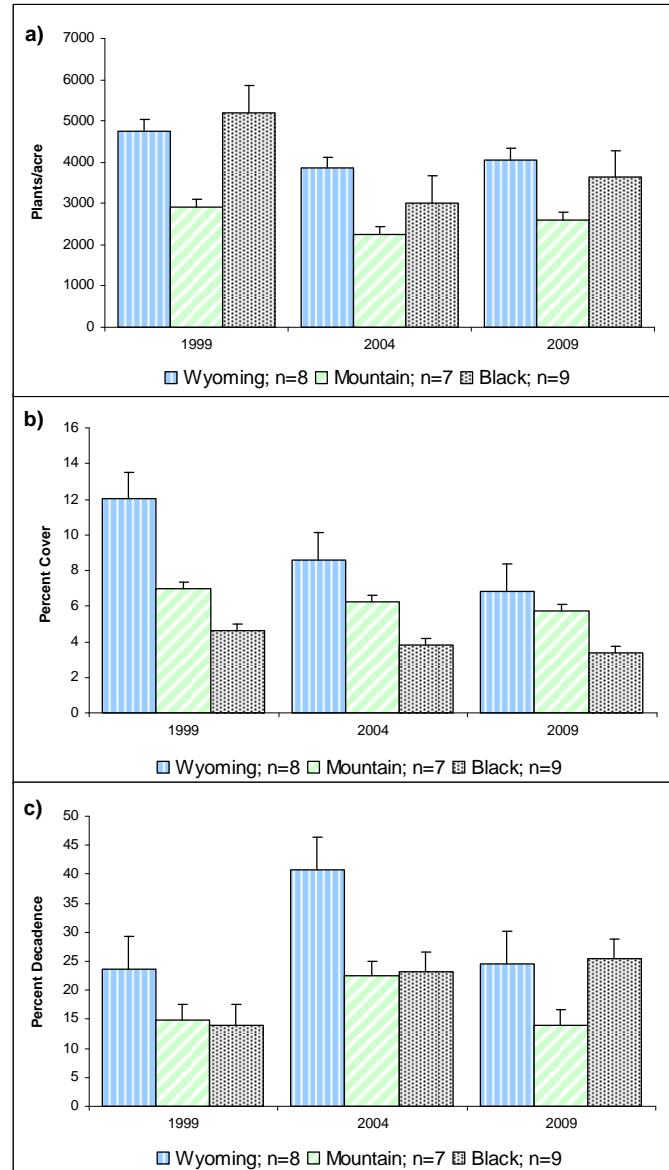


Figure 3. a) Mean density of sagebrush (*Artemisia* spp.) by year for WMU 25A, Plateau, Fish Lake. b) Mean cover of sagebrush by year for WMU 25A. c) Mean population decadence by year of sagebrush for WMU 25A.

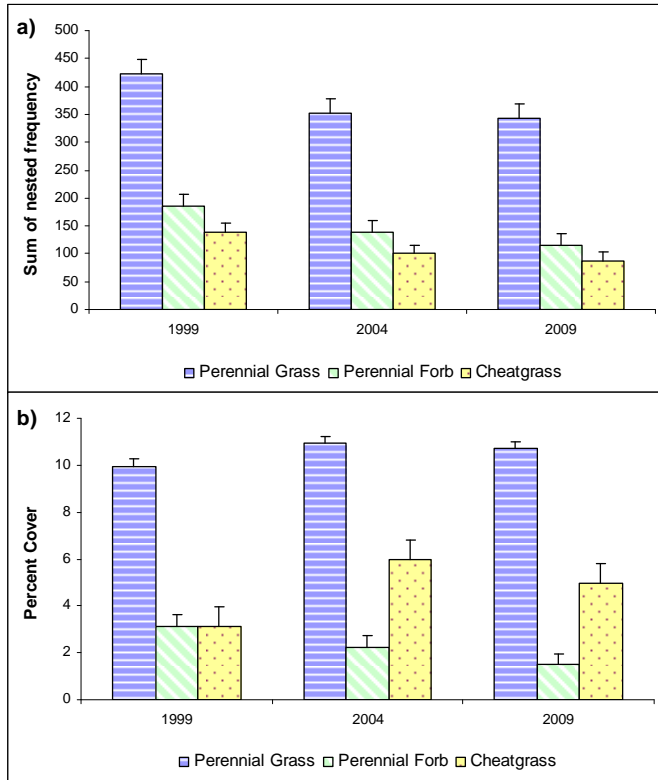


Figure 4. a) Mean perennial grass, perennial forb and cheatgrass sum of nested frequency by year for WMU 25A, Plateau, Fish Lake. b) Mean perennial grass, perennial forb and cheatgrass cover by year for WMU 25A.

The median forb trend (Figure 5). Perennial forbs are not overly abundant on this unit and the mean perennial forb sum of nested frequency decreased significantly from 1999 to 2004. The sum of nested frequency decreased again from 2004 to 2009, but the decrease was not significant (Figure 4a). The mean cover of perennial forbs decreased steadily from 1999 to 2009 with significant difference in cover from 1999 to 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): 25A-3, 25A-4, 25A-5, 25A-9, 25A-10, 25A-14, 25A-19 and 25A-20. The mean DCI ranking for these studies decreased from fair-good in 1999 to fair in 2004 and 2009 (Figure 6 and Table 1). The seven remaining deer winter range studies, 25A-1, 25A-2, 25A-7, 25A-8, 25A-11, 25A-16 and 25R-1, are within the mid-level potential scale for the deer DCI. The mean DCI ranking for these studies has remained relatively steady, but at poor, since 1999 (Figure 6 and Table 2). It appears that Preferred

Browse Cover and Perennial Forb Cover are limiting factors on this unit (Table 1 and 2). No studies were considered to be within the high potential scale for 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
99	13.9	6.9	2.0	19.3	0.0	1.2	0.0	43.3	Fair-Good
04	11.7	-3.2	1.8	16.3	0.0	0.4	0.0	27.0	Fair
09	8.8	2.0	0.3	21.1	0.0	0.3	0.0	32.3	Fair

Table 1. Low potential scale mean deer DCI scores (n=8) by year for WMU 25A, Plateau, Fish Lake. The deer DCI scores are divided into three categories based on ecological potentials which include 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
99	13.7	3.7	5.3	17.7	-0.3	4.2	0.0	44.3	Poor
04	11.4	3.8	1.1	24.2	-0.1	3.3	0.0	43.6	Poor
09	10.8	4.3	1.6	21.2	-0.1	3.2	0.0	41.0	Poor

Table 2. Mid-level potential scale mean deer DCI scores (n=7) by year for WMU 25A, Plateau, Fish Lake. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

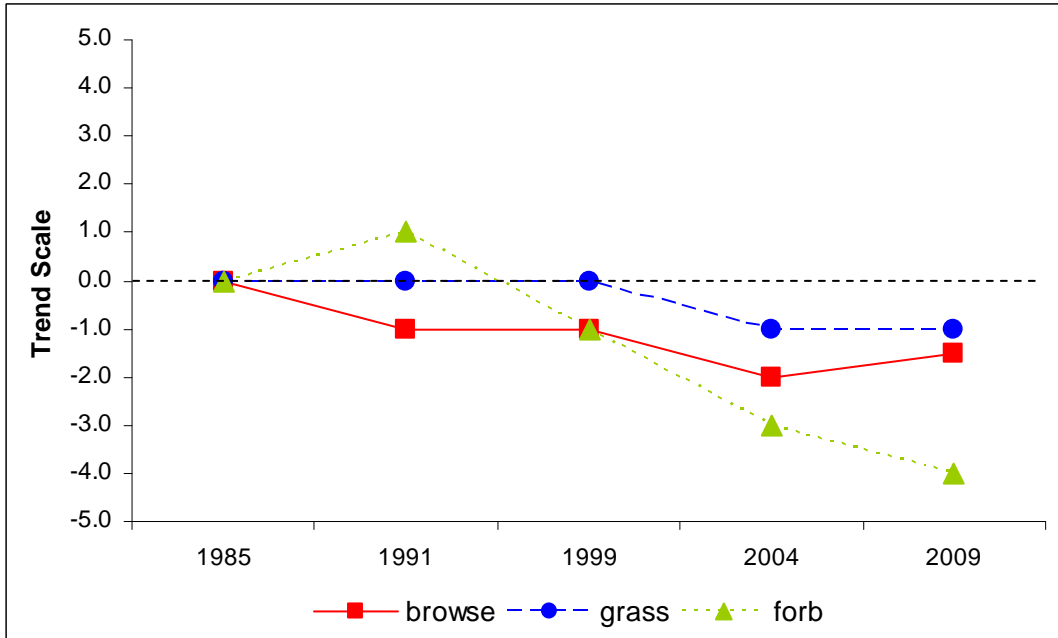


Figure 5. Cumulative median browse, grass and forb trends by year for WMU 25A, Plateau, Fish Lake.

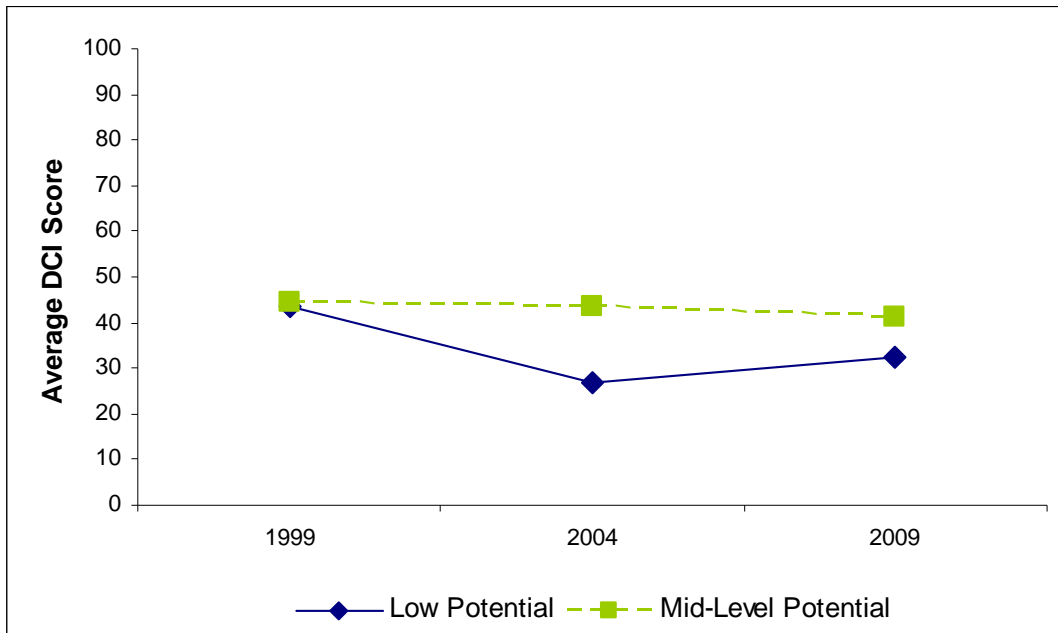
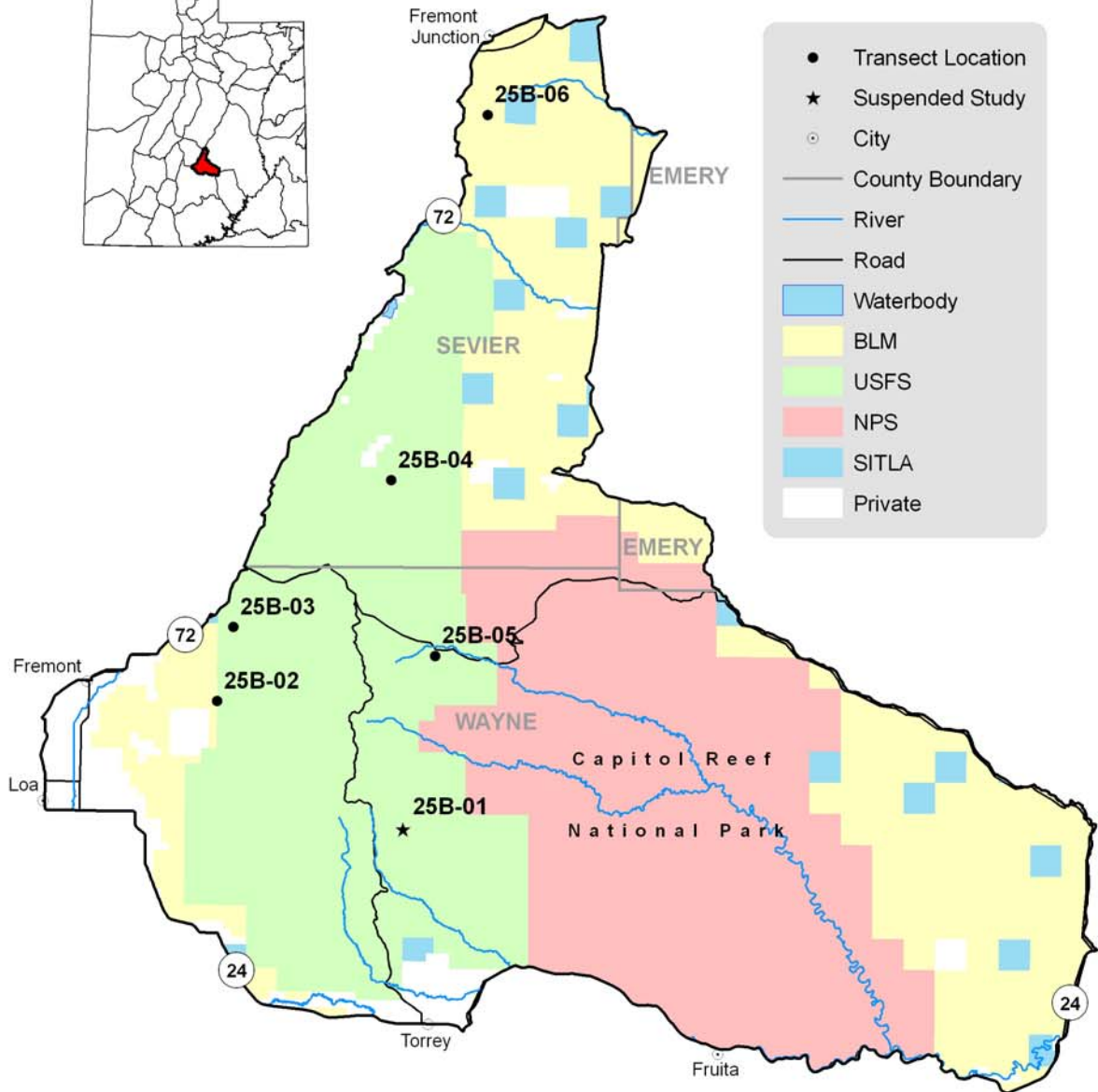


Figure 6. Mean low (n=8) and mid-level (n=7) potential scale DCI scores by year for WMU 25A, Plateau, Fish Lake. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

Management Unit 25B



Unit Location



WILDLIFE MANAGEMENT UNIT 25B - PLATEAU, THOUSAND LAKES

Boundary Description

Wayne, Emery, and Sevier Counties - Boundary begins at Highway SR-24 and Highway SR-72; north on SR-72 to Interstate 70; east on I-70 to Cainesville road; south on this road to SR-24; west on SR-24 to SR72 and beginning point.

Management Unit Description

The Thousand Lake Wildlife Management unit is part of the larger management unit 25 - Plateau. This unit is divided into three sub units, Fish Lake (25A), Thousand Lake (25B), and Boulder Mountain (25C). Management unit 25B was named after Thousand Lake Mountain, a lava-capped plateau with numerous small natural lakes. This mountain reaches an elevation of 11,295 feet and overlooks Capital Reef National Park and the desert country east of the unit. At the extreme southeastern corner of the unit is the lowest point in elevation in the herd unit at Cainesville (about 4,100 feet). The vegetation composition varies greatly throughout the unit with respect to topographical relief and elevation. Cainesville averages about 185 frost-free days and 5 to 6 inches of rainfall a year, while Thousand Lake Mountain receives 25 to 30 inches of rainfall a year and averages only 20 to 40 frost-free days.

The unit has good winter range with ample protective cover, large basins, draws, and open ridges. The upper limits of the normal winter range vary from 8,400 feet at the northern boundary to 9,000 feet on the south end of the mountain. The lower normal winter range limit is between 6,000 and 7,400 feet in elevation. At present, the winter range appears ample to support the deer and elk from the Thousand Lakes unit and also many wintering deer from the adjacent Fish Lake unit. Solomon Basin, Sage Flat, Horse Valley, Sand Flat, Paradise Flat, and Lyman Slopes are all winter concentration areas.

Several different estimates of the size of the unit's big-game ranges can be found. Many of these estimates are discussed here. Huff and Blotter (1964) conducted the original survey of the area's deer ranges and reported 90,489 acres of winter range. Jense et al. (1985) quoted this estimate but rounded it off. Mann (1985) used the same figure to arrive at an estimate of 3,800 acres that needs to be acquired from the private sector and maintained to help maintain the deer herd. In the deer herd unit management plan, Bogedahl (1983) gave markedly different estimates of the range sizes. This project planimetered the boundaries of the winter range as drawn on the original base map by Huff and Blotter to arrive at an estimate of 103,733 acres.

Huff and Blotter (1964) inventoried the vegetation on the winter range in 1963. They reported acreage and cover density for three major vegetative types. Pinyon-juniper made up 73% of the winter range with about 9% cover for desirable browse species. The sagebrush and mixed browse types accounted for 10% and 4% of the winter range and had 19% and 18% of the cover respectively for the key browse species. Ponderosa pine, with a healthy understory of antelope bitterbrush, is located along the upper edge of the winter range between Water Canyon and Sand Creek.

The condition of the spring and summer range is the current management concern. As the snow begins to recede in the spring, deer seek green grasses and forbs which are very scarce on the heavily overgrazed spring ranges. At this time, the early green-up in the alfalfa and grain fields on private land near Loa, Fremont, Lyman and Torrey are very attractive to wildlife and depredation problems become serious. The DWR has been working in cooperation with the BLM and Forest Service on revegetation projects immediately above these private lands to provide spring forage and alleviate this problem. Most of the big game summer range is in fairly good condition and adequate for present needs, but it is limited in size and should be managed carefully to insure that the necessary quality and quantity of summer range is maintained in order to maintain herds at current levels. Small sage flats on top of the mountain which have been sprayed with 2,4-D, have displayed increased summer use by deer as forb and grass production increases.

Grazing, uranium exploration, and logging are the three uses that have had the most impact on the Thousand Lakes unit. Grazing of cattle, horses, and sheep commenced with the settlement of the region in the 1860's. The range was open to anyone and was used from the time the snow melted enough in the spring to get livestock on the mountain, until the snow drove them off in the fall. Much of the east side, especially the Solomon Basin area, was used year-round by cattle. Because of the plentiful, well-dispersed water sources, the relatively flat mountain top was also heavily grazed each summer. This overgrazing resulted in soil compaction and soil loss at water sources, erosion problems, decreased water quality, and a decrease of the valuable grass-forb component in the vegetative community until nearly monotypic shrub types remained. The Forest Service has gradually increased grazing restrictions in order to allow the range to recover. Currently many areas are beginning to show improvements, but it will take a long time for the land to recover naturally.

Uranium prospectors have also left their mark on the land. Four-wheel drive vehicles and heavy equipment tracks crisscross the unit and are still quite visible.

Stands of ponderosa pine, Douglas-fir, and Engelmann spruce are found on the mountain with many areas having been logged in the past. Fire suppression has helped to accelerate succession of the high mountain aspen-meadow parklands toward climax stands of Engelmann spruce. Canopy closure in these spruce forests nearly eliminates all understory species, resulting in a significant loss of forage production.

Despite human impacts, portions of Thousand Lake Mountain are under consideration for wilderness designation. However, gas and oil exploration is an ongoing activity and coal deposits in the Last Chance area have drawn proposals for both underground and strip mining. Also, Highway U-72 which forms the western boundary, has been paved and is maintained for year-round use. This will tend to encourage more recreation and tourism through the area.

Range Trend Studies

Forest Service, BLM, and DWR personnel met in August, 1985 to discuss range trend studies and to select crucial areas of big game range where trend should be monitored. Four sites were chosen for permanent range trend studies on the herd unit were established and have been monitored consistently through 2009. Three of these studies [Horse Valley (25B-2), Sage Flat (25B-3) and Solomon Basin (25B-4)] sample sagebrush-grass communities and one study [Polk Creek (25B-5)] samples a mixed mountain brush community. Another site, Little Deer Peak (25B-6), has been added to the Thousand Lake unit and samples a sagebrush-grass community. It originally was from a neighboring unit, but was switched to Thousand Lake unit with the latest alignment of the management unit boundaries. In 2004, the Thousand Lake (25B-1) study was suspended due to poor access.

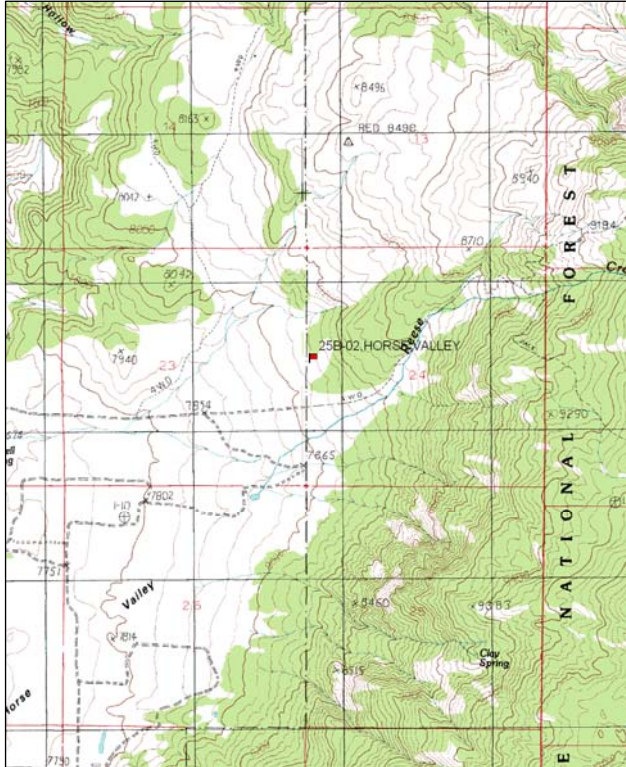
HORSE VALLEY - TREND STUDY NO. 25B-2-09

Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,020 ft (2,444 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)

Directions:

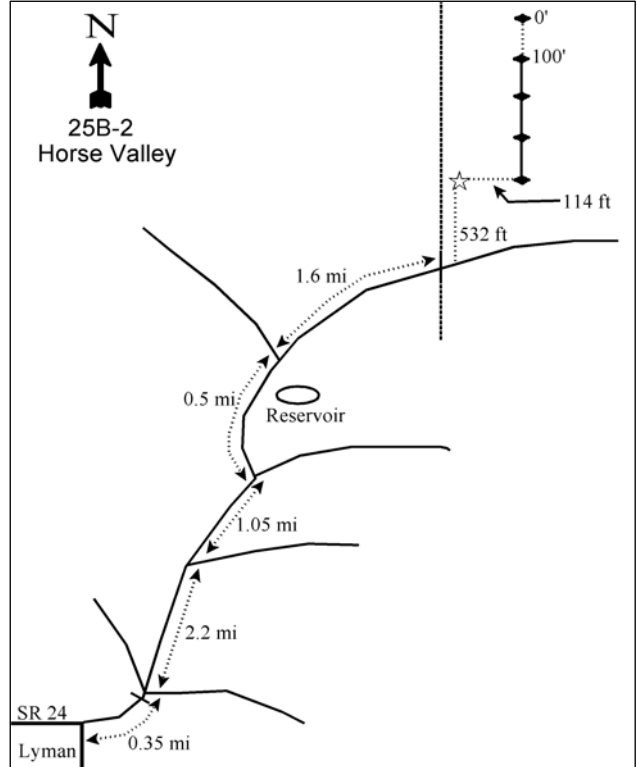
At the north end of main street (SR 24) in Lyman, SR 24 turns west towards Loa. Turn east here and go 0.35 miles to a 3-way split just beyond a cattleguard. Take the middle fork (the main road) and go 2.2 miles to a fork. Stay left and continue 1.05 miles on the main road to another fork. Again stay left and proceed 0.5 miles north just past a small reservoir to an intersection. Take the right fork toward Neffs Reservoir. On the main road, go 1.6 miles up and east across the top of some private land to a cattleguard at the Forest Service boundary. Park here, then walk 532 feet north along the east side of the fence to a witness post (rebar) next to the fence. The 400' stake is 114 feet east of the witness post. The 0-foot baseline stake lies 400 feet north, and has a red browse tag #7065 attached.

Map Name: Loa 1 NE, Utah



Township: 27S, Range: 3E, Section: 24

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 452723 E 4255665 N

HORSE VALLEY - TREND STUDY NO. 25B-2

Site Information

Site Description: This study is located in a sagebrush opening just east of the Forest Service boundary fence in Horse Valley. The west side of the fence is a strip of BLM land which has been proposed for a pinyon-juniper chaining and seeding treatment. Most of the valley is privately owned farmland. The key browse species is Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Cattle graze in the area as part of the Thousand Lakes allotment. The area is thought to be a winter deer concentration area, with many moving into the lower fields in late winter or early spring. Pellet group data has shown very light use by cattle and elk, with increasing use by deer from 1999 to 2009 (Table - Pellet Group Data).

Browse: Wyoming big sagebrush provides almost all of the browse cover on this site and about three-fourths of vegetation cover. However, there has been a lot difficulty through the years differentiating between black sagebrush (*Artemisia nova*) and Wyoming big sagebrush on this site due to hybridization. The population has matured and decadence increased in 2009 while recruitment of young plants was very low. The density of Wyoming big sagebrush has not fluctuated greatly since 1985 (Tables - Browse Characteristics). Broom snakeweed (*Gutierrezia sarothrae*) and narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) are also commonly found here, but do not provide much cover. Pinyon pine (*Pinus edulis*) density was estimated, using the point centered quarter method, at 53 trees/acre in 1999 and an average diameter was 2.3 inches. In 2004, this density increased to 118 trees/acre with an average diameter of only 1.0 inch. In 2004, 89% of the trees sampled were classified less than 4 feet tall. By 2009, density was constant at 114 trees/acre, with 65% of trees were less than 4 feet tall (Table - Point-Quarter Tree Data).

Herbaceous Understory: Perennial grass cover has averaged 2% cover since 1994. Blue grama (*Bouteloua gracilis*) is the most common grass and provided approximately 75% of grass cover in all sample years. Forbs are scarce and diversity is low. Pinguic hynenoxy (*Hymenoxys richardsonii*) is the most common forb and is poisonous to cattle (Table - Herbaceous Trends).

Soil: The soil is a sandy clay loam with little organic matter and a mildly alkaline pH (7.6). Soil phosphorus has marginal availability for plant growth and development (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Rocks and pavement together make up over 30% of the ground cover. Percent bare soil has varied from year to year, however the ratio of bare soil to protective cover has ranged from 1.8 to 2.4 from 1994 to 2009 (Table - Basic Cover). Active gullies up to 1.5 feet deep are common. Flow patterns are evidenced by the movement of soil and rock fragments and in some places plant roots are exposed. The soil erosion condition was classified as slight in both 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 – slightly down (-1):** Wyoming big sagebrush density decreased slightly and decadence increased from 14% to 45%. Broom snakeweed density also increased 24% to 8,199 plants/acre
- **1991 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. Wyoming big sagebrush decadence is still high at 42% and recruitment of young plants decreased from 14% of the population to 3%.
- **1994 to 1999 - slightly up (+1):** Wyoming big sagebrush density increased 18% and recruitment of young plants has increased to 10% while decadence is similar to past years. However, broom snakeweed density increased more than threefold to 4,980 plants/acre, but cover remained low at 1%.
- **1999 to 2004 - stable (0):** Wyoming big sagebrush density is similar to past years, as is decadence. Recruitment of young plants decreased to 4% of the population.

- **2004 to 2009 – stable (0):** Wyoming big sagebrush density is similar to past years while decadence has increased from 37% to 60% and recruitment young plants is low at 2%. However, broom snakeweed density decreased 84% to just 940 plants/acre.

Grass:

- **1985 to 1991 - up (+2):** The sum of nested frequency for perennial grasses increased 62%. Blue grama and bottlebrush squirreltail (*Sitanion hystrix*) are the most common species.
- **1991 to 1994 - down (-2):** The sum of nested frequency for perennial grasses declined 29%. Blue grama accounts at 1% cover and provides 77% of the grass cover. Total grass cover is low at 2%.
- **1994 to 1999 - stable (0):** The sum of nested frequency of perennial grasses is similar to the last reading and cover is at 2%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased 15%, but cover remained similar.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased 12%, but cover remained similar.

Forb:

- **1985 to 1991 - up (+2):** The sum of nested frequency for perennial forbs increased 38%, however, forbs are very rare.
- **1991 to 1994 - down (-2):** The sum of nested frequency for perennial forbs decreased 44%. Pingue hymenoxys accounts for 93% of forb cover and provides 1% cover.
- **1994 to 1999 - stable (0):** The sum of nested frequency of perennial forbs is similar to the last reading while cover has increased to 2%. Pingue hymenoxys accounts for 98% of forb cover.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs fell 70% and cover well was below 1%. Only two forb species were sampled.
- **2004 to 2009 - stable (0):** Forb values remained similar.

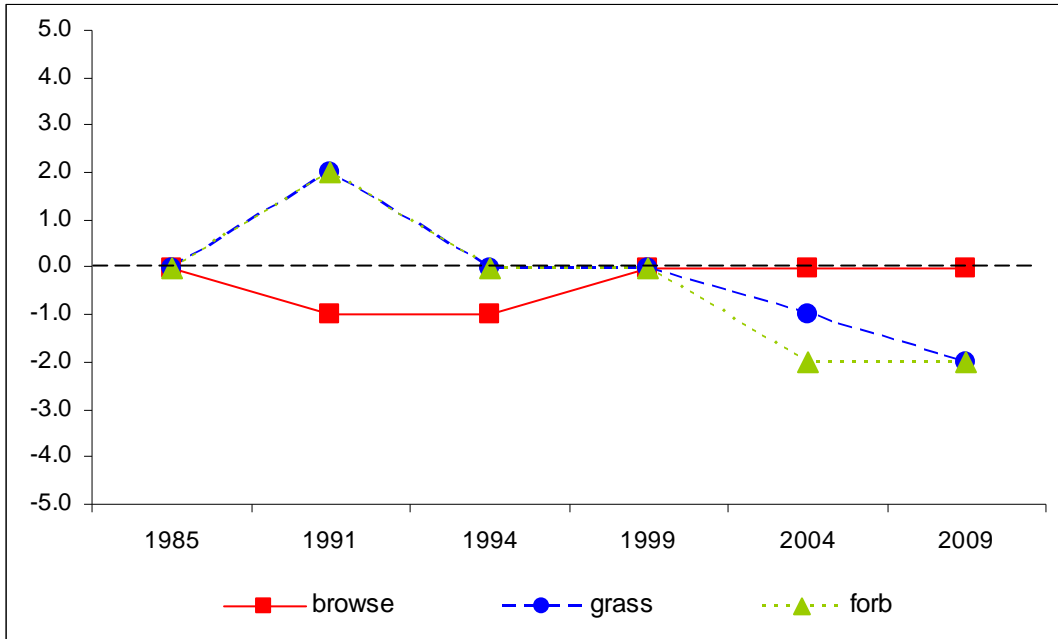
DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 25B, study no: 2

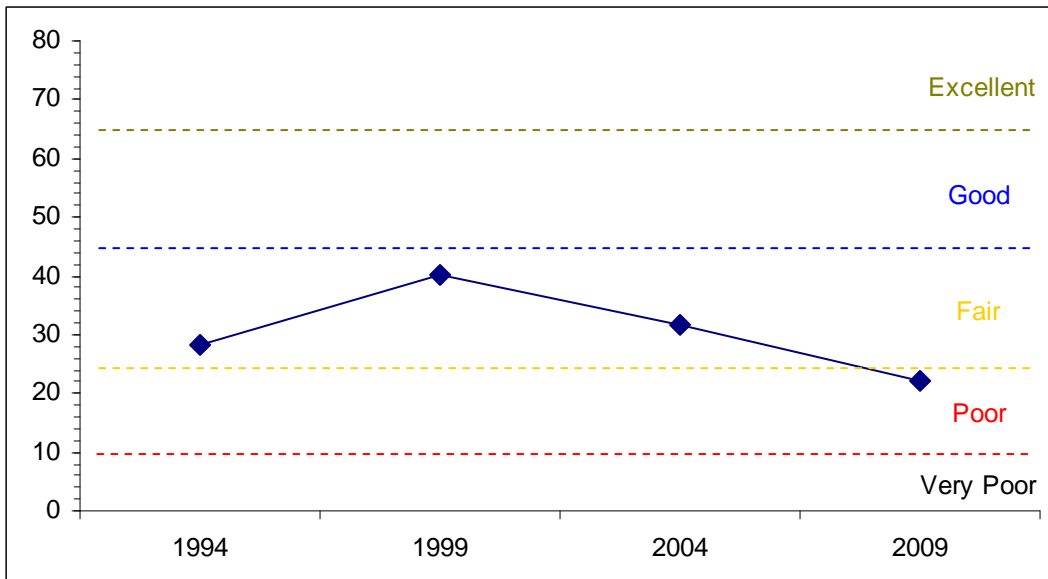
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	18.9	2.4	1.5	3.0	0.0	2.5	0.0	28.3	Fair
99	23.7	2.7	5.0	4.4	0.0	4.4	0.0	40.2	Fair
04	22.2	3.9	2.0	3.1	0.0	0.4	0.0	31.6	Fair
09	20.7	-3.0	1.0	3.1	0.0	0.3	0.0	22.1	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 25B Study no: 2



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 25B, Study no: 2



HERBACEOUS TRENDS--

Management unit 25B, Study no: 2

Type	Species	Nested Frequency						Average Cover %			
		'85	'91	'94	'99	'04	'09	'94	'99	'04	'09
G	<i>Bouteloua gracilis</i>	48	66	61	64	56	43	1.16	1.66	1.24	1.10
G	<i>Carex</i> sp.	a ⁻	b ⁶	a ⁻	a ⁻	a ⁻	a ⁻	-	-	-	-
G	<i>Oryzopsis hymenoides</i>	a ¹	a ³	a ⁻	a ¹	b ¹⁴	a ³	-	.00	.12	.04
G	<i>Sitanion hystrix</i>	ab ⁴³	b ⁷²	ab ⁵⁶	ab ⁵⁰	a ²⁹	a ⁴¹	.34	.55	.18	.41
G	<i>Stipa comata</i>	ab ⁹	b ¹⁷	a ⁻	a ¹	a ⁻	a ⁻	.00	.00	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		101	164	117	116	99	87	1.50	2.22	1.54	1.55
Total for Grasses		101	164	117	116	99	87	1.50	2.22	1.54	1.55
F	<i>Androsace septentrionalis</i> (a)	-	-	-	7	-	-	-	.02	-	-
F	<i>Arabis demissa</i>	-	3	-	-	-	-	-	-	-	-
F	<i>Astragalus convallarius</i>	1	2	3	3	-	1	.00	.01	-	.00
F	<i>Chaenactis douglasii</i>	-	3	-	-	-	-	-	-	-	-
F	<i>Cryptantha jamesii</i>	b ³⁰	ab ²⁴	a ⁶	a ⁻	ab ¹¹	a ⁹	.04	-	.06	.07
F	<i>Cryptantha</i> sp.	-	-	3	-	-	-	.03	-	-	-
F	<i>Erigeron pumilus</i>	4	8	3	3	-	-	.01	.01	-	-
F	<i>Hymenoxys richardsonii</i>	b ³⁹	b ⁵⁹	b ⁴²	b ⁵¹	a ⁷	a ⁸	1.16	2.17	.15	.06
F	<i>Phlox longifolia</i>	-	-	-	3	-	-	-	.00	-	-
F	<i>Townsendia incana</i>	-	3	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	0	7	0	0	0	0.01	0	0
Total for Perennial Forbs		74	102	57	60	18	18	1.25	2.19	0.21	0.13
Total for Forbs		74	102	57	67	18	18	1.25	2.21	0.21	0.13

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

BROWSE TRENDS--

Management unit 25B, Study no: 2

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	<i>Artemisia nova</i>	0	0	0	1	-	-	-	.03
B	<i>Artemisia tridentata wyomingensis</i>	82	84	83	85	15.11	18.95	17.78	16.52
B	<i>Atriplex canescens</i>	0	3	0	0	-	.00	-	-
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	46	25	36	34	1.06	.46	1.72	.28
B	<i>Echinocereus triglochidatus</i>	0	1	1	1	-	.00	.00	.00
B	<i>Gutierrezia sarothrae</i>	41	68	75	31	.18	1.15	3.43	.14
B	<i>Juniperus osteosperma</i>	0	0	0	1	-	-	-	.00
B	<i>Leptodactylon pungens</i>	0	1	0	0	-	.00	-	-
B	<i>Opuntia</i> sp.	7	17	13	10	.04	.13	.21	.04
B	<i>Pinus edulis</i>	0	4	5	6	-	.15	.21	.16
Total for Browse		176	203	213	169	16.39	20.85	23.37	17.17

CANOPY COVER, LINE INTERCEPT--

Management unit 25B, Study no: 2

Species	Percent Cover	
	'04	'09
Artemisia nova	-	.16
Artemisia tridentata wyomingensis	18.28	20.23
Chrysothamnus viscidiflorus stenophyllus	.75	.20
Gutierrezia sarothrae	4.80	.25
Pinus edulis	.65	.96

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25B, Study no: 2

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.4	0.7

POINT-QUARTER TREE DATA--

Management unit 25B, Study no: 2

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Pinus edulis	53	118	114	2.3	1.0	1.6

BASIC COVER--

Management unit 25B, Study no: 2

Cover Type	Average Cover %					
	'85	'91	'94	'99	'04	'09
Vegetation	6.50	5.75	18.79	24.79	24.46	19.28
Rock	11.00	17.25	18.92	12.81	16.38	12.79
Pavement	31.50	25.75	8.72	22.56	27.48	23.88
Litter	23.50	14.50	16.85	21.91	23.25	20.76
Cryptogams	1.75	.75	1.15	2.45	1.54	.39
Bare Ground	25.75	36.00	34.85	24.42	25.75	31.72

SOIL ANALYSIS DATA --

Management unit 25B, Study no: 2, Study Name: Horse Valley

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.5	7.6	50.9	27.8	21.3	2.2	7.7	112	0.5

PELLET GROUP DATA--

Management unit 25B, Study no: 2

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	14	9	3	37	-	-	-
Elk	-	-	-	1	-	1 (3)	1 (2)
Deer	8	3	-	2	1 (2)	1 (3)	17 (41)
Cattle	-	-	-	-	1 (2)	-	-

BROWSE CHARACTERISTICS--
Management unit 25B, Study no: 2

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia frigida</i>									
85	0	0	0	-	-	0	0	0	-/-
91	66	0	100	-	-	0	0	0	3/3
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	-/-
<i>Artemisia nova</i>									
85	0	0	0	-	-	0	0	0	-/-
91	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	8/14
<i>Artemisia tridentata wyomingensis</i>									
85	4798	15	71	14	266	69	6	8	19/25
91	4398	14	39	47	66	29	14	17	17/23
94	3820	3	55	42	200	24	3	26	19/35
99	4520	10	50	41	60	28	3	14	18/28
04	4400	4	59	37	100	7	0	23	17/27
09	4760	2	38	60	-	28	13	33	16/26
<i>Atriplex canescens</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
94	0	0	0	0	-	0	0	0	-/-
99	80	0	75	25	-	25	0	25	-/-
04	0	0	0	0	-	0	0	0	-/-
09	0	0	0	0	-	0	0	0	-/-
<i>Chrysothamnus viscidiflorus stenophyllus</i>									
85	8665	12	43	45	399	22	10	13	5/7
91	7531	1	4	96	-	35	22	62	5/7
94	2940	0	69	31	-	30	7	12	4/6
99	1180	15	63	22	20	0	0	12	6/10
04	1480	5	64	31	-	8	7	12	7/11
09	1300	5	77	18	40	0	0	17	12/6

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Echinocereus triglochidatus</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	-	0	0	0	4/6	
04	20	0	100	-	-	0	0	0	3/6	
09	20	100	0	-	-	0	0	0	-/-	
<i>Gutierrezia sarothrae</i>										
85	6198	16	82	2	9466	9	0	9	7/6	
91	8198	8	80	12	66	2	.81	2	5/4	
94	1420	14	79	7	-	0	0	1	7/6	
99	4980	64	26	10	2340	0	0	.40	7/8	
04	5920	2	98	0	-	0	0	0	7/9	
09	940	17	70	13	-	0	2	9	6/5	
<i>Juniperus osteosperma</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	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	60	100	0	-	-	0	0	0	-/-	
<i>Leptodactylon pungens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	40	100	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
<i>Opuntia sp.</i>										
85	1798	7	82	11	-	0	0	33	3/4	
91	931	29	50	21	-	7	0	0	3/4	
94	160	0	88	13	-	0	0	0	3/7	
99	600	27	53	20	20	0	0	20	3/11	
04	400	0	100	0	-	0	0	0	3/12	
09	240	0	100	0	-	0	0	0	3/10	
<i>Pinus edulis</i>										
85	66	100	0	-	266	0	0	0	-/-	
91	66	100	0	-	133	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	80	100	0	-	40	0	0	0	-/-	
04	120	83	17	-	20	0	0	0	-/-	
09	120	50	50	-	20	0	17	0	-/-	

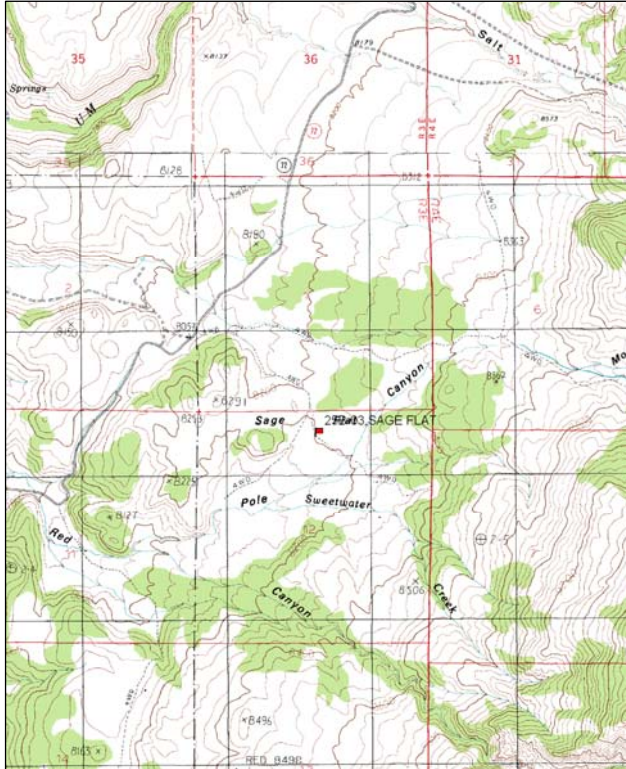
SAGE FLAT - TREND STUDY NO. 25B-3-09

Vegetation Type: Wyoming Big Sagebrush
Range Type: Crucial Deer Winter, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,200 ft (2,499 m)
Aspect: Southwest
Slope: 2%-5%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

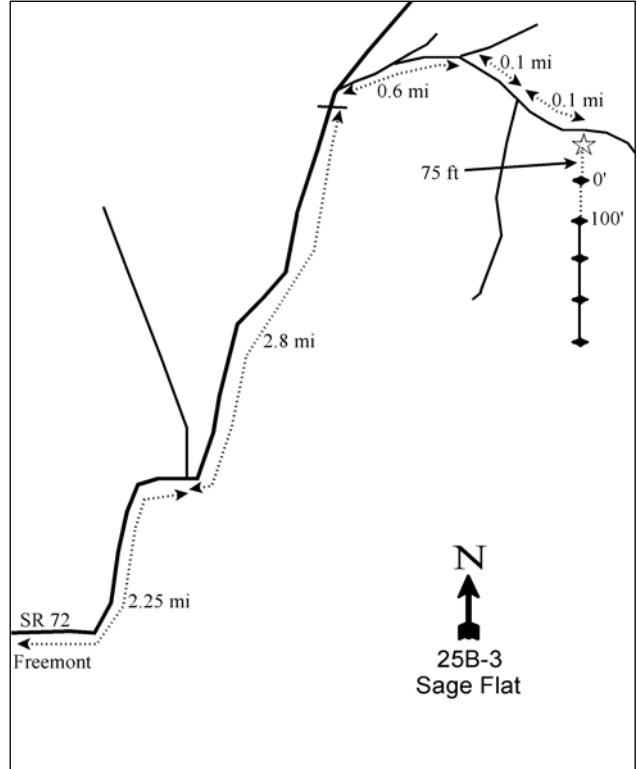
From Fremont travel north on SR 72 for 2.25 miles to a major fork, bear right and continue 2.8 miles on SR 72 to a cattleguard at the Forest Service boundary. One hundred yards beyond the cattleguard turn right. At 0.15 miles, a road forks off to the right. Go up this rough road 0.45 miles to a fork. Turn right and go 0.1 miles to another fork. Turn left at the fork and go 0.1 miles into the flat to a witness post on the right side of the road. The witness post and transect stakes are green steel fence posts with a white top. The frequency baseline, with browse tag #149, starts 75' due south of the witness post.

Map Name: Loa 1 NE, Utah



Township: 27S, Range: 3E, Section: 12

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 453556 E 4259466 N

SAGE FLAT - TREND STUDY NO. 25B-3

Site Information

Site Description: The Sage Flat trend study is located in an open valley dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). The area has been heavily grazed by livestock since the area was settled. The surrounding area is dominated by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with a black sagebrush (*Artemisia nova*) understory. Past use has led to an almost monotypic shrub type with few herbaceous species. The flat is thought to be an important deer concentration area in winter and spring and would be enhanced by with early season herbaceous species. Deer use has varied between low and moderate since 1981 while elk use has been low or unobserved. Cattle use was moderate in 2004, but not noted in 2009 (Tables – Pellet Group Data).

Browse: Wyoming big sagebrush is the key browse species on this site and dominates the vegetation component. After a large increase in density from 1985 to 1991, sagebrush density has not varied greatly. Decadence levels have remained acceptable (below 30%) since 1991, while recruitment of young plants has been good until 2009 when it decreased to just 7% of the population. Broom snakeweed (*Gutierrezia sarothrae*) is the only other shrub that occurs regularly (Table - Browse Characteristics).

Herbaceous Understory: Grass cover has declined gradually from 4% in 1994 to 2% in 2009. Western wheatgrass (*Agropyron smithii*) is the dominant grass species, but it too has steadily declined (Table - Herbaceous Trends). Forbs are rare on this site.

Soil: The soil is classified as loam with mildly alkaline (pH 7.7). Phosphorous has limited availability for plant growth and development at 4.7 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Erosion is evident on the site with about 50% of the soil surface exposed. Gullies have been filled in with small trees and flow patterns and pedestalling occur on the site. A gully is found near the 300' stake and a few others are crossed by the belts. The soil erosion condition was classified as moderate in 2004 and has improved to stable in 2009.

Trend Assessments

Browse:

- **1985 to 1991 - up (+2):** Wyoming big sagebrush density increased 71% to 12,665 plants/acre. Recruitment of young was high at 50% of the population and decadence was moderate at 24%.
- **1991 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. Wyoming big sagebrush recruitment decreased slightly, but was still high with young plants representing 39% of the population. Decadence decreased slightly to 16%.
- **1994 to 1999 - stable (0):** Wyoming big sagebrush density decreased slightly compared to past years, but recruitment of young plants increased slightly to 43% of the population, and decadence was moderate at 24%. Broom snakeweed density decreased 68% to 1,200 plants/acre.
- **1999 to 2004 - stable (0):** Wyoming big sagebrush density was similar, though recruitment decreased to 27% which was still considered good. Broom snakeweed density increased nearly fourfold to 4,500 plants/acre.
- **2004 to 2009 - slightly down (-1):** Wyoming big sagebrush density remained similar, but recruitment of young plants decreased and was low at 7%. Decadence increased slightly and was moderate at 27%.

Grass:

- **1985 to 1991 – slightly up (+1):** The sum of nested frequency of perennial grasses increased 14%. Western wheatgrass was the predominant grass.

- **1991 to 1994 - stable (0):** The sum of nested frequency is unchanged and cover was 4%. Western wheatgrass was still the dominant species and provided 60% of grass cover.
- **1994 to 1999 – stable (0):** The sum of nested frequency of perennial grasses was unchanged but cover decreased from 4% to 3% with western wheatgrass representing 39% of grass cover.
- **1999 to 2004 – slightly down (-1):** The sum of nested frequency of perennial grasses decreased 20% while cover was nearly similar to the last reading. No single species provided over 1% cover.
- **2004 to 2009 – slightly down (-1):** The sum of nested frequency of perennial grasses decreased 20% again while cover was only slightly lower at 2%. No one grass provided over 1% cover.

Forb:

- **1985 to 1991 – slightly up (+1):** Forbs are rare on the site and even small changes in the sum of nested frequency will result in high percent changes. Total forb cover was less than 1% and the sum of nested frequency rose 66%.
- **1991 to 1994 - down (-2):** Total forb cover was less than 1% and nested frequency decreased 71%.
- **1994 to 1999 – slightly up (+1):** Total forb cover was less than 1% and nested frequency increased 42%.
- **1999 to 2004 – slightly down (-1):** Total forb cover was less than 1% and nested frequency decreased 45%.
- **2004 to 2009 – slightly down (-1):** Total forb cover was less than 1% and nested frequency decreased 44%.

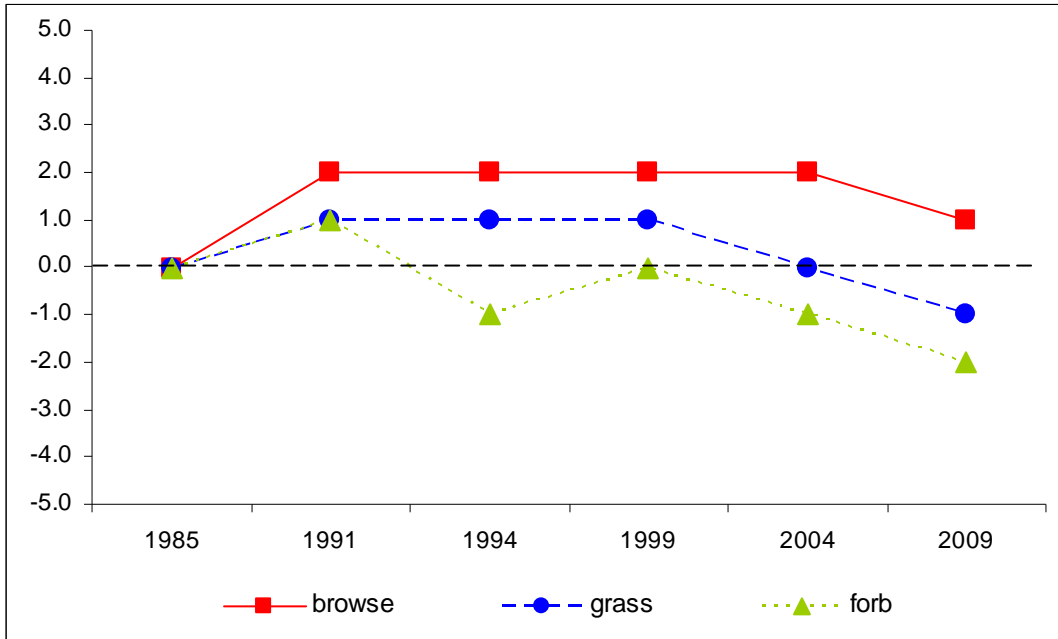
DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 25B, study no: 3

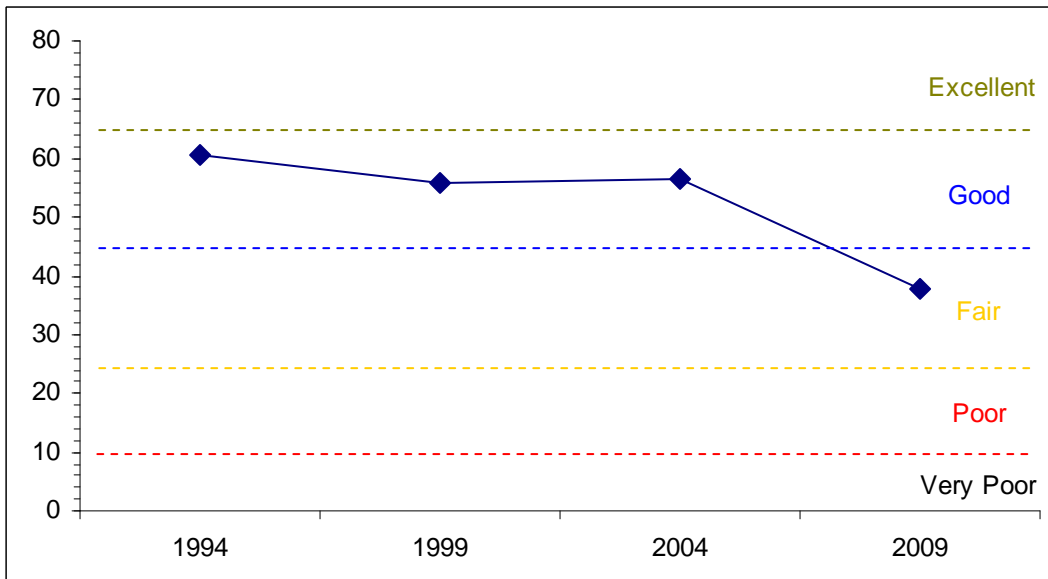
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	27.0	10.2	15.0	8.1	0.0	0.5	0.0	60.7	Good
99	26.2	8.0	15.0	6.0	0.0	0.7	0.0	55.8	Good
04	28.7	9.0	13.0	5.5	0.0	0.4	0.0	56.5	Good
09	22.3	6.9	3.5	4.8	0.0	0.3	0.0	37.8	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 25B Study no: 3



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 25B, Study no: 3



HERBACEOUS TRENDS--

Management unit 25B, Study no: 3

Type	Species	Nested Frequency						Average Cover %			
		'85	'91	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	a137	b182	b196	a133	a133	a116	2.41	1.15	.72	.84
G	Agropyron spicatum	a-	a-	a-	b62	a3	a2	-	.50	.06	.00
G	Bouteloua gracilis	a-	b10	b17	b16	b15	b11	.25	.36	.74	.68
G	Oryzopsis hymenoides	a5	ab9	ab6	bc22	c29	bc23	.21	.29	.51	.56
G	Poa secunda	5	-	-	-	-	4	-	-	-	.00
G	Sitanion hystrix	d94	cd74	bc57	abc42	ab41	a20	1.14	.66	.69	.30
Total for Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		241	275	276	275	221	176	4.03	2.98	2.73	2.41
Total for Grasses		241	275	276	275	221	176	4.03	2.98	2.73	2.41
F	Arabis sp.	-	-	-	2	3	-	-	.01	.03	-
F	Cryptantha sp.	a11	b30	ab13	a-	a5	ab12	.09	-	.02	.13
F	Cymopterus sp.	-	2	-	-	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	-	-	-	2	-	-	-	.03
F	Erigeron pumilus	b32	b45	ab22	b40	ab19	a3	.12	.15	.13	.01
F	Hymenoxys richardsonii	4	1	-	2	-	-	.00	.15	-	-
F	Penstemon sp.	-	-	-	1	-	-	.00	.00	-	-
F	Phlox longifolia	b38	c64	a6	ab13	a5	a3	.01	.04	.01	.03
F	Senecio multilobatus	-	1	-	-	-	-	-	-	-	-
F	Unknown forb-perennial	1	-	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	0	0	0	2	0	0	0	0.03
Total for Perennial Forbs		86	143	41	58	32	18	0.23	0.35	0.18	0.17
Total for Forbs		86	143	41	58	32	20	0.23	0.35	0.18	0.20

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

BROWSE TRENDS--

Management unit 25B, Study no: 3

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia frigida	7	13	6	4	.15	.30	.15	.03
B	Artemisia nova	0	3	2	2	-	.63	.63	.15
B	Artemisia tridentata wyomingensis	99	98	99	98	21.47	20.11	22.17	17.67
B	Ceratoides lanata	1	0	0	0	.00	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	9	11	12	14	.01	.00	.03	.01
B	Coryphantha vivipara arizonica	0	3	0	0	-	.00	-	-
B	Eriogonum microthecum	0	0	1	1	-	-	.00	.00
B	Gutierrezia sarothrae	64	36	64	29	.69	.33	2.59	.16
Total for Browse		180	164	184	148	22.33	21.37	25.57	18.03

CANOPY COVER, LINE INTERCEPT--

Management unit 25B, Study no: 3

Species	Percent Cover	
	'04	'09
Artemisia frigida	-	.05
Artemisia nova	.08	.31
Artemisia tridentata wyomingensis	23.20	21.04
Gutierrezia sarothrae	1.79	.10

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25B, Study no: 3

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.5	0.5

BASIC COVER--

Management unit 25B, Study no: 3

Cover Type	Average Cover %					
	'85	'91	'94	'99	'04	'09
Vegetation	6.00	2.50	24.93	24.49	26.55	20.60
Rock	.50	.50	1.67	.54	2.04	.01
Pavement	2.50	4.00	.98	4.90	4.84	6.38
Litter	30.00	27.00	18.25	19.50	19.04	19.51
Cryptogams	5.00	10.50	7.34	7.58	10.43	3.29
Bare Ground	56.00	55.50	50.48	46.57	46.81	59.15

SOIL ANALYSIS DATA --

Management unit 25B, Study no: 3, Study Name: Sage Flat

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.3	7.7	42.6	31.8	25.6	1.9	4.7	67.2	0.7

PELLET GROUP DATA--

Management unit 25B, Study no: 3

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	25	53	11	54	-	-	-
Elk	4	3	3	-	6 (15)	3 (7)	-
Deer	1	2	2	12	21 (52)	9 (23)	9 (22)
Cattle	4	2	1	-	15 (37)	-	1 (2)

BROWSE CHARACTERISTICS--
Management unit 25B, Study no: 3

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia frigida</i>									
85	0	0	0	0	-	0	0	0	-/-
91	132	50	50	0	-	0	50	0	5/7
94	320	0	100	0	-	0	0	0	3/5
99	500	24	68	8	20	44	32	0	3/5
04	220	0	100	0	-	27	0	0	3/4
09	100	0	100	0	-	0	20	0	6/8
<i>Artemisia nova</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
94	0	0	0	0	-	0	0	0	-/-
99	140	57	29	14	-	57	0	0	6/10
04	140	0	71	29	-	0	0	14	9/16
09	120	0	67	33	-	0	0	33	7/13
<i>Artemisia tridentata wyomingensis</i>									
85	7398	17	40	43	9199	47	33	4	19/20
91	12665	50	26	24	933	16	11	5	20/26
94	12960	39	45	16	40	46	0	8	19/29
99	11920	43	33	24	280	54	10	8	18/27
04	11360	27	54	20	20	26	8	11	15/23
09	11480	7	67	27	-	28	2	21	14/20
<i>Ceratoides lanata</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
94	20	100	0	-	-	0	0	0	2/2
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus viscidiflorus stenophyllus</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
94	240	8	58	33	-	0	0	0	4/6
99	280	21	14	64	-	0	29	43	4/6
04	360	33	61	6	-	17	0	6	4/5
09	300	7	80	13	-	0	0	13	2/4

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Coryphantha vivipara arizonica</i>									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	60	100	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Eriogonum microthecum</i>									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
94	0	0	0	0	-	0	0	0	-/-
99	0	0	0	0	-	0	0	0	-/-
04	40	0	50	50	-	0	100	50	7/2
09	20	0	100	0	-	0	0	0	2/4
<i>Gutierrezia sarothrae</i>									
85	8998	18	68	14	2066	1	.74	.74	7/5
91	9932	44	52	5	133	7	.67	3	3/2
94	3760	7	85	9	60	0	0	.53	5/5
99	1200	47	50	3	840	0	0	2	6/6
04	4500	0	100	0	-	0	0	0	6/8
09	820	2	95	2	-	0	0	2	5/6
<i>Opuntia sp.</i>									
85	0	0	0	-	-	0	0	0	-/-
91	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	0	0	0	-	-	0	0	0	-/-

SOLOMON BASIN - TREND STUDY NO. 25B-4-09

Vegetation Type: Black/Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 8,000 ft (2,438 m)

Aspect: East

Slope: 5%, but varies from 0%-20%

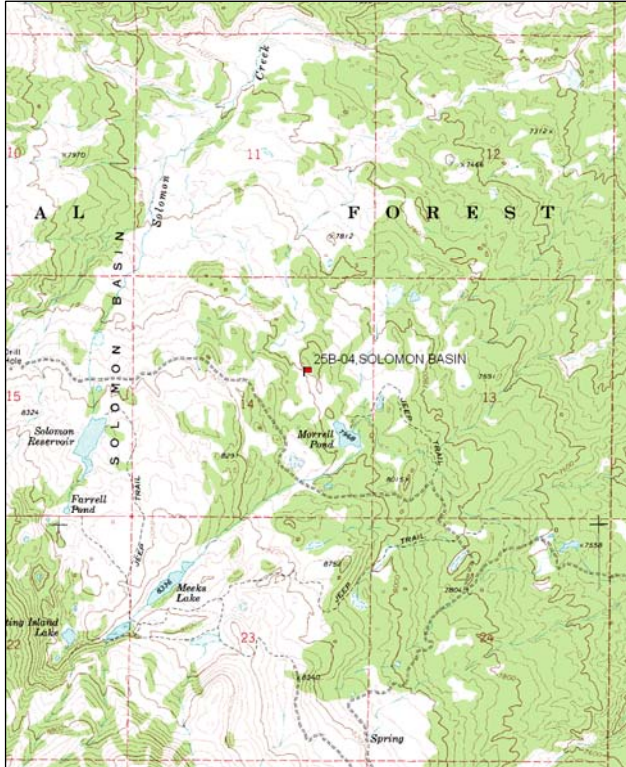
Transect bearing: 320 degrees magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95 ft)

Directions:

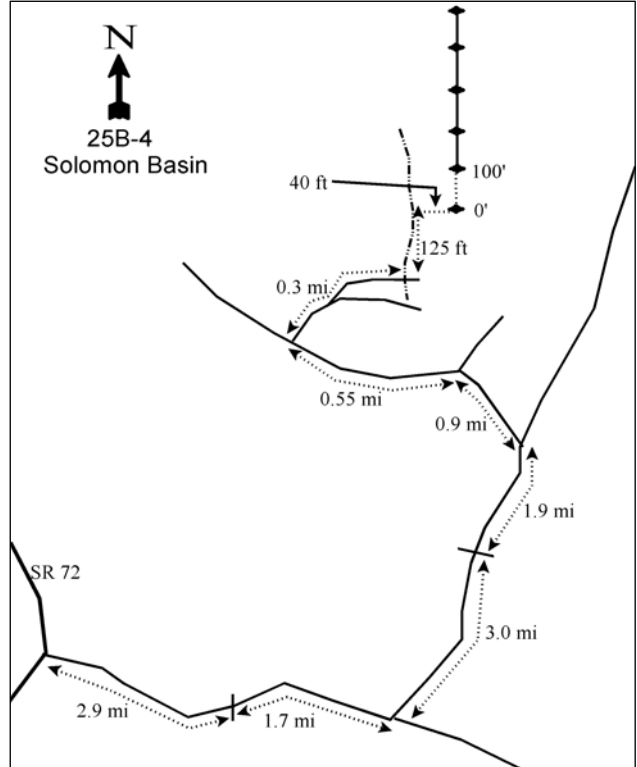
Travel north from Fremont on SR 72 for 7.3 miles to the Elkhorn-Torrey Road. Turn right and go 2.9 miles to a cattleguard. From the cattleguard go 1.7 miles to an intersection by Heart Lake. Turn left toward Meeks Lake and go 3.0 miles to a cattleguard. Go another 1.9 miles on the main road to an intersection. Stay left and go 0.9 miles toward Solomon Basin. Stay left again, bypassing the Morrell Pond Road and continue 0.55 miles, passing a doughnut-shaped pond. Take a sharp right turn here and go 0.2 miles to another fork. Bear left (the right fork takes you to Morrells Pond) and drive less than 0.1 miles to a ditch. Park here (very faint) and walk down the ditch for approximately 125 feet. The 0-foot stake is approximately 40 feet east of the ditch and marked with browse tag #26.

Map Name: Geyser Peak, Utah



Township: 26S, Range: 4E, Section: 14

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 461652 E 4266999 N

SOLOMON BASIN - TREND STUDY NO. 25B-4

Site Information

Site Description: This study was reestablished in 1994 after a new road was run through the original transect. The new site is located between two low parallel ridges in a narrow, shallow ravine. The site is part of a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland with nearby aspen (*Populus tremuloides*) stands and sagebrush flats. A pond is also nearby, perhaps concentrating grazing in the area. Pellet group data estimates that from 1999 to 2009 elk and cow use was low. Estimated deer use was moderate in 1999 and 2004 and high in 2009 (Tables – Pellet Group Data). This area is recognized as a key wintering area for deer and has a rest rotation grazing system.

Browse: The key browse species are mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*Artemisia nova*) under an overstory of mature pinyon pine and Utah juniper. Combined sagebrush cover has ranged from 42% to 52% cover from 1994 to 2009 (Table - Browse Trends). Crispleaf buckwheat (*Eriogonum corymbosum*), serviceberry (*Amelanchier utahensis*) and winterfat (*Ceratoides lanata*) are other preferred species found on site. Point centered quarter density estimated an average of 90 pinyon trees/acre from 1999 to 2009 and fewer than 26 juniper trees/acre in the same period (Table - Point-Quarter Data).

Herbaceous Understory: Grass cover has decreased since 1999 while the sum of nested frequency has decreased since the initial reading in 1994. In 2009, the grass component was predominantly composed of Mutton bluegrass (*Poa fendleriana*) and blue grama (*Bouteloua gracilis*). In past years, Salina wildrye (*Elymus salina*) and Kentucky bluegrass (*Poa pratensis*) dominated the understory. The forb understory has decreased since 1994. No one species was dominant, but the forb species are diverse (Table - Herbaceous Trends).

Soil: The rocky soil was classified as a clay loam with a neutral pH (7.3). Soil phosphorus is low at 4.6 ppm and may have low availability for plant growth and development (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare soil average 31% of cover over all sample years (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and slight in 2009 due to pedestalling and gully formation and the attendant movement of soil, rock, and litter.

Trend Assessments

Browse:

- **1994 to 1999 - stable (0):** The black sagebrush component improved slightly while the mountain big sagebrush component is down slightly. Black sagebrush density increased 13% to 4,680 plants/acre while decadence improved to 15% and recruitment of young is good at 19%. Mountain big sagebrush density remained similar while decadence increased slightly to 13% and recruitment of young decreased from 36% to 7%. Crispleaf buckwheat, Utah serviceberry, and winterfat density remained similar to the past reading.
- **1999 to 2004 – down (-2):** Black sagebrush density is similar to the past reading as are decadence and recruitment rates. Mountain big sagebrush density decreased 26% to 1,000 plants/acre while decadence is low and recruitment fair at 14%. Crispleaf buckwheat, Utah serviceberry, and winterfat density decreased 38% in the same period.
- **2004 to 2009 – slightly down (-1):** Black sagebrush density increased 41% to 6,920 plants/acre while decadence is low at 14% and recruitment of young is good at 20%. Mountain big sagebrush density decreased 44% to 560 plants/acre and decadence increased to 29%, however, recruitment is good at 18%. Crispleaf buckwheat, Utah serviceberry, and winterfat density decreased 22% in the same period.

Grass:

- **1994 to 1999 – slightly down (-1):** The sum of nested frequency for perennial grasses decreased 19% while cover increased from 9% to 12%. Salina wildrye and Kentucky bluegrass accounted for 85% of grass cover.
- **1999 to 2004 - down (-2):** The sum of nested frequency for perennial grasses decreased 20% while cover decreased to 6%. Salina wildrye and Kentucky bluegrass provided 83% of grass cover.
- **2004 to 2009 – slightly down (-1):** The sum of nested frequency for perennial grasses decreased 9% and cover was 5%. The dominant species were mutton bluegrass and blue grama, accounting for 21% of grass cover. Only mutton bluegrass provided more than 1% cover.

Forb:

- **1994 to 1999 – slightly down (-1):** The sum of nested frequency for perennial forbs decreased 16% while cover increased from 2% to 4%, due predominantly to dandelion (*Taraxacum officinale*).
- **1999 to 2004 - down (-2):** The sum of nested frequency for perennial forbs decreased 25% while cover decreased to 2%. No one species provided 1% cover or more.
- **2004 to 2009 – slightly down (-1):** The sum of nested frequency was similar to the past reading, but cover decreased to below 1% and only 13 species were sampled.

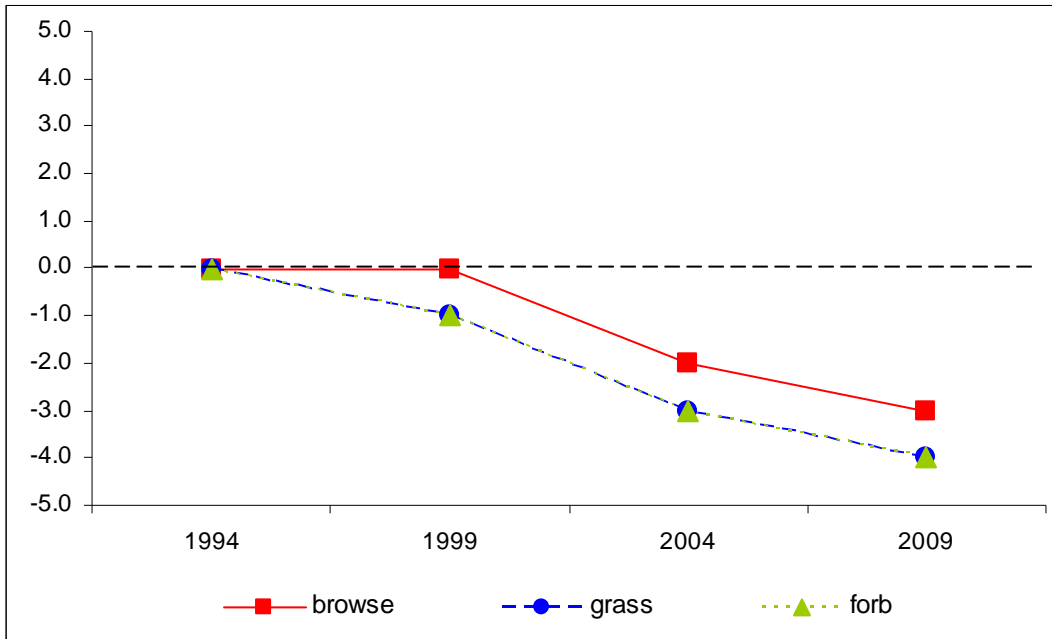
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 25B, study no: 4

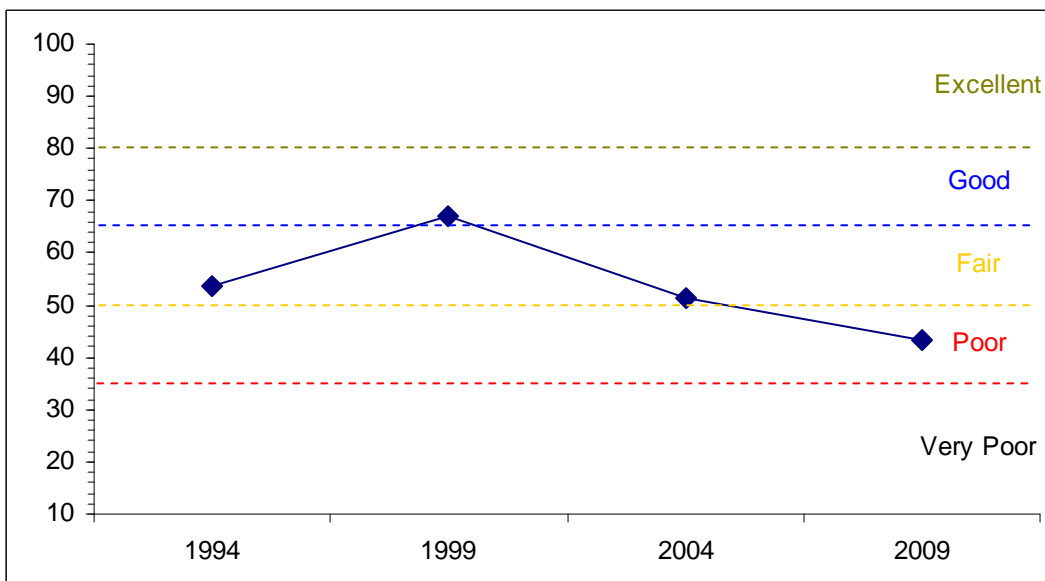
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	11.5	11.0	8.8	18.3	0.0	4.0	0.0	53.6	Fair
99	17.4	10.8	6.5	23.5	0.0	8.8	0.0	67.0	Good
04	17.0	11.8	7.2	11.5	0.0	3.8	0.0	51.3	Poor-Fair
09	12.8	9.5	9.7	9.9	0.0	1.5	0.0	43.5	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25B Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 25B, Study no: 4



HERBACEOUS TRENDS--
Management unit 25B, Study no: 4

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	-	1	11	4	-	.00	.36	.03
G	Agropyron spicatum	-	4	-	-	-	.03	-	-
G	Bouteloua gracilis	b56	ab35	a23	ab41	.78	1.45	.53	.89
G	Carex sp.	23	16	18	18	.16	.12	.31	.36
G	Elymus salina	c201	bc168	b135	a74	5.25	4.33	3.33	.66
G	Festuca ovina	10	3	-	-	.18	.03	-	-
G	Oryzopsis hymenoides	b16	a3	b21	ab3	.09	.15	.07	.07
G	Poa fendleriana	a-	a6	a4	b34	-	.06	.18	1.40
G	Poa pratensis	b65	b76	a25	a14	2.55	5.40	.60	.42
G	Poa secunda	7	-	3	8	.01	-	.03	.39
G	Sitanion hystrix	11	12	18	2	.05	.12	.11	.00
G	Stipa columbiana	4	-	-	-	.03	-	-	-
G	Stipa comata	a6	a-	a2	b39	.03	-	.18	.71
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		399	324	260	237	9.16	11.73	5.73	4.97
Total for Grasses		399	324	260	237	9.16	11.73	5.73	4.97
F	Achillea millefolium	-	-	4	-	-	-	.09	-
F	Androsace septentrionalis (a)	-	2	-	-	-	.00	-	-
F	Antennaria rosea	5	5	5	5	.15	.38	.15	.03
F	Arabis demissa	-	5	-	3	-	.01	-	.00
F	Artemisia ludoviciana	3	4	3	-	.03	.15	.00	-
F	Aster sp.	a5	ab18	b39	ab27	.01	.36	.76	.25
F	Astragalus convallarius	6	6	1	1	.01	.04	.03	.00
F	Astragalus miser	-	1	2	3	-	.00	.00	.00
F	Astragalus sp.	11	1	3	-	.02	.00	.01	-
F	Castilleja linariaefolia	a7	a3	a8	b33	.02	.03	.10	.26
F	Cirsium sp.	9	9	9	8	.07	.22	.18	.02
F	Cryptantha sp.	11	3	3	3	.05	.04	.03	.02
F	Cymopterus sp.	-	-	4	-	-	-	.03	-
F	Erigeron pumilus	b18	ab4	a-	a-	.03	.01	-	-
F	Eriogonum racemosum	-	-	-	1	-	.00	-	.00
F	Hymenoxys richardsonii	b57	b38	a8	a5	.62	.69	.05	.05
F	Lesquerella sp.	3	-	-	-	.00	-	-	-
F	Machaeranthera canescens	b36	a11	a10	a12	.38	.49	.26	.05
F	Microsteris gracilis (a)	3	-	-	-	.00	-	.00	-
F	Penstemon comarrhenus	-	-	1	-	-	-	.00	-
F	Penstemon sp.	a2	ab4	ab8	b19	.00	.04	.03	.04
F	Phlox longifolia	11	9	9	5	.02	.01	.05	.01
F	Schoenocrambe linifolia	7	-	-	-	.04	-	-	-
F	Senecio multilobatus	-	3	2	-	-	.00	.00	-
F	Sphaeralcea coccinea	4	2	9	-	.01	.03	.06	-
F	Taraxacum officinale	ab18	b52	a3	a-	.49	1.85	.03	-
F	Tragopogon dubius	-	-	4	-	-	-	.00	-

Type	Species	Nested Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
F	Unknown forb-perennial	-	1	-	-	-	.00	-	-
	Total for Annual Forbs	3	2	0	0	0.00	0.00	0.00	0
	Total for Perennial Forbs	213	179	135	125	2.00	4.40	1.92	0.76
	Total for Forbs	216	181	135	125	2.00	4.41	1.92	0.76

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

BROWSE TRENDS--

Management unit 25B, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Amelanchier utahensis	9	5	8	5	.63	.03	.00	.03
B	Artemisia frigida	1	1	0	0	.00	.00	-	-
B	Artemisia nova	39	57	55	68	4.28	6.84	7.03	7.18
B	Artemisia tridentata vaseyana	24	32	32	18	3.94	6.73	6.41	3.04
B	Atriplex canescens	0	0	0	1	-	-	-	.00
B	Ceratoides lanata	9	10	7	15	.21	.33	.19	.02
B	Cercocarpus montanus	0	0	0	1	-	-	-	.00
B	Chrysothamnus nauseosus	17	18	14	16	2.23	3.11	2.32	.87
B	Chrysothamnus viscidiflorus viscidiflorus	50	42	47	31	2.21	1.47	4.39	.67
B	Coryphantha vivipara arizonica	0	1	0	0	-	.00	-	-
B	Eriogonum corymbosum	22	21	23	38	.88	1.17	1.48	1.85
B	Gutierrezia sarothrae	53	49	39	29	1.27	1.00	1.52	.21
B	Juniperus osteosperma	0	1	1	1	.15	.15	.03	.38
B	Opuntia sp.	2	2	1	1	.01	.00	.00	.00
B	Pediocactus simpsonii	0	2	1	1	-	.03	.00	.01
B	Pinus edulis	0	13	12	10	3.49	4.09	6.13	7.96
B	Symphoricarpos oreophilus	5	8	9	3	.16	.48	.74	.15
B	Tetradymia canescens	14	17	15	13	.10	.24	.93	.09
B	Yucca harrimaniae	0	2	3	0	-	.18	.00	-
	Total for Browse	245	281	267	251	19.60	25.92	31.19	22.50

CANOPY COVER, LINE INTERCEPT--

Management unit 25B, Study no: 4

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	1.60	.93	-
Artemisia nova	-	9.69	8.96
Artemisia tridentata vaseyana	-	8.16	4.81
Ceratoides lanata	-	.50	.20
Chrysothamnus nauseosus	-	4.66	2.46
Chrysothamnus viscidiflorus viscidiflorus	-	5.30	.55
Eriogonum corymbosum	-	1.98	.91
Gutierrezia sarothrae	-	.58	.11
Opuntia sp.	-	-	.01
Pinus edulis	8.39	9.25	11.66
Symphoricarpos oreophilus	-	1.76	.05
Tetradymia canescens	-	1.06	.05
Yucca harrimaniae	-	.50	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25B, Study no: 4

Species	Average leader growth (in)	
	'04	'09
Amelanchier utahensis	5.2	2.1
Artemisia tridentata vaseyana	1.4	1.2

POINT-QUARTER TREE DATA--

Management unit 25B, Study no: 4

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	27	24	26	2.9	3.2	2.8
Pinus edulis	82	97	90	2.1	1.9	2.0

BASIC COVER--

Management unit 25B, Study no: 4

Cover Type	Average Cover %			
	'94	'99	'04	'09
Vegetation	27.32	38.12	37.22	28.33
Rock	5.05	2.79	4.19	2.97
Pavement	4.77	10.95	16.01	13.52
Litter	29.63	31.77	30.99	30.96
Cryptogams	.30	.43	.68	.68
Bare Ground	31.40	29.84	28.35	33.97

SOIL ANALYSIS DATA --

Management unit 25B, Study no: 4, Study Name: Solomon Basin

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.7	7.3	44.2	20.2	35.6	2	4.6	208	0.5

PELLET GROUP DATA--

Management unit 25B, Study no: 4

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	5	12	6	19
Elk	-	1	-	6
Deer	11	6	11	8
Cattle	1	9	3	6
Moose	-	-	-	-

Days use per acre (ha)		
'99	'04	'09
-	-	-
1 (2)	9 (23)	8 (20)
19 (47)	28 (69)	45 (111)
42 (104)	11 (27)	14 (34)
-	1 (2)	-

BROWSE CHARACTERISTICS--

Management unit 25B, Study no: 4

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
94	280	7	93	0	-	7	7	0	33/42
99	120	17	33	50	40	33	0	33	50/57
04	200	30	60	10	-	20	60	10	57/55
09	100	40	20	40	-	0	60	40	59/64
<i>Artemisia frigida</i>									
94	40	0	100	-	-	0	0	0	1/2
99	20	0	100	-	-	0	0	0	2/6
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Artemisia nova</i>									
94	4140	3	75	22	40	5	.48	6	10/16
99	4680	19	66	15	180	22	3	.42	8/17
04	4880	15	74	11	440	0	0	8	9/19
09	6920	20	65	14	300	17	.86	4	8/18
<i>Artemisia tridentata vaseyana</i>									
94	1500	36	57	7	-	1	0	4	19/28
99	1360	7	79	13	-	18	3	3	23/36
04	1000	14	76	10	4580	18	2	4	24/40
09	560	18	54	29	120	36	18	21	16/27
<i>Atriplex canescens</i>									
94	0	0	0	-	-	0	0	0	28/23
99	0	0	0	-	-	0	0	0	37/32
04	0	0	0	-	-	0	0	0	-/-
09	20	0	100	-	-	0	0	0	6/11
<i>Ceratoides lanata</i>									
94	380	0	100	0	-	58	26	0	6/6
99	460	13	78	9	40	22	74	0	4/7
04	380	0	89	11	-	5	89	5	7/8
09	960	13	88	0	-	50	13	0	4/4

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Cercocarpus montanus									
94	0	0	0	-	-	0	0	0	15/24
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	20	0	100	-	-	0	100	0	-/-
Chrysothamnus depressus									
94	0	0	0	-	-	0	0	0	6/12
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
Chrysothamnus nauseosus									
94	640	6	91	3	20	0	3	0	27/29
99	820	15	71	15	-	0	0	7	34/39
04	460	4	78	17	-	0	0	13	32/34
09	640	13	84	3	-	19	9	0	33/35
Chrysothamnus viscidiflorus viscidiflorus									
94	2720	7	81	12	-	3	2	5	9/16
99	2020	16	66	18	20	0	0	6	12/16
04	3940	9	86	5	40	3	0	6	12/16
09	1360	10	60	29	-	4	0	26	5/9
Coryphantha vivipara arizonica									
94	0	0	0	-	-	0	0	0	-/-
99	20	0	100	-	-	0	100	0	1/4
04	0	0	0	-	-	0	0	0	2/3
09	0	0	0	-	-	0	0	0	-/-
Eriogonum corymbosum									
94	2660	13	87	0	40	40	24	0	4/8
99	2100	22	66	12	-	20	11	2	9/16
04	2120	15	84	1	-	14	37	0	9/16
09	3960	8	91	1	-	40	8	0	5/11
Gutierrezia sarothrae									
94	4280	11	87	2	40	0	0	0	6/5
99	4020	10	90	0	100	0	.49	0	7/7
04	2280	9	91	0	-	0	0	0	8/8
09	1100	2	98	0	-	0	0	5	5/5
Juniperus osteosperma									
94	0	0	0	-	-	0	0	0	-/-
99	20	100	0	-	-	0	0	0	-/-
04	20	100	0	-	-	0	0	0	-/-
09	20	100	0	-	-	100	0	100	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Opuntia</i> sp.									
94	40	0	100	-	-	0	0	0	1/2
99	40	0	100	-	-	0	0	0	-/-
04	20	0	100	-	-	0	0	0	4/15
09	20	0	100	-	-	0	0	0	-/-
<i>Pediocactus simpsonii</i>									
94	0	0	0	-	-	0	0	0	2/3
99	40	0	100	-	-	0	0	0	2/3
04	20	0	100	-	-	0	0	0	1/2
09	20	0	100	-	-	0	0	0	1/4
<i>Pinus edulis</i>									
94	0	0	0	-	-	0	0	0	-/-
99	280	93	7	-	140	0	0	0	-/-
04	280	57	43	-	80	0	0	0	-/-
09	260	23	77	-	100	0	0	0	-/-
<i>Ribes</i> sp.									
94	0	0	0	-	-	0	0	0	26/35
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-
<i>Symphoricarpos oreophilus</i>									
94	120	0	100	0	-	0	17	0	15/23
99	280	21	71	7	40	7	0	7	16/28
04	300	40	53	7	-	0	0	7	16/25
09	180	11	89	0	-	0	78	0	5/14
<i>Tetradymia canescens</i>									
94	520	12	85	4	-	0	0	8	10/17
99	580	21	59	21	40	14	3	7	10/15
04	660	39	55	6	-	6	0	0	11/18
09	480	8	79	13	60	8	8	8	5/7
<i>Yucca harrimaniae</i>									
94	0	0	0	-	-	0	0	0	-/-
99	180	0	100	-	-	0	0	0	13/16
04	240	17	83	-	-	0	0	0	7/12
09	0	0	0	-	-	0	0	0	-/-

POLK CREEK - TREND STUDY NO. 25B-5-09

Vegetation Type: Mixed Mountain Brush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,400 ft (2,560 m)
Aspect: Northeast
Slope: 0%-10%
Transect bearing: 165 degrees magnetic
Belt placement: line 1 (11& 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

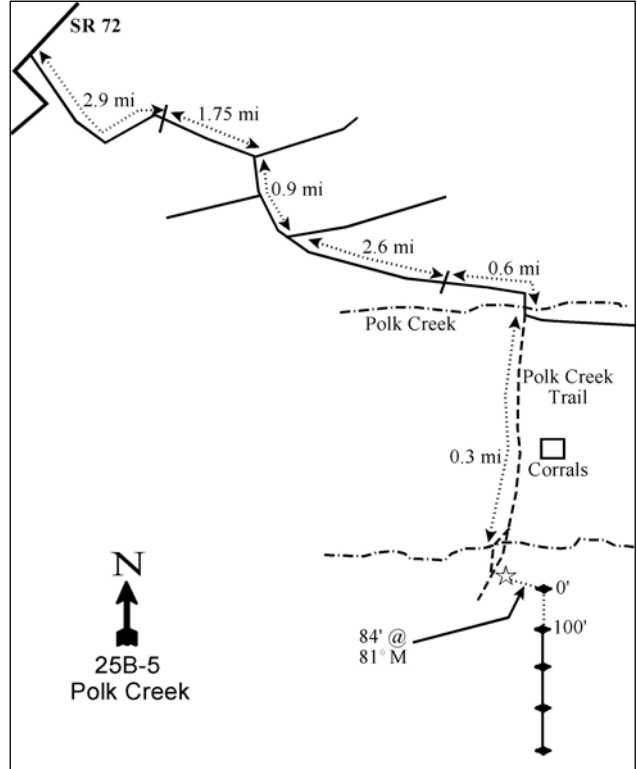
Directions:

Travel north from Fremont on SR 72 for 7.3 miles to the Elkhorn-Torrey Road. Turn right and go 2.9 miles to a cattleguard. From the cattleguard go 1.75 miles to an intersection by Heart Lake. Take the right fork (#206) and go 0.4 miles toward Cathedral Valley. At the intersection, turn left (#22) toward Cathedral Valley. Proceed 0.5 miles to another fork (Round Lake turnoff). Stay right and go 2.6 miles to a cattleguard. From the cattleguard, proceed 0.6 miles down to Polk Creek. Immediately after crossing the creek, turn right on the Polk Creek Trail. Go 0.3 miles past a camp and some corrals on your left to another creek. Cross the creek, then look 110 feet beyond the creek (along the left fork of the road) for a steel rebar witness post on the left side of the road. The frequency baseline of the study starts 84 feet east (81°M) of the witness post. The 0-foot baseline stake has a red browse tag #7060 attached.

Map Name: Flat Top, Utah



Diagrammatic Sketch:



Township: 27S, Range: 5E, Section: 7

GPS: NAD 83, UTM 12S 463910 E 4257980 N

POLK CREEK - TREND STUDY NO. 25B-5

Site Information

Site Description: This study is located on the east side of Thousand Lake Mountain on a flat and gentle slope. This part of a three pasture, rest-rotation grazing allotment. Black sagebrush (*Artemisia nova*) and antelope bitterbrush (*Purshia tridentata*) are the most common browse species. Pellet group data estimates cattle use has been low in each sample year while deer use has increased from moderate use in 1999 to very heavy use in 2009. Estimated elk use has been consistently low in all readings (Table - Pellet Group Data).

Browse: A variety of browse species are present with black sagebrush and bitterbrush being the key species. Bitterbrush densities have increased overall since 1985, even with a change in density estimation methods in 1994. Black sagebrush density has remained fairly constant, averaging 7,822 plants/acre from 1985 to 2009. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has a small, but increasing density from 265 plants/acre in 1991 to 680 plants/acre in 2009 (Table - Browse Characteristics). Pinyon pine (*Pinus edulis*) densities, as estimated by the point centered quarter method, have increased from 199 trees/acre in 1999 to 244 trees/acre in 2009. Utah juniper (*Juniperus osteosperma*) density has also increased, albeit more slowly, from 46 trees/acre in 1999 to 57 trees/acre in 2009 (Table - Point-Quarter Tree Data). Canopy cover as of 2009 was a combined 9% for pinyon and juniper, up from 7% in 2004 (Table - Canopy Cover).

Herbaceous Understory: Grass species are varied, but have only fair production. The most common species have been blue grama (*Bouteloua gracilis*), a sedge (*Carex* sp.), bottlebrush squirreltail (*Sitanion hystrix*), and needle and thread (*Stipa comata*). As of 2009, blue grama has become the dominant grass species, providing 49% of grass cover, whereas the sedge and bottlebrush squirreltail had been the dominant species. Perennial grass cover has fluctuated between 5% and 9% since 1994. The forb community is diverse though not abundant. Since 1994, only two forb species have provided more than 1% cover. Perennial forb cover has generally been between 1% and 2% with a spike of 5% in 1999.

Soil: The soil was classified as a sandy clay loam with a neutral pH (6.8) (Table - Soil Analysis Data). The soil erosion condition was classified as stable in 2004, with some erosion occurring. The erosion condition was slight in 2009 due to flow patterns and soil rock movement.

Trend Assessments

Browse:

- **1985 to 1991 – slightly up (+1):** Bitterbrush density increased 64% from 1,865 plants/acre to 3,065 plants/acre, but decadence increased from 4% to 37%. Recruitment of young bitterbrush plants decreased from 36% to only 9% of the population. The black sagebrush density increased 10%, and recruitment of young plants increased from 9% to 21%. Mountain big sagebrush was sampled for the first time at a density of 265 plants/acre.
- **1991 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. Bitterbrush decadence decreased to 3%, but no young plants were sampled. Black sagebrush decadence was still high at 34% and recruitment of young plants decreased to only 5% of the population.
- **1994 to 1999 – slightly down (-1):** Bitterbrush density decreased 27% to 1,840 plants/acre, but decadence remained low and recruitment of young plants increased to 10%. Black sagebrush density was unchanged as was the amount of decadence, meanwhile recruitment had improved to 16%. Mountain big sagebrush increased three-fold to 300 plants/acre with low decadence at 7%, and good recruitment of young plants at 33%.
- **1999 to 2004 – slightly up (+1):** Bitterbrush density increased 61% to 2,980 plants/acre and decadence was fair at 15%. No young bitterbrush plants were recruited. Black sagebrush density decreased 22% to 7,120 plants/acre while decadence was similar to past years at 31% and recruitment

was fair at 11%. Mountain big sagebrush density increased 20% to 360 plants/acre. Decadence was moderate at 22%.

- **2004 to 2009 - slightly up (+1):** Bitterbrush density increased 16% to 3,460 plants/acre, though decadence was high at 39% and recruitment low at 1%. Black sagebrush density remained similar to the last reading while decadence is moderate at 17% and recruitment of young plants was good at 23%. Despite the increase in density of bitterbrush and black sagebrush, both species decreased in cover. Mountain big sagebrush density increased 88% to 680 plants/acre, decadence was low at 9% and recruitment was good at 35%.

Grass:

- **1985 to 1991 - stable (0):** The sum of nested frequency for perennial grasses remained similar. Sedge and bottlebrush squirreltail were the most frequent species.
- **1991 to 1994 – down (-2):** The sum of nested frequency for perennial grasses decreased 31%. Bottlebrush squirreltail, sedge and blue grama were the most common species, providing 86% of grass cover.
- **1994 to 1999 - stable (0):** The sum of nested frequency for perennial grasses was similar to the past reading although cover has nearly doubled from 5% to 9%. Sedge and bottlebrush squirreltail were the most common species again, accounting for 66% of grass cover.
- **1999 to 2004 – slightly down (-1):** The nested frequency of perennial grasses had decreased 13% while cover was still at 9%. Sedge and squirreltail bottlebrush were the most common species and provide 62% of grass cover.
- **2004 to 2009 - down (-2):** The nested frequency of perennial grasses decreased 10% and cover decreased to 6%. The more productive grasses have decreased and blue grama was the most common species and provides 49% of grass cover.

Forb:

- **1985 to 1991 – slightly down (-1):** The sum of nested frequency for perennial forbs decreased 11%. The forbs were diverse, but no one species was dominant.
- **1991 to 1994 – slightly down (-1):** The sum of nested frequency for perennial forbs decreased 11%. Forb cover was low at 2%.
- **1994 to 1999 - up (+2):** The sum of nested frequency for perennial forbs increased 35% and cover increased to 5%. Lobeleaf groundsel (*Senecio multilobatus*) and thorn skeletonplant (*Lygodesmia spinosa*) provided 55% of forb cover.
- **1999 to 2004 - down (-2):** The sum of nested frequency for perennial forbs decreased 53% and cover dropped to 2%. No one species provided 1% or more cover.
- **2004 to 2009 - down (-2):** The sum of nested frequency for perennial forbs decreased 26% and cover fell below 1%.

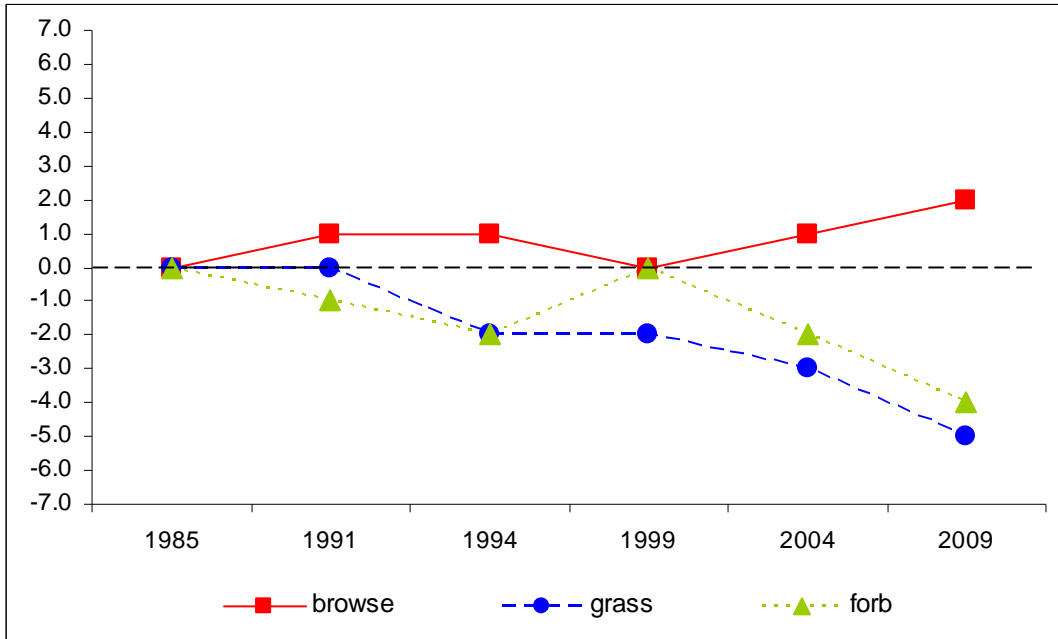
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 25B, study no: 5

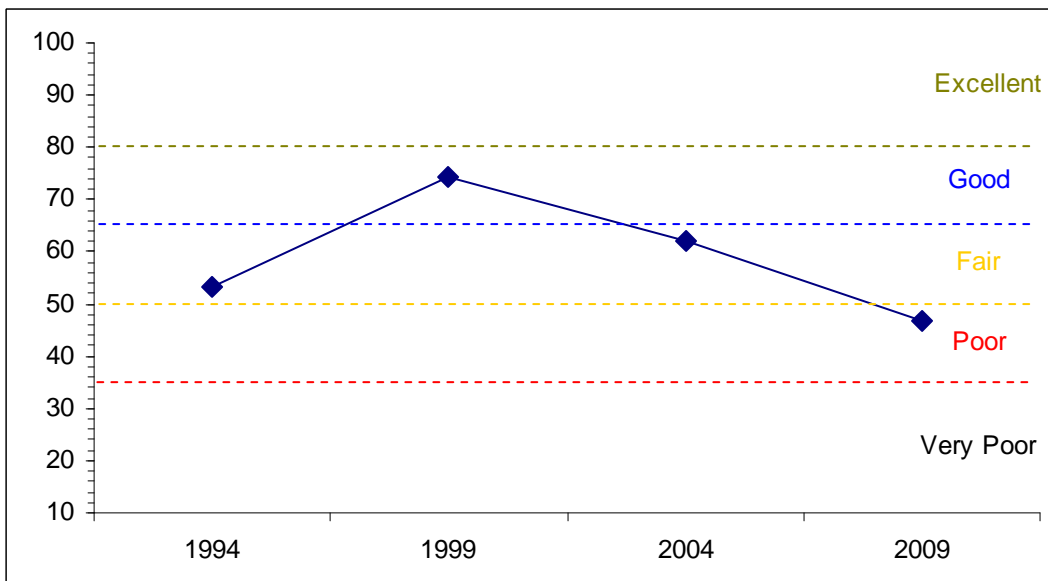
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	30.0	8.6	1.5	9.5	0.0	3.9	0.0	53.4	Fair
99	30.0	8.8	6.7	18.7	0.0	10.0	0.0	74.2	Good
04	30.0	8.6	2.6	17.4	0.0	3.4	0.0	62.0	Fair
09	24.4	5.5	4.0	11.1	0.0	1.7	0.0	46.8	Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25B Study no: 5



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
Management unit 25B, Study no: 5



HERBACEOUS TRENDS--
Management unit 25B, Study no: 5

Type	Species	Nested Frequency						Average Cover %			
		'85	'91	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron smithii	a-	a-	a ³	b ¹⁶	ab ⁴	ab ⁹	.03	.13	.07	.08
G	Bouteloua gracilis	abc ¹⁰⁶	bc ¹⁰⁵	c ¹⁰⁶	ab ⁷²	a ⁶¹	abc ⁸⁹	1.81	1.50	1.33	2.70
G	Carex sp.	c ¹⁷⁶	c ¹⁸⁶	ab ⁸⁶	b ¹⁰²	ab ⁹¹	a ⁵⁷	1.01	3.33	2.84	1.00
G	Festuca ovina	-	-	-	9	5	-	-	.21	.02	-
G	Oryzopsis hymenoides	-	-	-	-	-	2	-	-	.00	.15
G	Poa fendleriana	b ³²	ab ²⁰	b ³⁵	ab ⁷	a ⁶	ab ²⁰	.51	.10	.07	.19
G	Sitanion hystrix	cd ¹⁵²	d ¹⁸⁰	bc ¹¹³	ab ⁹⁹	b ¹⁰²	a ⁵⁸	1.26	2.81	2.57	.83
G	Sporobolus cryptandrus	-	-	7	-	-	-	.04	-	-	-
G	Stipa comata	abc ⁷	a ⁵	ab ⁷	bc ³²	abc ³⁰	c ³⁵	.04	.94	1.77	.58
G	Stipa lettermani	-	-	-	5	-	-	-	.30	-	-
G	Stipa sp.	a-	b ¹⁸	a-	a-	a-	a-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		473	514	357	342	299	270	4.73	9.34	8.71	5.55
Total for Grasses		473	514	357	342	299	270	4.73	9.34	8.71	5.55
F	Alyssum alyssoides (a)	-	-	-	-	2	-	-	-	.00	-
F	Androsace septentrionalis (a)	-	-	-	1	1	-	-	.00	.03	-
F	Antennaria parvifolia	b ⁶	a ¹	a-	a-	a-	a-	-	-	-	-
F	Antennaria rosea	-	-	3	-	1	1	.01	-	.03	.00
F	Arabis demissa	12	11	2	15	3	-	.00	.17	.04	-
F	Artemisia dracunculus	-	-	-	-	1	-	-	-	.00	-
F	Artemisia ludoviciana	4	6	-	1	-	-	-	.00	-	-
F	Aster sp.	-	8	-	3	7	10	-	.00	.07	.02
F	Astragalus convallarius	3	-	-	-	-	-	-	-	-	-
F	Astragalus sp.	4	-	7	-	2	-	.01	-	.03	-
F	Castilleja chromosa	-	5	1	-	-	-	.00	-	-	-
F	Chaenactis douglasii	6	5	1	-	2	-	.00	-	.00	-
F	Chenopodium album (a)	-	-	-	2	-	-	-	.00	-	-
F	Comandra pallida	ab ¹³	ab ⁷	b ¹⁶	ab ¹⁴	a-	a ³	.18	.42	-	.00
F	Cryptantha sp.	a ¹⁵	a ¹⁴	b ⁴⁰	a ¹⁴	a ⁶	a ²	.32	.07	.04	.01
F	Cymopterus sp.	-	4	-	-	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	-	9	-	-	-	.02	-	-
F	Erigeron pumilus	b ³⁷	ab ¹⁵	ab ²¹	ab ¹⁶	a ⁷	a ⁸	.10	.11	.02	.01
F	Eriogonum alatum	-	3	-	7	8	-	-	.12	.12	-
F	Eriogonum cernuum (a)	-	-	1	-	-	-	.00	-	-	-
F	Eriogonum racemosum	24	22	17	28	18	19	.04	.53	.27	.13
F	Gayophytum ramosissimum(a)	-	-	1	7	2	-	.00	.06	.01	-
F	Hymenoxys richardsonii	ab ⁹	a ⁵	b ²⁴	ab ¹⁴	a ³	a ⁶	.41	.45	.03	.10
F	Lepidium sp. (a)	-	-	-	8	2	-	-	.02	.00	-
F	Lithospermum incisum	-	-	-	-	-	-	.00	-	-	-
F	Lupinus argenteus	1	-	-	-	-	-	-	-	-	-
F	Lygodesmia spinosa	b ⁵⁵	b ⁵⁸	ab ³²	a ²⁴	a ²⁴	a ²⁶	.70	1.16	.71	.49
F	Machaeranthera canescens	a ³	ab ⁸	a ⁵	b ²⁵	a ²	a ⁵	.04	.20	.03	.01
F	Microsteris gracilis (a)	-	-	-	-	12	-	-	-	.04	-

Type	Species	Nested Frequency					Average Cover %				
		'85	'91	'94	'99	'04	'09	'94	'99	'04	'09
F	Oenothera sp.	-	-	1	-	-	-	.00	-	-	-
F	Penstemon humilis	-	1	3	3	4	6	.03	.03	.03	.04
F	Phlox longifolia	9	24	10	14	4	-	.03	.06	.01	-
F	Polygonum douglasii (a)	-	-	3	1	3	3	.01	.00	.00	.00
F	Potentilla sp.	-	1	-	-	-	-	-	-	-	-
F	Senecio multilobatus	_b 25	_a 1	_a 1	_c 62	_b 19	_a 1	.00	1.71	.19	.03
F	Sphaeralcea coccinea	3	-	1	3	2	-	.03	.03	.03	-
F	Taraxacum officinale	-	5	-	3	-	-	-	.00	-	-
F	Tragopogon dubius	-	3	-	3	4	-	-	.00	.01	-
F	Unknown forb-perennial	2	-	-	-	-	-	-	-	-	-
F	Zigadenus paniculatus	1	-	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	5	28	22	3	0.01	0.12	0.10	0.00
Total for Perennial Forbs		232	207	185	249	117	87	1.94	5.10	1.70	0.87
Total for Forbs		232	207	190	277	139	90	1.96	5.23	1.80	0.87

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

BROWSE TRENDS--

Management unit 25B, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia nova	98	95	91	85	15.72	14.35	9.55	5.26
B	Artemisia tridentata vaseyana	3	10	14	18	.53	.84	.93	.16
B	Ceratoides lanata	2	2	2	2	.00	.00	.00	.00
B	Chrysothamnus depressus	15	15	24	13	.12	.15	.40	.19
B	Chrysothamnus nauseosus	9	10	16	8	.72	.09	.71	.07
B	Chrysothamnus viscidiflorus lanceolatus	54	46	46	37	1.80	1.43	1.33	1.31
B	Coryphantha vivipara arizonica	0	0	1	0	-	-	.00	-
B	Gutierrezia sarothrae	23	16	41	27	.10	.16	1.71	.70
B	Juniperus osteosperma	0	2	3	2	-	.63	.15	.38
B	Opuntia sp.	4	4	4	6	.18	.15	.15	.18
B	Pediocactus simpsonii	0	3	8	3	-	.00	.00	.01
B	Pinus edulis	0	13	19	16	4.33	5.49	7.28	8.61
B	Purshia tridentata	47	47	48	51	10.00	15.23	13.23	11.61
B	Symphoricarpos oreophilus	5	7	5	6	.00	.41	.38	.16
B	Tetradymia canescens	20	28	25	24	.44	.79	.85	.22
B	Yucca sp.	0	0	1	0	-	-	.03	-
Total for Browse		280	298	348	298	33.96	39.76	36.74	28.90

CANOPY COVER, LINE INTERCEPT--

Management unit 25B, Study no: 5

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	9.26	7.05
Artemisia tridentata vaseyana	-	.63	1.23
Chrysothamnus depressus	-	.70	.31
Chrysothamnus nauseosus	-	1.41	.76
Chrysothamnus viscidiflorus lanceolatus	-	2.75	2.36
Gutierrezia sarothrae	-	1.25	.46
Juniperus osteosperma	-	1.46	.66
Opuntia sp.	-	.48	.03
Pinus edulis	5.00	12.68	14.73
Purshia tridentata	-	18.33	16.70
Symphoricarpos oreophilus	-	.75	.76
Tetradymia canescens	-	.61	.38
Yucca sp.	-	.03	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25B, Study no: 5

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	1.3	0.8
Artemisia tridentata vaseyana	3.7	1.3
Purshia tridentata	5.3	1.1

POINT-QUARTER TREE DATA--

Management unit 25B, Study no: 5

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	46	51	57	2.0	2.1	2.6
Pinus edulis	199	236	244	2.5	2.8	3.2
Pinus ponderosa	19	<18	<18	5.9	-	-

BASIC COVER--

Management unit 25B, Study no: 5

Cover Type	Average Cover %					
	'85	'91	'94	'99	'04	'09
Vegetation	8.75	11.00	38.57	48.68	42.66	39.00
Rock	4.75	6.25	17.39	18.85	18.57	17.08
Pavement	17.25	7.75	9.53	8.58	10.69	9.17
Litter	54.25	53.50	30.89	43.84	38.29	44.44
Cryptogams	0	.75	.05	.15	.11	.07
Bare Ground	15.00	20.75	13.78	8.48	9.40	11.02

SOIL ANALYSIS DATA --

Management unit 25B, Study no: 5, Study Name: Polk Creek

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.2	6.8	53.8	22.5	23.6	2.2	12.7	198.4	0.5

PELLET GROUP DATA--

Management unit 25B, Study no: 5

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'99	'04	'09	'99	'04	'09
Rabbit	23	32	15	23	-	-	-
Elk	7	2	3	7	1 (2)	5 (12)	8 (17)
Deer	23	9	23	24	20 (49)	66 (162)	70 (174)
Cattle	4	7	-	1	7 (18)	6 (14)	2 (5)
Moose	-	-	-	-	-	1 (2)	-

BROWSE CHARACTERISTICS--

Management unit 25B, Study no: 5

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Artemisia nova									
85	6731	9	54	37	933	46	22	14	7/9
91	7465	21	45	34	133	29	2	13	8/14
94	9120	5	61	34	5120	7	0	9	10/21
99	9160	16	50	33	800	20	2	11	11/19
04	7120	11	58	31	2620	8	0	19	9/16
09	7340	23	60	17	60	2	.81	11	8/14
Artemisia tridentata vaseyana									
85	0	0	0	0	-	0	0	0	-/-
91	265	0	25	75	-	0	0	0	11/7
94	100	0	100	0	-	0	0	0	21/30
99	300	33	60	7	40	7	0	0	20/27
04	360	22	56	22	620	22	0	11	15/20
09	680	35	56	9	-	9	0	0	12/16
Ceratoides lanata									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
94	60	0	100	0	-	0	0	0	6/4
99	100	0	80	20	-	20	80	0	5/6
04	80	50	25	25	-	0	50	25	5/5
09	60	0	100	0	-	0	0	0	3/1

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Chrysothamnus depressus										
85	1464	5	68	27	-	5	0	5	3/6	
91	2531	13	24	63	-	32	42	11	3/6	
94	420	0	100	0	-	0	0	0	5/10	
99	480	4	96	0	-	21	25	0	4/7	
04	720	0	92	8	-	17	42	8	7/11	
09	400	5	80	15	-	0	15	10	3/7	
Chrysothamnus nauseosus										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
94	240	0	50	50	-	0	0	8	15/19	
99	220	18	55	27	-	9	9	0	22/28	
04	500	20	52	28	-	16	0	20	17/18	
09	180	0	78	22	20	11	0	11	14/13	
Chrysothamnus viscidiflorus lanceolatus										
85	865	8	92	0	66	0	0	0	7/5	
91	66	0	100	0	-	0	0	0	4/13	
94	2120	5	92	3	60	0	0	0	18/27	
99	1740	5	92	3	120	1	0	1	10/15	
04	2060	14	82	5	60	8	0	3	11/15	
09	1640	4	88	9	-	2	2	10	9/12	
Coryphantha vivipara arizonica										
85	0	0	0	-	-	0	0	0	-/-	
91	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	2/2	
09	0	0	0	-	-	0	0	0	-/-	
Echinocereus sp.										
85	0	0	0	-	-	0	0	0	-/-	
91	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	5/19	
09	0	0	0	-	-	0	0	0	-/-	
Gutierrezia sarothrae										
85	4931	8	78	14	-	1	0	1	6/4	
91	1398	43	52	5	-	19	0	0	4/5	
94	920	52	48	0	100	0	0	0	5/5	
99	580	7	93	0	360	0	0	0	7/8	
04	2820	7	93	0	20	0	0	0	8/9	
09	1820	31	69	0	-	0	0	0	7/7	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Juniperus osteosperma										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	40	100	0	-	-	0	0	0	-/-	
04	60	67	33	-	-	0	0	0	-/-	
09	40	0	100	-	-	0	0	0	-/-	
Opuntia sp.										
85	399	83	17	-	-	0	0	0	1/5	
91	333	0	100	-	-	0	0	0	4/5	
94	120	50	50	-	-	0	17	0	3/6	
99	80	0	100	-	-	0	0	0	5/16	
04	200	20	80	-	-	0	0	0	5/18	
09	440	5	95	-	-	0	0	91	3/7	
Pediocactus simpsonii										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	2/3	
99	60	67	33	-	-	0	0	0	-/-	
04	220	27	73	-	-	0	0	0	3/3	
09	60	0	100	-	-	0	0	0	2/4	
Pinus edulis										
85	332	80	20	-	266	0	0	0	69/128	
91	332	60	40	-	333	0	0	0	81/87	
94	0	0	0	-	-	0	0	0	-/-	
99	260	69	31	-	200	0	0	0	-/-	
04	460	70	30	-	20	0	0	13	-/-	
09	340	53	47	-	40	0	0	0	-/-	
Purshia tridentata										
85	1865	36	61	4	999	36	46	4	13/41	
91	3065	9	54	37	333	33	22	0	7/21	
94	2520	0	97	3	40	2	2	0	12/36	
99	1840	10	80	10	20	30	38	7	15/43	
04	2980	0	85	15	-	43	52	11	16/38	
09	3460	1	60	39	20	17	67	35	13/37	
Rhus trilobata										
85	66	0	100	-	-	100	0	0	12/20	
91	66	0	100	-	-	100	0	0	18/23	
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)	
<i>Symphoricarpos oreophilus</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
94	120	17	83	-	-	0	0	0	13/23	
99	140	0	100	-	-	29	0	0	19/26	
04	140	14	86	-	-	0	0	0	11/21	
09	220	0	100	-	-	27	0	18	14/24	
<i>Tetradymia canescens</i>										
85	864	23	54	23	-	0	0	0	5/4	
91	998	7	67	27	-	27	0	0	7/4	
94	480	8	83	8	-	0	0	4	9/11	
99	700	20	66	14	-	14	3	3	9/10	
04	600	17	73	10	20	23	0	3	10/13	
09	540	7	70	22	-	30	15	15	8/9	
<i>Yucca sp.</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	20	100	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	3/4	

LITTLE DEER PEAK - TREND STUDY NO. 25B-6-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Upland Loam (Wyoming Big Sagebrush), R034XY306UT

Land Ownership: BLM

Elevation: 7,500 ft (2,560 m)

Aspect: Southwest

Slope: 0%-3%

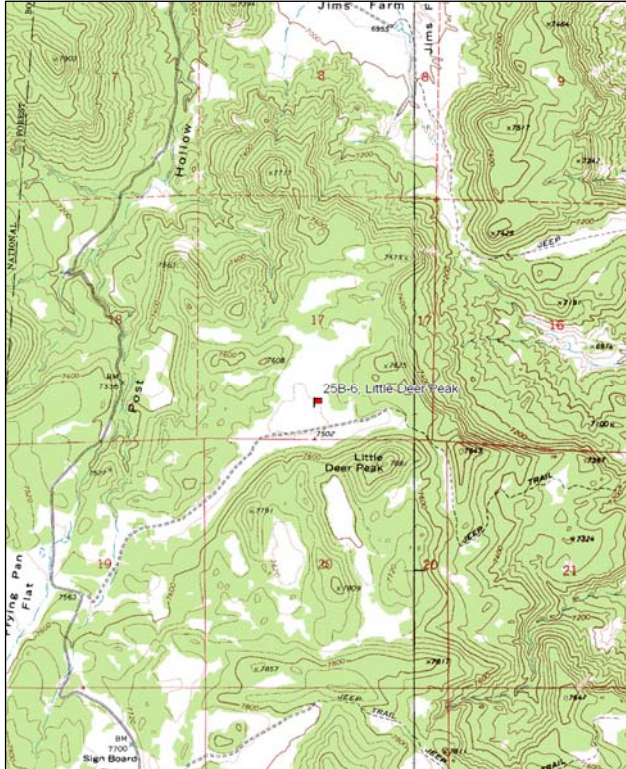
Transect bearing: 160 degrees magnetic

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

Directions:

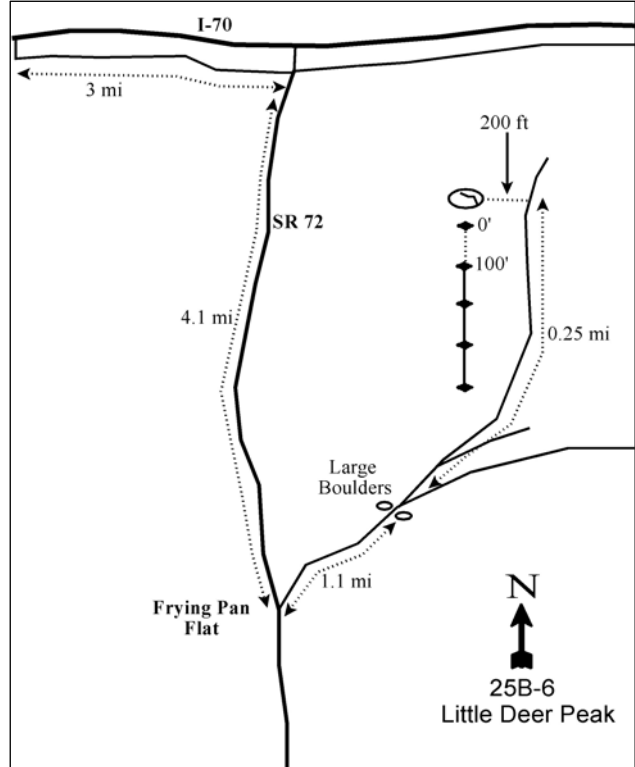
From Salina, go 37.5 miles east on I-70 to a rest area. From the rest area, go approximately 3 miles east on the frontage road to Fremont Junction. Turn south on SR 72 and drive 4.1 miles to a left turn across from Frying Pan Flat. Go left down this road for 1.1 miles to a fork between 2 large boulders. Take the left fork 0.05 miles to another fork. Go left 0.2 miles to a large split boulder which is 200 feet to the left of the road. The 0-foot baseline stake is 15 feet south of the split boulder and has a red browse tag #7082 attached.

Map Name: John's Peak, Utah



Township: 24S, Range: 5E, Section: 17

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 466614 E 4285760 N

LITTLE DEER PEAK - TREND STUDY NO. 25B-6

Site Information

Site Description: This study samples a sagebrush flat surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland. The area is grazed as part of the BLM's Little Deer Peak grazing allotment. Most cool season grasses are gone, replaced by warm season species, perhaps due to grazing pressure. When ungulate use was first estimated using pellet group counts in 1999 the area showed heavy use by elk and deer with light cattle use. Elk use has steadily decreased since the first reading while deer use has fluctuated between moderately high and low. Cattle use has been consistently low (Table - Pellet Group Data).

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the most abundant browse species. Most of the plants are scrubby and stunted, looking similar to black sagebrush (*Artemisia nova*). Sagebrush density has stabilized since nearly halving after the first reading in 1985. Decadence rates have been high each year and may begin to negatively affect the population when combined with low recruitment rates (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are limited to four species, which provide high cover (>10%), however, production is dominated by blue grama (*Bouteloua gracilis*) which has provided 80% or more of grass cover since 1999. Forbs are very limited and have never provided 2% or more cover since 1999 (Table - Herbaceous Trends).

Soil: The soil was classified as a sandy clay loam with a neutral pH (7.3) (Table - Soil Analysis Data). Bare ground has varied between 33%-42% (Table - Basic Cover). Soil erosion condition was classified as stable in 2009, with some flow patterns evident.

Trend Assessments

Browse:

- **1985 to 1991 – slightly down (-1):** Wyoming big sagebrush density declined 47%, however, much of the population consisted of young plants that are easily lost in drought conditions. Decadence was still high at 29% while recruitment of young was low at 5%.
- **1991 to 1999 – stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore trend was determined using other parameters. Wyoming big sagebrush decadence remains unchanged while recruitment of young plants increased slightly to 11%.
- **1999 to 2004 - stable (0):** Wyoming big sagebrush density was unchanged from the last reading, as was decadence. Recruitment decreased to just 1%.
- **2004 to 2009 – down (-2):** Wyoming big sagebrush density decreased 16% while decadence increased to 57%, coupled with low recruitment this indicated a decline in the health of the sagebrush component in this community. Sagebrush canopy cover also decreased from 17% to 9%.

Grass:

- **1985 to 1991 – slightly up (+1):** The nested frequency of perennial grasses increased 16%. Only three species were sampled.
- **1991 to 1999 - stable (0):** The nested frequency of perennial grasses remained similar to the last reading. Cover was high at 17%, although blue grama and bottlebrush squirreltail (*Sitanion hystrix*) accounted for nearly 100% of cover.
- **1999 to 2004 - stable (0):** The nested frequency of perennial grasses remained similar to the past two samplings and cover increased to 18%, once again blue grama and bottlebrush squirreltail accounted for 95% of grass cover.

- **2004 to 2009 – slightly down (-1):** The nested frequency of perennial grasses decreased 18% while cover fell to 11%. Blue grama was the predominant grass providing 92% of grass cover. Overall, four species were sampled.

Forb:

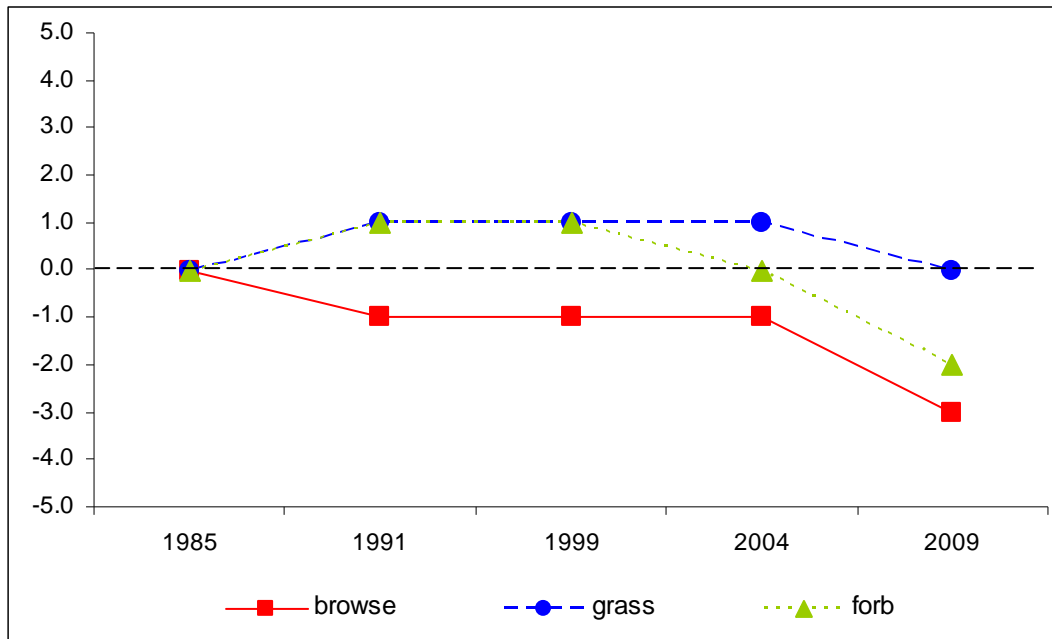
- **1985 to 1991 – slightly up (+1):** The nested frequency of perennial forbs increased 17%. The forb community was neither diverse nor abundant.
- **1991 to 1999 - stable (0):** The nested frequency of perennial forbs was similar to the last reading and cover was at 2%.
- **1999 to 2004 – slightly down (-1):** The nested frequency of perennial forbs decreased 19% while cover decreased to 1%.
- **2004 to 2009 - down (-2):** The nested frequency of perennial forbs decreased 61% and cover was well below 1%. Only three forb species were sampled.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 25B, 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
99	17.5	6.1	5.5	30.0	0.0	3.0	0.0	62.1	Good
04	16.2	6.5	0.5	30.0	0.0	2.5	0.0	55.7	Good
09	12.4	-2.1	1.5	22.1	0.0	0.3	0.0	34.3	Fair

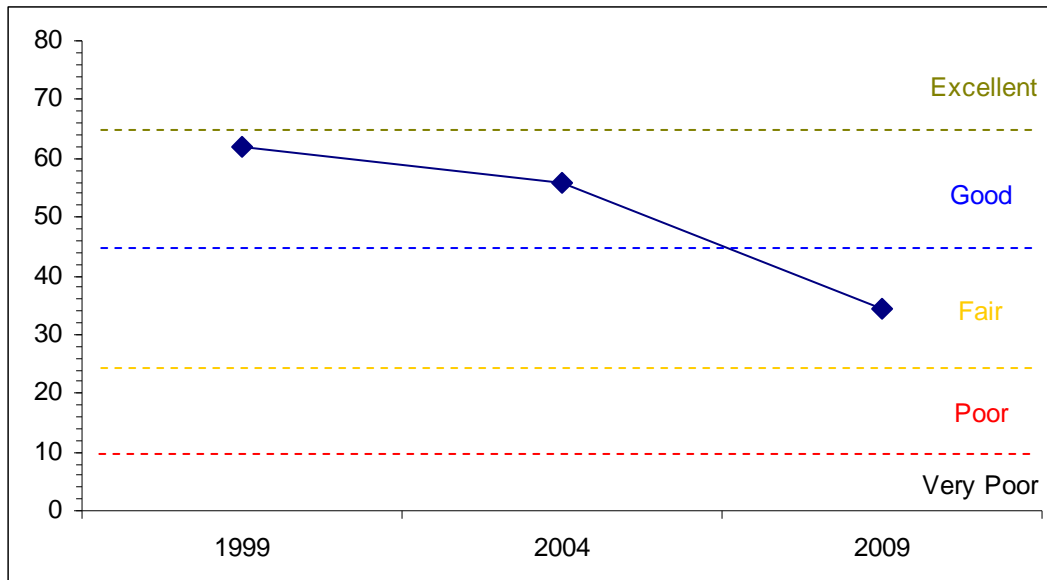
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25B Study no: 6



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 25B, Study no: 6



HERBACEOUS TRENDS--

Management unit 25B, Study no: 6

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	a-	a-	a-	c35	b17	.00	.90	.13
G	Bouteloua gracilis	a286	b321	a278	a279	a278	14.19	14.63	10.19
G	Carex sp.	b9	a-	a-	a-	a-	-	-	-
G	Oryzopsis hymenoides	a-	ab11	a-	a1	b23	-	.00	.37
G	Sitanion hystrix	b92	b115	c188	b129	a47	2.71	2.75	.36
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		387	447	466	444	365	16.92	18.30	11.06
Total for Grasses		387	447	466	444	365	16.92	18.30	11.06
F	Arabis sp.	-	-	7	-	-	.01	-	-
F	Astragalus sp.	6	-	-	-	-	-	-	-
F	Chaenactis douglasii	1	-	-	-	-	-	-	-
F	Chenopodium fremontii (a)	-	-	a-	b13	a5	-	.03	.02
F	Chenopodium leptophyllum(a)	-	-	a-	b28	a-	-	.08	-
F	Descurainia pinnata (a)	-	-	-	3	-	-	.00	-
F	Draba sp. (a)	-	-	1	-	-	.00	-	-
F	Erigeron pumilus	bc33	c50	a8	ab21	a7	.07	.17	.02
F	Gayophytum ramosissimum(a)	-	-	-	3	-	-	.00	-
F	Penstemon comarrhenus	3	-	-	1	-	-	.03	-
F	Penstemon sp.	2	6	2	-	-	.00	-	-
F	Sanguisorba minor	-	-	-	1	-	-	.00	-
F	Sphaeralcea coccinea	b105	bc119	c152	bc114	a47	1.43	1.03	.14
Total for Annual Forbs		0	0	1	47	5	0.00	0.12	0.01
Total for Perennial Forbs		150	175	169	137	54	1.52	1.24	0.16

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
	Total for Forbs	150	175	170	184	59	1.52	1.37	0.18

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

BROWSE TRENDS--

Management unit 25B, Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia frigida	9	4	1	.09	.33	.00
B	Artemisia nova	1	0	0	.00	-	-
B	Artemisia tridentata wyomingensis	84	86	85	13.93	12.68	9.93
B	Cercocarpus ledifolius	0	0	1	-	-	.00
B	Chrysothamnus viscidiflorus viscidiflorus	62	65	54	1.35	2.10	1.00
B	Echinocereus triglochidatus	4	0	0	.00	-	-
B	Gutierrezia sarothrae	50	58	5	1.60	2.32	.00
B	Leptodactylon pungens	4	2	2	.00	.00	.00
B	Opuntia sp.	12	11	7	.01	.06	.07
B	Pediocactus simpsonii	2	7	4	.00	.02	.01
	Total for Browse	228	233	159	17.00	17.53	11.03

CANOPY COVER, LINE INTERCEPT--

Management unit 25B, Study no: 6

Species	Percent Cover	
	'04	'09
Artemisia frigida	.23	-
Artemisia tridentata wyomingensis	16.70	9.38
Chrysothamnus viscidiflorus viscidiflorus	6.31	.88
Gutierrezia sarothrae	2.63	-
Opuntia sp.	.08	.25

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25B, Study no: 6

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	2.0	0.4

BASIC COVER--

Management unit 25B, Study no: 6

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	17.50	14.75	34.75	36.79	25.79
Rock	2.00	2.00	2.86	2.88	2.04
Pavement	13.50	7.25	4.82	7.90	3.34
Litter	29.00	32.25	23.83	24.63	34.11
Cryptogams	1.25	1.75	1.10	2.19	1.85
Bare Ground	36.75	42.00	38.14	41.32	33.45

SOIL ANALYSIS DATA --

Management unit 25B, Study no: 6, Study Name: Little Deer Peak

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.5	7.3	49.8	25.2	24.9	1.4	13.1	153.6	0.5

PELLET GROUP DATA--

Management unit 25B, Study no: 6

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	41	20	56	-	-	-
Elk	17	8	24	41 (100)	21 (53)	11 (26)
Deer	12	8	11	31 (76)	3 (8)	25 (63)
Cattle	1	1	-	7 (18)	4 (11)	2 (5)

BROWSE CHARACTERISTICS--

Management unit 25B, Study no: 6

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia frigida									
85	66	0	100	-	-	0	0	0	10/10
91	66	0	100	-	-	0	100	0	2/6
99	300	13	87	-	100	13	13	0	5/5
04	160	0	100	-	-	0	0	0	7/9
09	20	0	100	-	-	0	0	0	-/-
Artemisia nova									
85	0	0	0	0	-	0	0	0	-/-
91	0	0	0	0	-	0	0	0	-/-
99	100	0	0	100	-	0	0	100	-/-
04	0	0	0	0	-	0	0	0	-/-
09	0	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)	
<i>Artemisia tridentata wyomingensis</i>										
85	9598	24	42	35	66	45	42	21	10/15	
91	5131	5	66	29	-	19	8	6	10/16	
99	6200	11	59	30	180	35	2	6	12/24	
04	6220	1	70	29	20	21	26	13	13/25	
09	5220	3	40	57	400	24	29	46	12/24	
<i>Cercocarpus ledifolius</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	40	100	0	-	-	0	0	0	-/-	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
85	4532	34	66	0	-	4	0	0	9/10	
91	7731	25	62	13	66	24	9	3	3/6	
99	3540	7	85	8	-	5	0	7	6/10	
04	3300	1	98	1	-	0	0	.60	9/14	
09	2340	1	34	65	-	22	27	66	4/9	
<i>Echinocereus triglochidatus</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	100	20	80	-	-	0	0	0	1/3	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
<i>Gutierrezia sarothrae</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	2940	6	94	0	340	.68	0	0	6/9	
04	2820	0	100	0	-	0	0	0	7/9	
09	100	0	80	20	-	0	0	20	4/5	
<i>Leptodactylon pungens</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	80	0	75	25	-	0	0	25	5/7	
04	120	0	100	0	-	0	0	0	5/7	
09	60	0	67	33	20	0	0	33	3/4	
<i>Opuntia sp.</i>										
85	199	0	100	0	-	0	0	0	5/7	
91	133	0	100	0	-	0	0	0	2/9	
99	380	11	84	5	40	0	0	11	3/9	
04	320	6	94	0	-	0	0	0	2/7	
09	220	27	55	18	-	0	0	27	2/6	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Pediocactus simpsonii</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	40	100	0	-	-	0	0	0	1/3	
04	160	13	88	-	-	0	0	0	1/2	
09	80	25	75	-	20	0	0	0	0/1	
<i>Pinus edulis</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	66	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	

SUMMARY
WILDLIFE MANAGEMENT UNIT 25B - PLATEAU, THOUSAND LAKES

Community Types

There were five Range Trend studies sampled in WMU 25B during the summer of 2009. Three of the studies [Horse Valley (25B-2), Sage Flat (25B-3) and Little Deer Peak (25B-6)] sampled Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities that are all within crucial deer winter and substantial elk winter habitat. One study [Solomon Basin (25A-4)] samples a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) community that is within crucial deer and elk winter habitat. One study [Polk Creek (25A-5)] samples a mixed mountain brush community that is crucial deer and elk winter habitat.

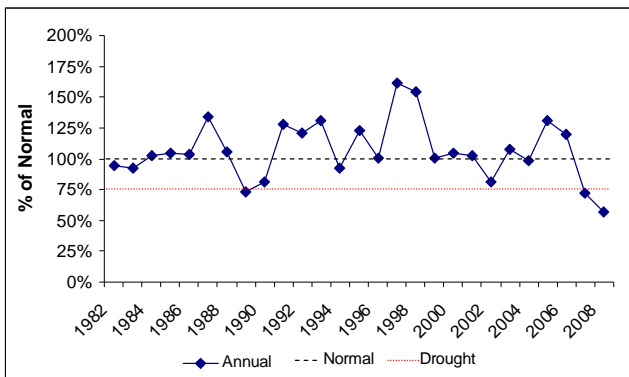


Figure 1. Percent annual precipitation based on the 27 year mean precipitation for WMU 25B, Plateau, Thousand Lakes. Precipitation data were collected at the Salina 24E, Capital Reef National Park and Loa weather stations (Utah Climate Summary 2009).

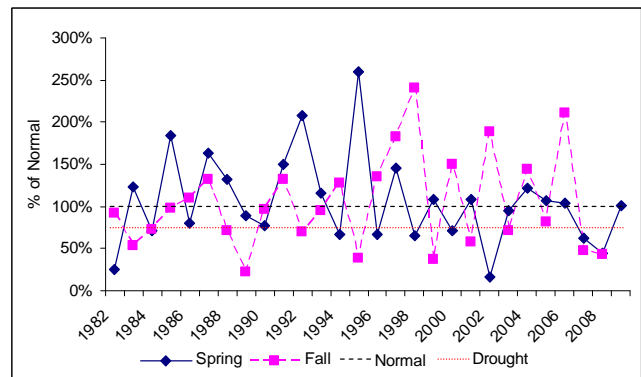


Figure 2. Percent annual precipitation based on the 27 year mean for spring (March-May) and fall (Sept.-Nov.) precipitation for WMU 25B, Plateau, Thousand Lakes. Precipitation data were collected at the Salina 24E, Capital Reef National Park and Loa weather stations (Utah Climate Summary 2009).

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation data from this herd unit were compiled from the Salina 24E, Capital Reef National Park and Loa weather stations (Figures 1 and 2). The unit's 27 year annual mean was 9.47 inches, the 28 year spring (March to May) mean was 2.13 inches, and the 27 year fall (Sept. to Nov.) mean was 2.63 inches. The unit's annual precipitation was below 75% of the normal annual mean (drought conditions) in 1989, 2007 and 2008 (Figure 1). Spring precipitation was below 75% of normal in 1982, 1984, 1994, 1996, 1998, 2000, 2002, 2007 and 2008 (Figure 2). Fall precipitation was below 75% of normal in 1983, 1984, 1988, 1989, 1995, 1999, 2001, 2003, 2007 and 2008 (Figure 2) (Utah Climate Summary 2009).

Browse

The median browse trend (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 sampled at three study sites in the unit: 25B-2, 25B-3 and 25B-6. The mean density of Wyoming big sagebrush decreased slightly, but significantly from 1994 to 1999, then remained similar through 2009 (Figure 3a). The mean cover of Wyoming big sagebrush remained similar from 1994 to 2004 then decreased significantly from 2004 to 2009 (Figure 3b). The mean Wyoming big sagebrush population decadence remained similar from 1994 to 2004 then increased significantly from 2004 to 2009 (Figure 3c). Other units in this area experienced a decline in Wyoming big sagebrush populations in 2004 that was not represented by the studies in this unit. However, there was a general decline in Wyoming big sagebrush similar to the 2004 declines of the other units in 2009.

Black sagebrush was sampled on three sites in the unit: 25B-3, 25B-4 and 25B-5. The mean density of black sagebrush has remained relatively similar over the sample years, though average cover decreased significantly from 1999 to 2004 and again from 2004 to 2009 (Figure 3a and 3b). The mean population decadence of black sagebrush has remained moderately low at less than 24% since 1994. There was a slight and significant increase in decadence from 1999 to 2004, but decadence decreased again in 2009 (Figure 3c).

Mountain big sagebrush was sampled on two studies in the unit, 25B-4 and 25B-5. There was little change in the mean density since 1994, though cover increased significantly from 1994 to 1999, remained similar from 1999 to 2004, then decreased significantly from 2004 to 2009 (Figure 3a and 3b). The mean mountain big sagebrush population decadence steadily increased from 1994 to 2009, and was significantly higher in 2004 and 2009 than in 1994 and significantly higher in 2009 than in 1999.

Herbaceous Understory

The median grass trend (Figure 5). The mean perennial grass sum of nested frequency remained similar from 1994 to 1999, then decreased significantly from 1999 to 2004 and again from 2004 to 2009 (Figure 4a). The mean cover of perennial grass reflected this trend, though it increased significantly from 1994 to 1999 then decreased from 1999 to 2004, but not significantly. The mean cover of perennial grasses decreased again, but this time significantly, from 2004 to 2009 (Figure 4b).

The median forb trend (Figure 5). Perennial forbs are not overly abundant on this unit and the mean perennial forb sum of nested frequency decreased significantly from 1999 to 2004. The sum of nested frequency decreased again from 2004 to 2009, but the decrease was not significant (Figure 4a). The mean cover of perennial forbs had a similar trend to the sum of nested frequency, though there was a significant increase in cover from 1994 to 1999 (Figure 4b). No noxious weeds were sampled on the studies in this herd unit.

Desirable Components Index

Three studies in this herd unit sampled in 2009 are considered within the low potential scale for the deer Desirable Components Index (DCI): 25B-2, 25B-3 and 25B-6. The mean DCI ranking for these studies increased from fair-good in 1994 to good in 1999 and 2004, then decreased to fair in 2009 (Figure 6 and Table 1). Much of the change came from the Perennial Grass Cover and Preferred Browse Young plant recruitment (Table 1). The two remaining deer winter range studies, 25B-4 and 25B-6, are within the mid-level potential scale for the deer DCI. The mean DCI ranking for these studies increased from fair in 1994 to good in 1999,

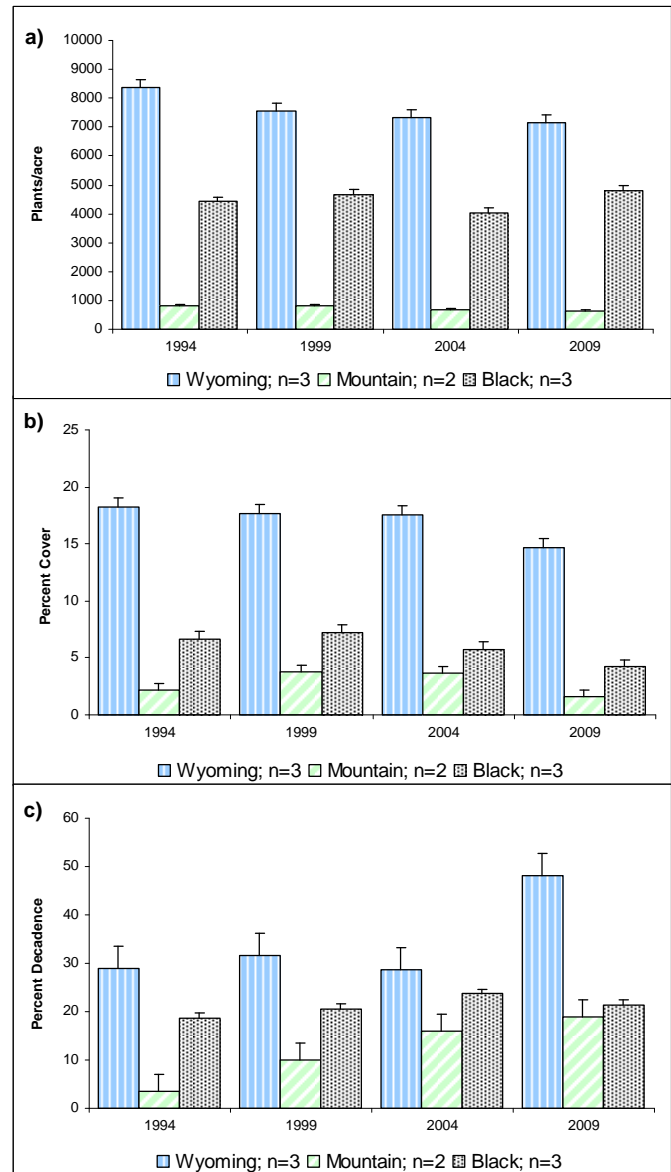


Figure 3. a) Mean density of sagebrush (*Artemisia spp.*) by year for WMU 25B, Plateau, Thousand Lakes. b) Mean cover of sagebrush by year for WMU 25B. c) Mean population decadence of sagebrush by year for WMU 25B.

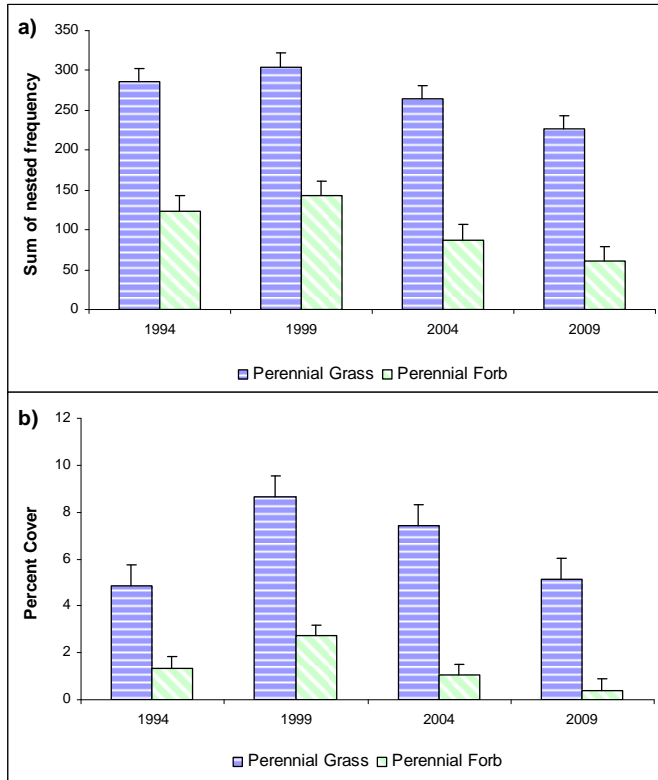


Figure 4. a) Mean perennial grass, perennial forb and cheatgrass sum of nested frequency by year for WMU 25B, Plateau, Thousand Lakes. b) Mean perennial grass, perennial forb and cheatgrass cover by year for WMU 25B.

then decreased to fair again in 2004, and decreased further to poor in 2009 (Figure 6 and Table 2). Most of the change came from changes in the Perennial Grass Cover and Perennial Forb Cover scores (Table 2). No studies on this unit were considered to be within the high potential scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	22.9	6.3	8.3	5.5	0.0	1.5	0.0	44.5	Fair-Good
99	22.5	5.6	8.5	13.5	0.0	2.7	0.0	52.7	Good
04	22.4	6.5	5.2	12.8	0.0	1.1	0.0	47.9	Good
09	18.5	0.6	2.0	10.0	0.0	0.3	0.0	31.4	Fair

Table 1. Low potential scale mean deer DCI scores (n=3) by year for WMU 25B, Plateau, Thousand Lakes. The deer DCI scores are divided into three categories based on ecological potentials which include 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	20.7	9.8	5.1	13.9	0.0	3.9	0.0	53.5	Fair
99	23.7	9.8	6.6	21.1	0.0	9.4	0.0	70.6	Good
04	23.5	10.2	4.9	14.4	0.0	3.6	0.0	56.7	Fair
09	18.6	7.5	6.9	10.5	0.0	1.6	0.0	45.1	Poor

Table 2. Mid-level potential scale mean deer DCI scores (n=2) by year for WMU 25B, Plateau, Thousand Lakes. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

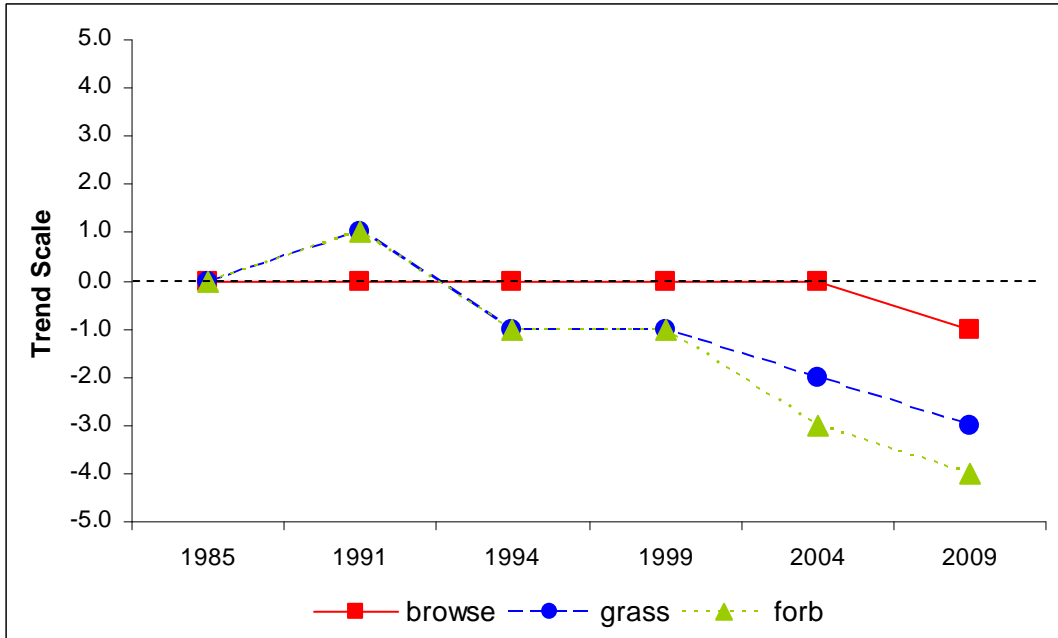


Figure 5. Cumulative median browse, grass and forb trends by year for WMU 25B, Plateau, Thousand Lakes.

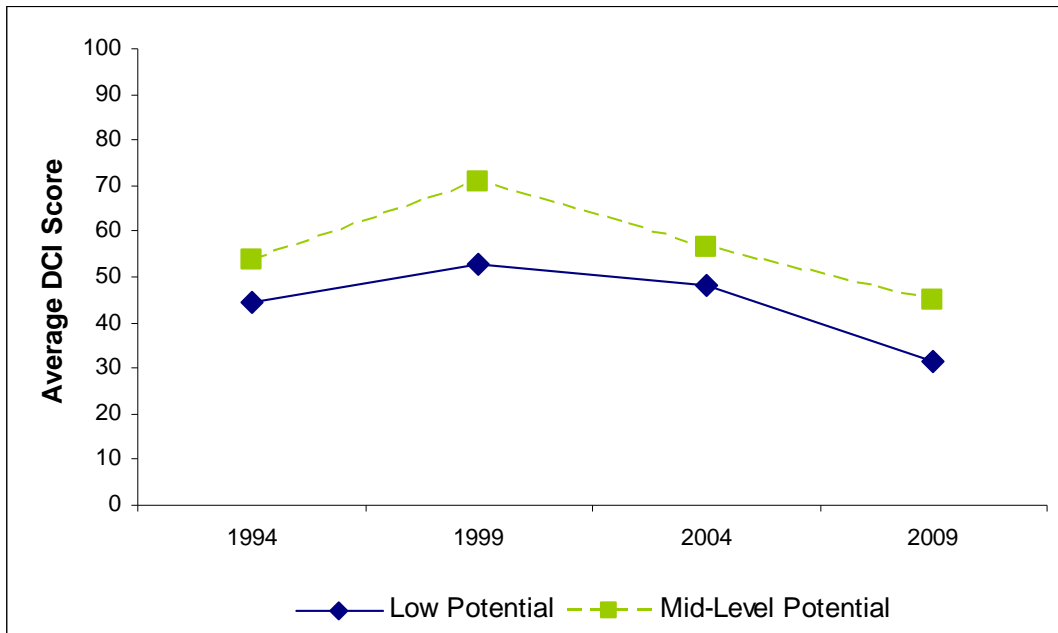


Figure 6. Mean low (n=3) and mid-level (n=2) potential scale DCI scores by year for WMU 25B, Plateau, Thousand Lakes. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

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