UTAH BIG GAME RANGE TREND STUDIES

2004 Volume 1

Southeastern Region

PUBLICATION NUMBER 05-13
REPORT FOR FEDERAL AID PROJECT W-82-R-49

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

UTAH BIG GAME
RANGE TREND STUDIES
2004 Volume 1

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Performance Report for Federal Aid Project W-82-R-49

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UTAH DEPARTMENT OF NATURAL RESOURCES
Division of Wildlife Resources
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*Indicates study was not monitored in 2004, because it was suspended, replaced by another study, or was not accessible. Maps, discussion, and tables for these studies are available in 1999 Volume 1 report or at http://www.wildlife.utah.gov/range/.

PROGRAM NARRATIVE

State: UTAH Project Number: W-82-R

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 2004 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 with rereads 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:

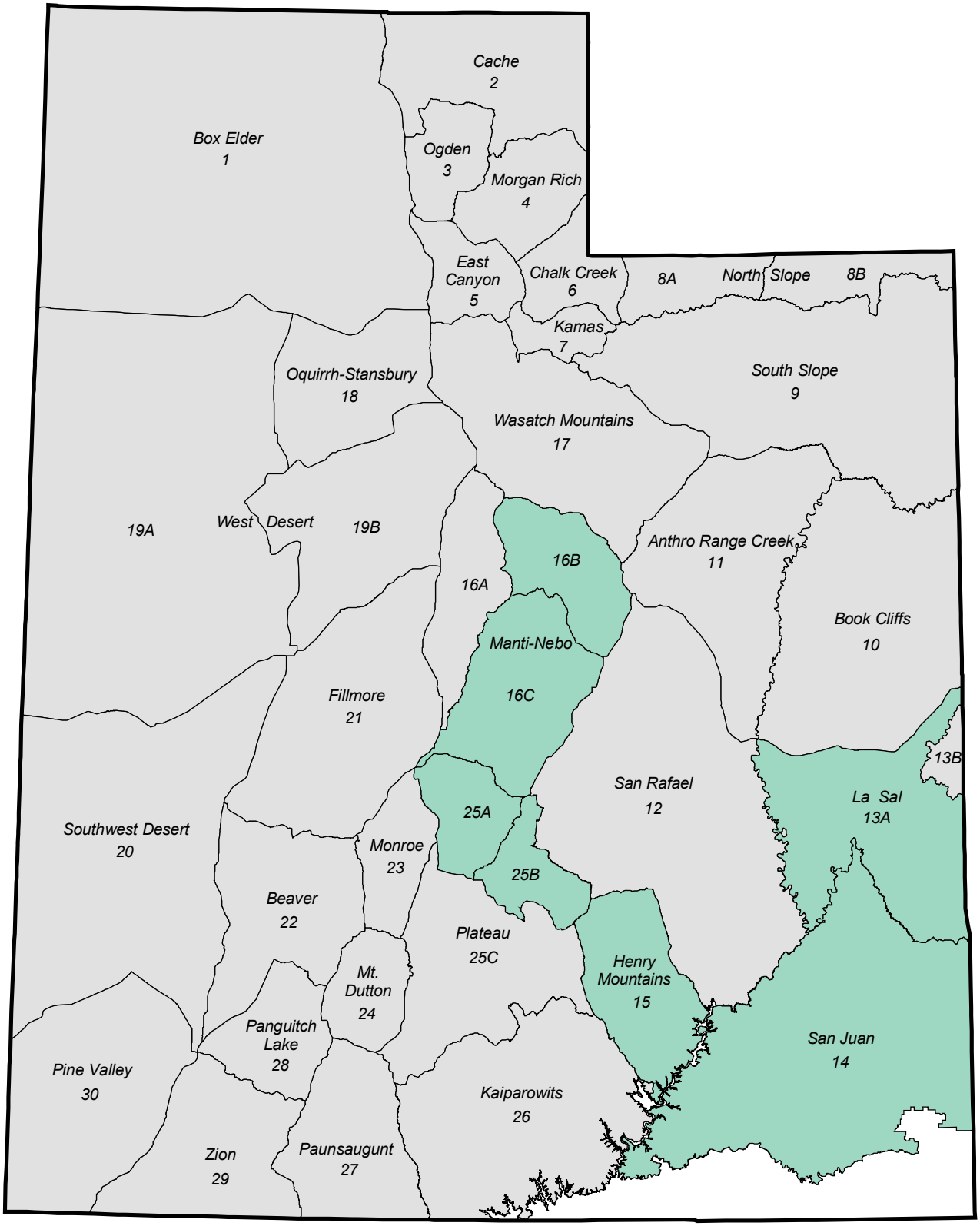
Bureau of Land Management
- Monticello Resource Area
- Moab resource Area

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 2004



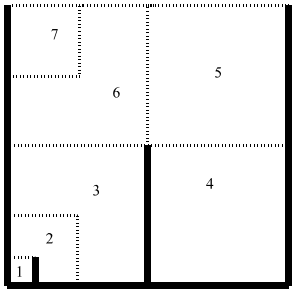
RANGE TREND STUDY METHODS

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 vegetative 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 have 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 critical 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 beginning baseline stake, is marked with a metal tag for proper identification of the transect.

Vegetative composition

Determining vegetational characteristics for each “key” area is determined by setting up 5 consecutive 100 foot baseline transects in the area of interest. This 500 foot line is the baseline and one, 100 foot belt is placed perpendicular to each 100 foot section of the baseline at random foot marks and centered on the 50 foot mark. The beginning of each belt is marked by a rebar stake to ensure a more precise alignment of the originally sampled belt. A 1/4 m^2 quadrat is centered every 5 feet along the same side of the belt, starting at the 5 foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all plant species occurring within a quadrat, including annual species.

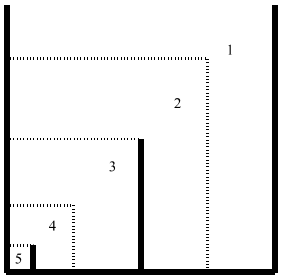
Cover is determined using an ocular cover estimation procedure using 7 cover classes (Bailey and Poulton, 1968, Daubenmire 1969). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100%. For example, to estimate vegetative cover with this 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.



Cover Classes
1/4 m^2 Quadrat

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

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.



Nested Frequency
1/4 m² Quadrat

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 by themselves and do not necessarily indicate changes in composition and/or distribution of key plant species.

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

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 placed in the following five classes. ([1]U.S. Department of Interior Bureau of Land Management 1996).

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 9 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.

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 4 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 at two hundred foot intervals along the baseline. Three hundred feet are 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 larger sample will better reflect changing trends in shrub populations. 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. Particular attention is given to woody plants and their important role as indicators on critical 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 decadent plants, and the percentage of decadent plants that are classified as dying
3) biotic potential or proportion of seedlings to the population
4) proportion of young plants in population
5) proportion of individuals moderately or heavily browsed
6) proportion of plants in poor vigor
7) changes in height and crown diameter measurements for mature age class
8) changes in browse species composition
9) strip frequency values
10) proportion of cover contributed by key species

Trends in herbaceous plants as a group or as a single "key" species can be 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 (Friedman test which is analogous to analysis of variance) (Conover 1980) is conducted on nested frequencies of each species to determine significant changes at alpha = .10. Ground cover parameters are analyzed and compared in the discussions of the reread studies. Trends for soil are determined by comparing basic ground cover measurements and cover composition (herbs vs shrubs) between years as well as comparing photos and observer observations between readings. A ratio of the nested frequency values of protective cover types (vegetation, litter, and cryptogams) to bare soil can also be used to help determine changes in soil trend. Beginning in 2002, an erosion condition class assessment adapted from the Bureau of Land Management is also completed on each study site to provide additional qualitative information on soil condition. On newly established studies, a more subjective or apparent assessment is made from qualitative comparisons.

The following tables and partial tables are taken from study number 23-1 to help illustrate some basic comparisons that can be made with the data. The "Herbaceous Trends" table summarizes 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 23-1. 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, grasses had a combined total cover value of 11.39% in 1998 and 7.08% in 2003. In 1985 and 1991, bluebunch wheatgrass (*Agropyron spicatum*) had a nested frequency value of 227 out of a possible nested frequency score of 400. By 1998, nested frequency declined to 183. The subscript letters indicate that the nested frequency value for *A. spicatum* between 1991 and 1998 declined significantly. Nested frequency declined to 160 in 2003, but the subscript letters indicate that this was not a significant change. Cover was estimated at 7.78% for *A. spicatum* in 1998 declining to 5.59% in 2003. Trend for this grass is down over the life of the transect due to a significant decline in sum of nested frequency since 1991.

HERBACEOUS TRENDS --
Management unit 23 , Study no: 1

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron spicatum	$_{b}$227	$_{b}$227	$_{a}$183	$_{a}$160	7.78	5.59
G	Bromus tectorum (a)	-	-	$_{b}$42	$_{a}$15	.43	.03
G	Oryzopsis hymenoides	4	12	12	5	.17	.04
G	Poa fendleriana	$_{a}$6	$_{bc}$36	$_{c}$49	$_{ab}$24	.98	.46
G	Poa secunda	$_{a}$3	$_{a}$18	$_{b}$94	$_{b}$80	2.00	.94
G	Sitanion hystrix	$_{c}$25	$_{bc}$20	$_{ab}$6	$_{a}$2	.01	.01
Total for Annual Grasses		0	0	42	15	0.43	0.03
Total for Perennial Grasses		265	313	344	271	10.95	7.05
Total for Grasses		265	313	386	286	11.39	7.08
F	Agoseris glauca	$_{a}$-	$_{a}$10	$_{ab}$1	$_{a}$-	.00	-
F	Arabis spp.	$_{a}$-	$_{b}$18	$_{a}$1	$_{a}$1	.00	.00
F	Astragalus convallarius	2	4	6	6	.15	.10
F	Calochortus nuttallii	4	8	-	-	-	-
F	Crepis acuminata	-	6	7	-	.06	-
F	Eriogonum racemosum	-	-	4	-	.03	-
F	Eriogonum umbellatum	$_{a}$-	$_{a}$1	$_{b}$9	$_{ab}$5	.16	.07
F	Phlox austromontana	-	6	4	6	.16	.15
F	Physaria chambersii	1	4	-	-	-	-
F	Phlox longifolia	$_{a}$8	$_{b}$27	$_{a}$16	$_{a}$6	.20	.02
Total for Annual Forbs		0	0	0	0	0.00	0
Total for Perennial Forbs		15	84	48	24	0.83	0.35
Total for Forbs		15	84	48	24	0.83	0.35

Values with different subscript letters are significantly different at alpha = .10 (annuals excluded)

In 1985, perennial grasses had a sum of nested frequency value of 265. This value steadily increased to 313 in 1991 and 344 in 1998 before declining to 271 in 2003. These changes would indicate a slightly upward perennial grass trend from 1985 to 1998 and a stable trend overall for the life of the transect. The forb trend can be determined in a similar manner. The herbaceous understory trend is determined using both the grass and forb sum of nested frequency values. For example, total herbaceous cover was 12.23% in 1998 with grasses providing the bulk of the cover. Therefore, when determining herbaceous trend, the grass proportion should be weighted more heavily then the forb proportion in this example.

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 23-1 are listed. For example, mountain big sagebrush (*Artemisia tridentata vaseyana)* had a strip frequency of 40 out of a possible 100 in 1998, declining to 26 in 2003. Average cover is determined using cover classes in conjunction with the $1/4m^2$ quadrat and estimating the percent of the quadrat covered. In this case, mountain big sagebrush cover was estimated to be 2.54% in 1998, declining to only 0.76% in 2003.

BROWSE TRENDS --
Management unit 23 , Study no: 1

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia nova	35	26	2.24	2.41
B	Artemisia tridentata vaseyana	40	26	2.54	.76
B	Gutierrezia sarothrae	2	0	-	-
B	Juniperus osteosperma	4	5	5.51	9.29
B	Opuntia spp.	1	2	.15	-
B	Pinus edulis	4	6	5.99	8.81
B	Purshia tridentata	18	15	3.20	4.31
Total for Browse		104	80	19.63	25.58

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, Utah juniper (*Juniperus osteosperma*) had an estimated average cover of 23.31% in 2003. Prior to 2002, only trees species were sampled in the line-intercept transect. Beginning in 2002, all woody species are included in the line-intercept transect and a canopy cover value for each is determined.

CANOPY COVER, LINE INTERCEPT --
Management unit 23 , Study no: 1

Species	Percent Cover	
	'98	'03
Artemisia nova	-	1.85
Artemisia tridentata vaseyana	-	.55
Juniperus osteosperma	7.19	23.31

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 bitterbrush (*Purshia tridentata*) averaged 4 inches in length while mountain big sagebrush leaders averaged only 1.1 inches in 2003.

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 23 , Study no: 1

Species	Average leader growth (in)
	'03
Artemisia tridentata vaseyana	1.1
Purshia tridentata	4.0

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. Data from 2003 estimated 197 juniper and 119 pinyon trees/acre with average basal diameters of 7.0 inches and 5.3 inches respectively.

POINT-QUARTER TREE DATA --
Management unit 23 , Study no: 1

Species	Trees per Acre		Average diameter (in)	
	'98	'03	'98	'03
Juniperus osteosperma	213	197	8.8	7.0
Pinus edulis	115	119	4.8	5.3

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 vegetative cover (2.0 and 5.75), while the new method estimates the vertical projection of the crown, or aerial cover (30.04 and 32.5%). Therefore, comparisons can be made for all cover measurements except for general vegetation cover.

BASIC COVER --
Management unit 23 , Study no: 1

Cover Type	Average Cover %			
	'85	'91	'98	'03
Vegetation	2.00	5.75	30.04	32.50
Rock	6.00	5.25	11.18	13.20
Pavement	30.50	24.25	26.32	19.74
Litter	46.50	46.50	42.49	37.44
Cryptogams	5.00	3.00	.93	3.45
Bare Ground	10.00	15.25	21.42	13.10

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. Average soil temperature is taken from the deepest probe, one at each of the 5 baseline starting stakes. The temperature is listed in the table as the top measurement (e.g., 62.3°F), with the average depth (in inches) as the lower measurement (12.7). Average soil temperature is re-measured with each reading and the most current soil temperature and depth is listed in the soil analysis table. 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 23, Study # 01, Study Name: Bear Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
11.2	62.3 (12.7)	7.3	40.0	33.4	26.6	3.4	9.0	57.6	0.5

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

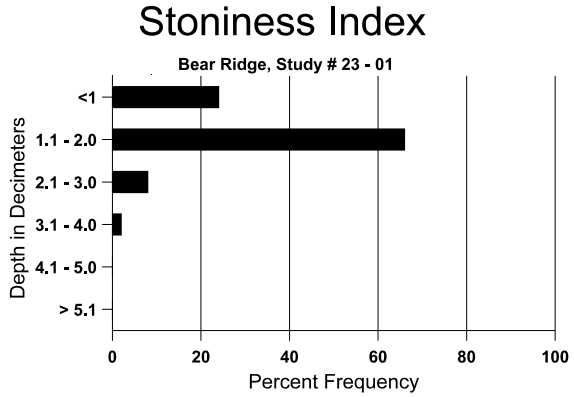
Ultra acid	< 3.5
Extremely acid	3.5-4.4
Very strongly acid	4.5-5.0
Strongly acid	5.1-5.5
Moderately acid	5.6-6.0
Slightly acid	6.1-6.5
Neutral	6.6-7.3
Slightly alkaline	7.4-7.8
Moderately alkaline	7.9-8.4
Strongly alkaline	8.5-9.0
Very strongly alkaline	> 9.1

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 10 ppm and 70 ppm respectively may be limiting to plant growth and development.

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

To determine how rock is distributed throughout the upper soil profile, a stoniness index is determined for each study site. Depth to the nearest rock is estimated on the first 10 feet (at one-foot intervals) along each of the 5 baselines, which allows 50 measurements. These data are then analyzed for each of the 5 incremental decimeter measurements, making it possible to visually determine the proportion (relative percent of rock at each depth) of rock from <1 decimeter to >5 decimeters. In the following example, most of the rock in the soil profile (~65%) was encountered in the 1 to 2 decimeter (4 to 8 inch) depth range. The distribution of rock in the soil profile can be an important factor for what is growing on the site.



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 1998, rabbit pellets were found in 25% of the quadrats placed on study 23-1, increasing to 32% in 2003. Quadrat frequency of rabbit or big game pellets indicate a relative amount of use by that particular animal. This data can help characterize changes in wildlife use patterns on the site.

PELLET GROUP DATA --
Management unit 23 , Study no: 1

Type	Quadrat Frequency		Days use/acre (ha)	
	'98	'03	'98	'03
Rabbit	25	32	-	-
Elk	4	-	7 (17)	1 (3)
Deer	36	20	51 (125)	54 (134)

It was determined that additional information on pellet groups was necessary. Therefore, a pellet group transect is now sampled in conjunction with the vegetative transects. The pellet group transect utilizes 50, 100ft^2 circular plots which are placed through the study area. These are usually two parallel transects of 25 plots on each side of the vegetative transect which runs 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. In the above example, deer days use/acre was estimated at 51 in 1998 increasing slightly to 54 in 2003. If a trend study needs to be read annually and more precision is required, the pellet group transect is marked permanently (rebar) and the pellet groups within the circular plots are removed or marked after being counted.

The “Browse Characteristics” table summarizes characteristics of the shrub community on study 23-1. 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 1,400 in 1985, 1,065 in 1991, 1,100 in 1998, and 840 plants/acre in 2003. 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 (more than three times larger) is 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 of the population classified as dying, percent decadence, percent of the population displaying poor vigor, percent heavy hedging, young recruitment, etc. should be given more weight in determining shrub trend when comparing survey years where sample sizes are different.

BROWSE CHARACTERISTICS --
Management unit 23 , Study no: 1

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
85	**1400**	266	200	400	800	-	67	24	57	-	14	13/15
91	**1065**	333	333	66	666	-	19	6	63	11	38	12/13
98	**1100**	-	100	260	740	2300	56	2	67	27	40	15/23
03	**840**	-	120	140	580	1740	29	0	69	40	40	14/21

The data on mountain big sagebrush shows the proportion of decadent shrubs in the population has steadily increased from 57% in 1985 to 69% by 2003. Plants classified as dying had also increased to 40% by 2003. More seedlings were encountered in 1985 and 1991, with slight fluctuations in the number of young plants. Dead plants, included in sampling after 1992, are abundant at 2,300 plants/acre in 1998 and 1,740 in 2003, and outnumber live plants by a ratio of 2:1 in both years. The percentage of plants displaying poor vigor has increased from 14% in 1985 to 40% in 1998 and 2003. The proportion of shrubs displaying heavy hedging declined from 24% in 1985, to 6% in 1991, and 0% by 2003. The proportion of shrubs displaying moderate use has ranged from 67% in 1985 to 19% in 1991. The average height of mature sagebrush has remained similar in all readings and averaged 14 inches in 2003. Average crown diameter has fluctuated from 13 inches in 1991 to 23 inches in 1998.

Considering all these factors, trend for sagebrush in 2003 is slightly downward due to a decline in density, increased decadence, and an higher proportion of plants classified as dying. No seedlings were encountered in 1998 or 2003 and young plants are only moderately abundant.

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. 1987). In some cases, most notably *Agropyron* and *Purshia*, the species names used by the Range Trend Study Plant Species List (Giunta 1983) and the Intermountain Flora (Cronquist et al. 1977) are retained to maintain continuity and alleviate confusion with earlier published reports.

The desirable components index (DCI) 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 vegetative components (ie., preferred browse cover, shrub decadence and young recruitment, cover of perennial grasses and forbs and annual grasses, etc.). 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. The Desirable Components Index Ratings are divided into three categories because of different ecological potential, these include: Wyoming Big Sagebrush – Cliffrose – Desert shrubs, Mountain Big Sagebrush, and Mountain Brush. 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.

Desirable Components Index Ratings

Wyoming Big Sagebrush and Desert Shrub Communities

> 65 points =	Excellent
45 – 64	Good
25 – 44	Fair
10 – 24	Poor
< 10	Very poor

Mountain Big Sagebrush and Pinyon-Juniper Chainings

> 80 points =	Excellent
79 – 65	Good
64 – 50	Fair
49 – 35	Poor
< 35	Very poor

Mountain Brush Communities

> 90 points =	Excellent
89 – 70	Good
69 – 55	Fair
54 – 40	Poor
< 39	Very poor

(Black sagebrush and Basin big sagebrush will be placed in Wyoming or Mountain big sagebrush scales based on precipitation and elevation).

Desirable Components Index Scoring

Preferred Browse (60 points)

(Preferred Browse species are favorable or critical to deer)

Preferred Browse Cover (30 pts. possible)
1.5 points for each 1% of preferred browse cover (maximum is 20% or 30 points)

Percent Decadence (15 points possible)
-0.3 points for each 1% decadence (do not exceed 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

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[2]U.S. Department of Interior Bureau of Land Management. 1996. Sampling vegetation attributes, Interagency Technical Reference, BLM/RS/ST-96/002+1730.

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REPORT FORMAT

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

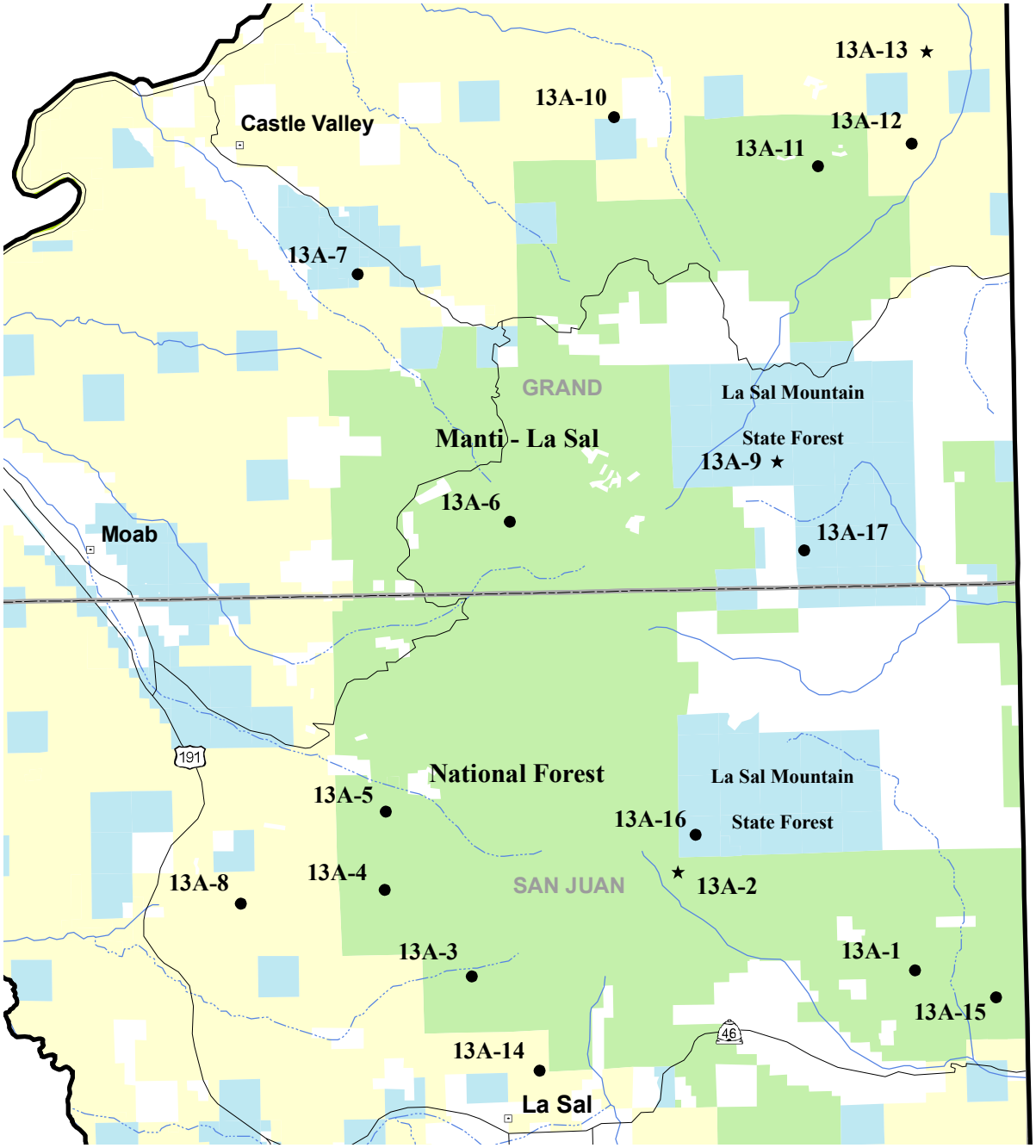
The name of the site and directions for locating the site are given on the location page. Also included on this page are the vegetation type, arrangement and diagrammatic sketch of the baseline, and the location on a topographical map. The 7.5 minute topographical map name and public land survey description 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 physical characteristics (elevation, slope, aspect), soil, ground cover, vegetative community, and species composition. The trend assessment is based upon the comparison of the recent year and the previous years data. Additional assessment is made by comparing photographs from year to year.

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

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

Management Unit 13A

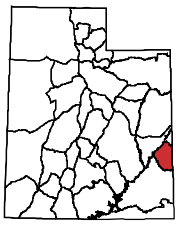


Map Scale 1:255,000 (1 inch = 4.02 miles)

N

- Transect location
- ★ Suspended site
- National Forest
- BLM
- State of Utah
- Private land
- Water body
- River or stream
- Intermittent stream
- Road

Unit Location



WILDLIFE MANAGEMENT UNIT 13A - LASAL MOUNTAINS

Boundary Description

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

Winter Range Description

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

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

Key Areas

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

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

Herd Unit Management Objectives

The targeted winter herd size is to have a herd population of 13,000 deer on the LaSal mountains. The major management problems on the unit are related to low deer numbers and a slow response in total numbers of deer to restricted harvest. However, this should be expected with the fawns/100 does ratio decreasing over the years and continuing to decrease over the last five years (1990-1995) to 48 (Evans et al. 1995). The average is still low at only 50 fawns/100 does through 1999.

Much of the winter range around the LaSal Mountains has had some kind of treatment to provide improved grazing and winter range conditions. The treatments are mainly pinyon-juniper chaining and seeding projects, roller-chopper treatments of old chainings, sagebrush removal, and contour trenching on the more eroded sites. A majority of the range trend studies established on the unit sample these treated types. Chained areas are found on North Beaver Mesa, Black Ridge, Amasas Back, Slaughter Flat, Buck Hollow, and the Two-Mile Chaining. Due to the wide difference in treatment years, from 1960 to the late 1970's, early 1980's, and early 1990's, there is considerable variability to what stage of succession they are in. Basically, on the areas studied except for Amasas Back, pinyon-juniper encroachment is not yet a problem. The key browse species is mountain or Wyoming big sagebrush which dominate most sites. The higher elevation treatments on North Beaver Mesa, Buck Hollow, and Two-Mile Chaining also have a variety of other browse and abundant quantities of grass. Treatments on critical deer winter range on Slaughter Flat, Upper Fisher Valley, and Black Ridge have a moderately dense stand of Wyoming big sagebrush (averaging 3,633 plants/acre) with an understory of crested wheatgrass. These sites are limited in their ability to produce other desirable browse.

The primary management objective of the DWR, BLM, and the Forest Service is to maintain the value of the chained areas for big game and livestock. Thinning existing regrowth and promoting the establishment and production of desirable browse and herbaceous species will result in long-term benefits for big game.

Study Establishment

Locations for herd unit 13A trend studies were determined in an Interagency meeting in Moab in 1986. However, they could not be incorporated into the range crew schedule until the summer of 1987. The studies were then established and read during June of 1987. Three studies were set up on big game summer range. In 2004, two summer range sites (#2 and #9) were dropped and replaced with two new sites (#16 and #17). Another three were established on transitional deer and elk ranges. The remaining seven studies sampled lower elevation critical deer winter range around the base of the mountain. Meetings again with Interagency personnel in the summer of 1994 determined that an additional two sites would need to be added because of the increases in the elk population. These studies are #14, Lower Lacky Fan, and #15, Hideout Mesa.

Trend Study 13A-1-04

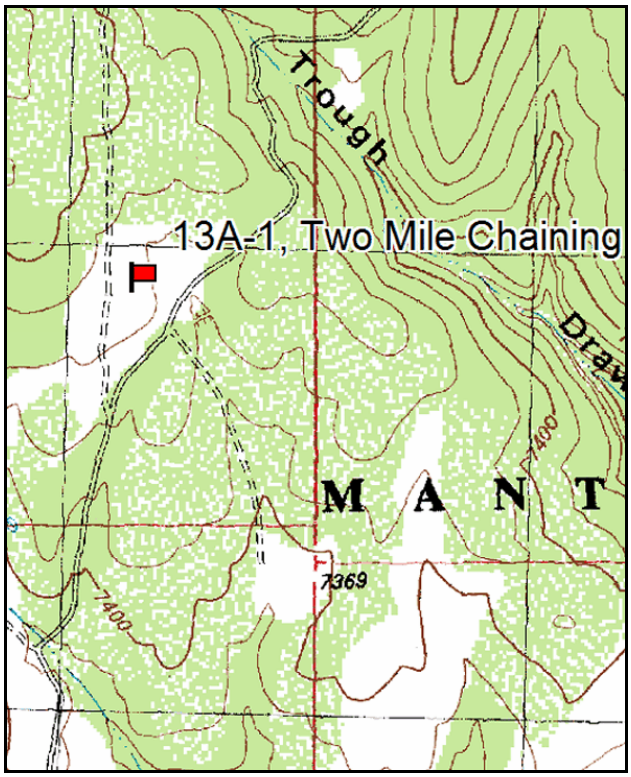
Study site name: Two Mile Chaining . Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 165 degrees magnetic.

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

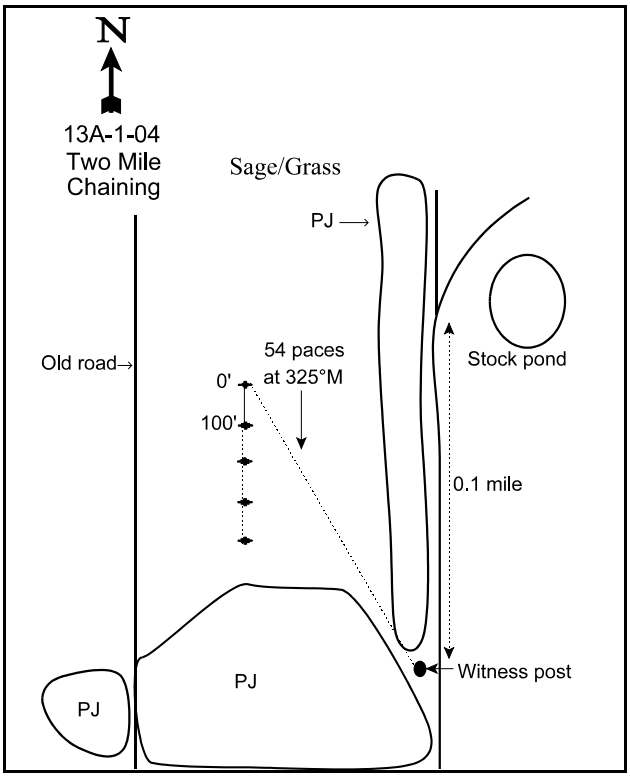
LOCATION DESCRIPTION

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



Map Name: Ray Mesa

Township 28S , Range 25E , Section 13



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4247896 N, 665141 E

DISCUSSION

Two Mile Chaining - Trend Study No.13A -1

This study is located in the Two Mile Chaining on the south end of the LaSal Mountains. Nine hundred acres were chained and seeded in 1978. This Forest Service chaining is thought to be important as spring/fall transition big game range and is becoming increasingly important as elk winter range. Pellet group data from 1999 estimated 32 deer (79 ddu/ha) and 70 elk days use/acre (173 edu/ha). During 2004 surveys, deer and elk pellet groups were almost half they were in 1999. Pellet group data from 2004 estimated 16 deer, 27 elk, and 4 cow days use/acre (40 ddu/ha, 68 edu/ha, and 11 cdu/ha). This site is located on the South Paradox allotment which receives summer/fall cattle use. A fire on Ray Mesa burned about 300 yards from the edge of this site in 2003.

The study site is characterized by long, gently sloping foothills (4-6%), generally with a southeast aspect and an elevation of 7,500 feet. The soil is a loam with a slightly acidic pH (6.5) and an effective rooting depth of 11 inches. Phosphorus could be a limiting factor on this site with only 8ppm. Values below 10 ppm may limit normal plant growth and development. Organic matter appears to be well below average (2%). The sites in this herd unit average 3.5% organic matter. The erosion condition class determined soil movement as slight in 2004, but there is a fair amount of bare soil exposed.

Mountain big sagebrush is the dominant browse species on the site. Density was estimated at 3,199 plants/acre in 1987, 4,800 in 1994, then has continually decreased to 4,080 in 1999 and 3,800 in 2004. It made up 60% of the total browse cover in 1994, 39% in 1999 and 32% in 2004. The sagebrush population is composed mainly of moderately hedged mature plants that generally have good vigor. The proportion of the plants that are moderately hedged has increased from 13% in 1994, 41% in 1999, to 33% in 2004. The proportion of seedlings in the population was quite high in 1994 at 20%, down to 9% in 1999, but no seedlings were found in 2004. The proportion of decadent plants in the population rose from 13% in 1987 to 42% in 1994. However, it decreased to 24% in 1999 and has remained at 22% in 2004. Low rabbitbrush is twice as abundant as the sagebrush, but only contributed 13% of the total browse cover in 1994, 21% in 1999, and 15% in 2004.

Density of Utah serviceberry was 480 plants/acre in 1994, 440 in 1999, and slightly decreased to 400 in 2004. Percent cover has increased from 2.3% in 1994, 3.7% in 1999, to 6.5% in 2004. Utilization has increased from moderate to heavy use in previous years to heavy use in 2004, although annual leader growth average 4.6 inches. Scattered oak clumps are vigorous and show light to moderate hedging. Pinyon pine continues to creep back onto this site. In 2004, density was estimated at 175 trees/acre with average diameter of 2.8 inches.

Herbaceous species diversity is relatively high and plants are vigorous. Seeded grasses are well established and productive. Overall, crested wheatgrass was the most abundant seeded species, making up 21% of the grass cover in 1994, 18% in 1999, and has increased to 42% in 2004. Being more drought tolerant than the other species, this would be expected. Intermediate wheatgrass and smooth brome have decreased substantially in providing consistent cover with the drought. Bulbous bluegrass decreased significantly, which can dominate a site like cheatgrass. Silvery lupine was the dominant forb in 1994 but was not found on the site in 2004. Some individual plants show damage by insects. The number of forb species have fluctuated over the years from 16 in 1987, 12 in 1994, 16 in 1999, and to 13 in 2004.

1994 TREND ASSESSMENT

The trend for soils would be slightly down because of the increase in the amount of bare soil (now 32%) and the decrease in percent litter cover (from 61% to 46%). However, there does not appear to be a problem with soil erosion because of the high amounts of grass cover and fairly level terrain. Trend for the key browse

species is stable to slightly down. Mountain big sagebrush makes up 61% of the browse cover with a population of 4,800 plants/acre, but the trend for percent decadency should be watched closely to see if this trend continues because there is a ratio of 1:40 (one dead plant to every 40 live plants). As the rate of percent decadency increases, there are going to be more dead plants in the population. With the low percentage of plants that are being heavily browsed (only 1%), this increased decadency has most likely been caused by the extended drought and associated winter injury. The trend for the herbaceous understory is easier to interpret as the nested frequency values for both the grasses and forbs have significantly decreased since 1987. Again, this has basically been caused by the prolonged drought. The Desirable Components Index rated this site as good with a score of 69 due to high decadency and few young shrubs.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - down (1)
winter range condition (DC Index) - 69 (good) Mountain big sagebrush type

1999 TREND ASSESSMENT

The trend for soils is considered stable at this time even with the slight decreases in percent bare soil and the slight improvement in the ratio of protective cover vs bare soil (2.8 to 3.3). Soil erosion still does not appear to be a problem because of the relatively large amounts of protective cover and gentle terrain. Trend for the key browse species is slightly down even with the improvement in percent decadence from 42% to 24%. Mountain big sagebrush made up 61% of the browse cover in 1994, now it only makes up 39% of the cover. It has also experienced a loss in numbers since 1994 (4,800 plants/acre), currently down to 4,080 plants/acre. The ratio of dead to live plants has also increased from 1:40 (2%) to now where it is 1:15 (6%). All this has taken place with only light to moderate use. The many years of drought have had a profound effect on sagebrush populations, along with competition with winter annuals. On this site, bulbous bluegrass now makes up 50% of the total herbaceous cover. The trend for the herbaceous understory is considered stable even with some slight increases in sum of nested frequency for the grasses which make up almost 90% of the herbaceous cover. The Desirable Components Index rated this site as good with a score of 69 with an increase in perennial grass cover, but preferred browse cover and perennial forbs both decreased.

TREND ASSESSMENT
soil - up slightly (4)
browse - slightly down (2)
herbaceous understory - stable (3)
winter range condition (DC Index) - 69 (good) Mountain big sagebrush type

2004 TREND ASSESSMENT

The trend for soils is stable. Overall, protective ground cover is good, although patches of bare soil account for 30% of the soil surface. Rock and pavement does not contribute very much to the ground cover on this site (<0.1%). Percent litter cover has decreased steadily since 1987, although it has slightly increased this year. Trend for key browse, mountain big sagebrush and serviceberry, is slightly down. Densities of both species have slightly decreased, but mature mountain big sagebrush have increased from previous estimates. Utilization is moderate on sagebrush, but increased to heavy on serviceberry, although it appears to be doing well. The ratio of dead to live plants continues to increase from 1:40 in 1994, 1:15 in 1999, to 1:6 in 2004. The trend for the herbaceous understory is stable. There was a drop in perennial grass sum of nested frequency, but was due to a decrease in bulbous bluegrass, which is a short lived perennial with low forage value. Crested wheatgrass, mutton bluegrass, and needle-and-thread grass all increased slightly in nested frequency and cover. Forbs contribute little to percent cover, most are low growing, although they are diverse

in the number of species. The Desirable Components Index rated this site as good with a score of 75 due to increase in preferred browse cover, decrease in shrub decadence, and a relatively stable amount of perennial grass cover.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable (3)
winter range condition (DC Index) - 75 (good) Mountain big sagebrush type

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	135	106	100	112	2.46	2.50	4.81
G	Agropyron intermedium	-	-	3	2	-	.03	.00
G	Bouteloua gracilis	15	19	17	13	1.07	.14	.53
G	Bromus inermis	75	67	63	68	.63	2.40	1.00
G	Bromus tectorum (a)	-	-	3	-	-	.00	-
G	Carex spp.	-	-	-	-	.00	-	-
G	Hilaria jamesii	-	-	-	2	-	-	.03
G	Koeleria cristata	$_{b}$61	$_{a}$3	$_{a}$19	$_{a}$3	.03	.18	.01
G	Oryzopsis hymenoides	-	3	3	3	.00	.00	.03
G	Poa bulbosa	$_{b}$220	$_{c}$256	$_{c}$250	$_{a}$129	7.14	8.01	2.43
G	Poa fendleriana	$_{a}$-	$_{b}$16	$_{c}$53	$_{c}$55	.06	.38	1.24
G	Sitanion hystrix	6	1	-	-	.00	-	-
G	Stipa comata	$_{b}$48	$_{a}$14	$_{ab}$24	$_{ab}$30	.11	.23	1.24
Total for Annual Grasses		0	0	3	0	0	0.00	0
Total for Perennial Grasses		560	485	532	417	11.52	13.89	11.35
Total for Grasses		560	485	535	417	11.52	13.90	11.35
F	Agoseris glauca	-	-	-	-	-	-	.00
F	Astragalus convallarius	40	17	25	37	.10	.42	.99
F	Castilleja chromosa	$_{b}$38	$_{a}$4	$_{a}$-	$_{a}$-	.01	-	-
F	Castilleja linariaefolia	-	2	1	-	.01	.03	-
F	Calochortus nuttallii	8	-	-	1	-	-	.00
F	Comandra pallida	-	-	-	3	-	-	.01
F	Cordylanthus spp. (a)	-	-	-	5	-	-	.16
F	Crepis acuminata	$_{b}$14	$_{a}$6	$_{a}$-	$_{a}$-	.03	-	-
F	Erigeron flagellaris	-	-	3	-	-	.15	-
F	Erigeron pumilus	$_{b}$111	$_{a}$21	$_{a}$43	$_{a}$20	.07	.51	.53
F	Eriogonum racemosum	$_{b}$63	$_{a}$30	$_{a}$34	$_{a}$25	.14	.30	.35

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Hymenoxys acaulis	3	-	3	1	-	.00	.03
F	Lomatium triternatum	$_{b}$31	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Lupinus argenteus	$_{c}$162	$_{a}$57	$_{b}$20	$_{a}$-	3.64	.14	-
F	Machaeranthera canescens	1	-	2	-	-	.01	-
F	Penstemon caespitosus	$_{b}$85	$_{a}$2	$_{a}$6	$_{a}$6	.01	.03	.07
F	Petradoria pumila	-	-	5	-	-	.06	-
F	Phlox longifolia	$_{c}$67	$_{bc}$53	$_{ab}$31	$_{a}$7	.14	.06	.05
F	Senecio multilobatus	-	1	1	-	.00	.00	-
F	Sphaeralcea coccinea	58	55	52	49	1.24	.38	.60
F	Tragopogon dubius	6	-	-	-	-	-	-
F	Trifolium gymnocarpon	-	3	3	2	.00	.00	.00
F	Unknown forb-perennial	6	-	-	-	-	-	-
F	Zigadenus paniculatus	-	-	3	-	-	.00	.00
Total for Annual Forbs		0	0	0	5	0	0	0.15
Total for Perennial Forbs		693	251	232	151	5.43	2.15	2.66
Total for Forbs		693	251	232	156	5.43	2.15	2.82

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

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

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

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

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	.80	7.25
Artemisia tridentata vaseyana	-	13.21
Chrysothamnus depressus	-	1.04
Chrysothamnus viscidiflorus viscidiflorus	-	4.73
Eriogonum microthecum	-	.11
Opuntia spp.	-	.65
Pinus edulis	3.59	11.86
Quercus gambelii	-	1.23

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

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

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

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

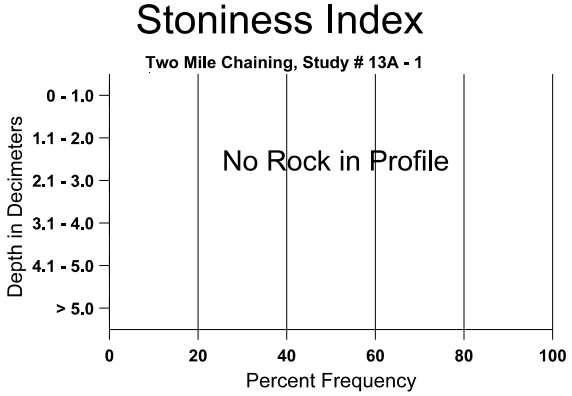
Average diameter (in)	
'99	'04
2.1	2.8

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
11.0	62.0 (16.3)	6.5	48.2	30.6	21.3	2.0	8.0	105.6	0.4



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

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	44	6	6
Elk	28	26	11
Deer	14	28	15
Cattle	-	2	-

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

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**66**	66	66	-	-	-	0	0	0	-	0	-/-
94	**480**	-	180	280	20	-	21	4	4	-	0	41/42
99	**440**	60	100	300	40	20	36	32	9	9	9	51/53
04	**400**	60	120	260	20	-	5	70	5	-	0	42/46
Artemisia tridentata vaseyana												
87	**3199**	-	266	2533	400	-	42	8	13	-	2	13/17
94	**4800**	940	200	2580	2020	120	13	2	42	5	10	18/32
99	**4080**	360	540	2580	960	280	41	3	24	2	3	21/31
04	**3800**	-	200	2760	840	660	33	10	22	8	9	15/24
Cercocarpus montanus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	101/113
Chrysothamnus depressus												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**560**	80	-	560	-	-	0	0	0	-	0	16/22
99	**1580**	40	100	1480	-	20	33	0	0	-	0	4/9
04	**1180**	20	20	1140	20	-	22	36	2	2	2	5/9
Chrysothamnus viscidiflorus viscidiflorus												
87	**6199**	66	1533	4666	-	-	14	1	0	-	1	5/8
94	**7300**	2500	240	7040	20	20	0	0	0	-	1	9/20
99	**8500**	-	480	7940	80	-	2	0	1	.23	.23	5/10
04	**5080**	20	100	4860	120	40	5	0	2	1	1	6/11

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Coleogyne ramosissima												
87	**66**	-	-	66	-	-	0	0	-	-	0	11/4
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Coryphantha vivipara arizonica												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	-	60	-	-	0	0	-	-	0	3/5
04	**100**	-	20	80	-	-	0	0	-	-	0	2/4
Eriogonum microthecum												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**280**	20	-	280	-	-	0	0	-	-	0	8/8
99	**400**	20	20	380	-	-	15	0	-	-	0	5/7
04	**340**	-	-	340	-	-	6	0	-	-	0	7/7
Gutierrezia sarothrae												
87	**66**	-	-	66	-	-	0	0	-	-	0	8/6
94	**0**	-	-	-	-	-	0	0	-	-	0	7/9
99	**160**	-	20	140	-	-	0	0	-	-	0	11/8
04	**180**	-	-	180	-	-	0	0	-	-	0	8/10
Opuntia spp.												
87	**200**	-	-	200	-	-	0	0	0	-	67	3/6
94	**1480**	40	240	1020	220	20	3	0	15	-	7	2/7
99	**1320**	20	400	860	60	-	0	0	5	-	0	3/9
04	**1800**	40	20	1620	160	-	0	0	9	7	9	4/8
Pinus edulis												
87	**133**	-	133	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**340**	80	180	160	-	-	0	0	-	-	0	-/-
04	**380**	40	120	260	-	-	0	0	-	-	0	-/-
Purshia tridentata												
87	**0**	66	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	12/28
99	**20**	-	-	20	-	-	0	0	-	-	0	12/40
04	**20**	-	-	20	-	-	100	0	-	-	0	10/23

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Quercus gambelii												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**220**	20	40	180	-	-	0	0	0	-	0	43/18
04	**140**	-	20	20	100	-	0	0	71	-	0	43/19
Symphoricarpos oreophilus												
87	**0**	66	-	-	-	-	0	0	-	-	0	-/-
94	**80**	-	-	80	-	-	25	0	-	-	0	8/19
99	**40**	-	20	20	-	-	0	0	-	-	0	22/36
04	**80**	-	-	80	-	-	0	0	-	-	0	10/12

Trend Study 13A-3-04

Study site name: Buck Hollow . Vegetation type: Chained, Seeded P-J .

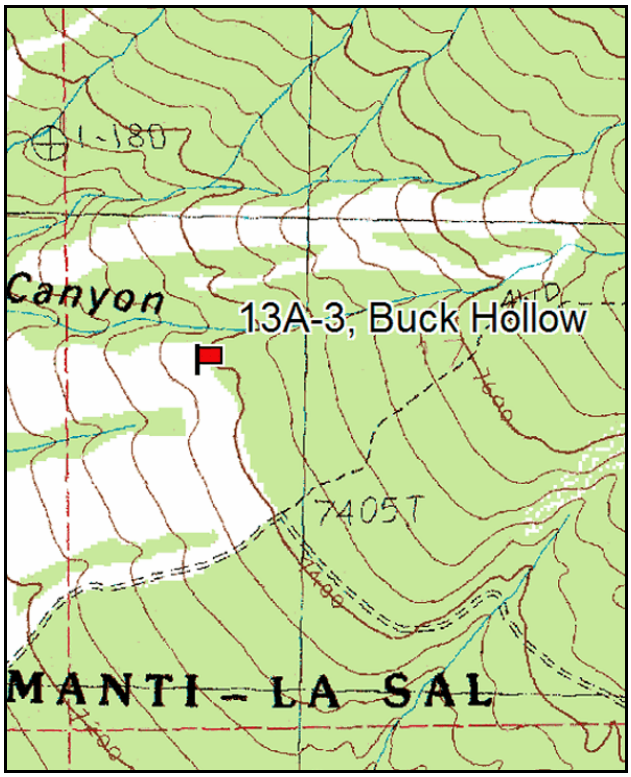
Compass bearing: frequency baseline 165 degrees magnetic.

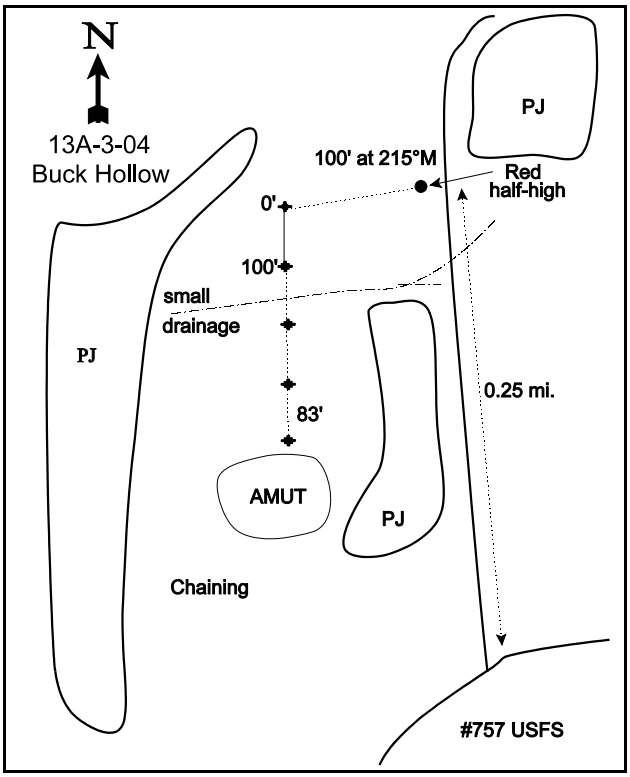
Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From LaSal Junction, proceed east on SR 46 for 0.3 miles past mile marker 5. Turn left onto County Road 130 and travel 2.95 miles to a fork. Bear right on road #166 and go 0.8 miles to another fork. Bear right, and continue 1.3 miles to a cattleguard marking the Forest Service boundary. Continue 1.55 miles to a fork, turn left and go 0.25 miles. A red witness post (1 ½ foot tall fencepost) is located on the left side of the road. The transect starts 100 feet out in the chaining. The study is marked by half high green fenceposts.

***An alternate route is to take SR 191 south from Moab. At mile marker 113, continue 0.15 miles south and turn left (east) on county road #166. Continue south on main road for 11.4 miles to a fork, and turn left (east). Go 1.3 miles to the cattleguard and Forest Service boundary listed above. Follow remainder of directions as noted above.





Map Name: LaSal West

Township 28S , Range 24E , Section 17

Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4247659 N, 647773 E

DISCUSSION

Buck Hollow - Trend Study No. 13A-3

The Buck Hollow study samples a chaining within the wide-ranging pinyon-juniper type on the south slope of the LaSal Mountains. This area is thought to be particularly important as a principal elk wintering area. In 1999, there was an estimated 66 deer (163 ddu/ha), 15 elk (37 edu/ha), and 20 cow days use/acre (49 cdu/ha) on the site. In 2004, pellet group data estimated 42 deer (104 ddu/ha), 11 elk (28 edu/ha), and 4 cow days use/acre (9 cdu/ha). This study site is part of the La Sal grazing allotment. The 700 acre Buck Hollow chaining and seeding project was completed in 1982. The site is now dominated by seeded grasses which currently contribute 63% of the total vegetative cover. Scattered clumps of unchained, mature pinyon-juniper provide excellent escape cover. This woodland community was an old, very mature stand when it was chained. The elevation of the site is 7,400 feet with a general southwest aspect on a gentle south-facing slope (5-10%).

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

Besides scattered clumps of serviceberry and true mountain mahogany, there is little other desirable browse within the chaining. Most of the mature seed-producing plants occur nearby on the edge of the chaining. The browse population on the site is mainly made up of young plants, just getting established. Four-wing saltbush was seeded, but no plants were sampled on the transect. Some nearby plants were measured for height/crown. There are some patches of Gambel oak that are lightly browsed. There were abundant seedlings in 1987, which were all growing around the mature plants. However, no seedlings have been found since. There is some reinvasion and/or releasing of young pinyon and juniper that escaped the chaining. The point-quarter method in 1999 estimated 64 juniper trees/acre and 115 pinyon trees/acre with an average diameter of 3.3 inches for juniper and 3.9 inches for pinyon. In 2004, point-quarter estimated 68 juniper trees/acre and 106 pinyon trees/acre with and average diameter of 2.5 inches for juniper and 3.7 inches for pinyon.

Seeded grasses are the prevalent forage available in this chaining. These large vigorous plants are mainly smooth brome, intermediate wheatgrass, and crested wheatgrass. Combined, they represented 97% of the grass cover and 70% of the total vegetative cover in 1994 with similar values in 1999. In 2004, they contribute 99% of the grass cover and 61% of the total vegetative cover. Several other species are present, including tall wheatgrass, orchardgrass, Indian ricegrass, bottlebrush squirreltail, and Carex. Forbs are not as essential because they only contribute 21% of the total vegetative cover. The most abundant forb is alfalfa, which makes up 48% of the forb cover.

1987 APPARENT TREND ASSESSMENT

Excellent ground cover is provided by the dense mixture of bunch and rhizomatous grass species. Herbaceous understory cover is excellent. Litter cover is also quite high at 73%. There is a scattering of rock and pavement cover totaling less than 5%. Percent bare ground is only about 11%.

1994 TREND ASSESSMENT

The soil trend should be considered stable at this time as there is still a generous amount of litter cover from the chaining and herbaceous cover is excellent with only about 15% relative bare ground. The browse species

are not a very significant contributor to the productivity of the site for they only make up 15% of the total vegetative cover, with almost all of that coming from small pinyon. Trend for browse is stable but it is an insignificant contributor to the productivity of the site. Within the herbaceous understory, the seeded species make up 80% of the total vegetative cover. The nested frequency values for the grasses have gone down slightly with the nested frequency of forbs going up slightly; trend for the herbaceous understory is stable. The Desirable Components Index rated this site as poor with a score of 36 due to lack of preferred browse cover, although perennial grass and forb cover is abundant.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 36 (poor) Pinyon-Juniper Chaining type

1999 TREND ASSESSMENT

The soil trend is considered to be improving with improved ratios of protective cover to bare soil. Vegetative cover and litter cover have increased, with a corresponding decrease in percent bare soil. The browse species are still not a very significant contributor to the productivity of the site as they only make up 14% of the total vegetative cover, with almost all of that coming from small pinyon. Trend for browse is stable but it continues to be an insignificant contributor to the productivity of the site. The majority of the herbaceous species cover comes from seeded species which make up 77% of the total vegetative cover. The nested frequency values for the grasses have gone up slightly with the nested frequency for forbs going down slightly. Because grasses almost triple the cover of the forbs, overall trend for the herbaceous understory is stable. The Desirable Components Index rated this site as poor with a score of 40 due to lack of preferred browse cover, although perennial grass and forb cover is abundant.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 40 (poor) Pinyon-Juniper Chaining type

2004 TREND ASSESSMENT

The trend for soil is slightly down. Bare ground cover increased to almost 20% and the protective cover to bare soil decreased slightly. Drought conditions the last 2 to 3 years has decreased vegetation production, which decreased litter cover and increased bare ground cover. Trend for browse species is stable, but still not a significant contributor to the productivity of the site. Browse species only make up 16% of the total vegetation cover and 77% of that is small pinyon. Trend for herbaceous understory is depressed slightly but not enough to warrant a change in trend. These changes are most due to drought conditions. The majority of vegetation cover still comes from grasses and forbs which account for 84% of the total vegetation cover. The Desirable Components Index rated this site as poor with a score of 41 due to lack of preferred browse cover, although perennial grass and forb cover is abundant.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 41 (poor) Pinyon-Juniper Chaining type

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{c}$119	$_{a}$58	$_{ab}$80	$_{bc}$97	.88	2.45	3.74
G	Agropyron intermedium	$_{c}$290	$_{b}$208	$_{b}$205	$_{a}$139	6.18	6.94	2.75
G	Bromus inermis	$_{a}$150	$_{b}$208	$_{b}$231	$_{b}$223	7.42	10.11	8.41
G	Bromus tectorum (a)	-	-	-	13	-	-	.02
G	Carex spp.	9	23	19	13	.46	.44	.16
G	Oryzopsis hymenoides	$_{b}$5	$_{a}$-	$_{a}$-	$_{a}$-	-	.00	-
G	Poa fendleriana	-	3	8	4	.03	.09	.02
G	Poa secunda	-	-	6	-	-	.06	.00
G	Sitanion hystrix	$_{b}$34	$_{b}$21	$_{a}$3	$_{a}$-	.13	.03	.00
G	Sporobolus cryptandrus	-	-	-	-	-	-	.03
Total for Annual Grasses		0	0	0	13	0	0	0.01
Total for Perennial Grasses		607	521	552	476	15.12	20.14	15.14
Total for Grasses		607	521	552	489	15.12	20.14	15.16
F	Alyssum spp. (a)	-	-	-	-	.00	-	-
F	Arabis hirsuta	2	-	6	-	-	.01	-
F	Astragalus convallarius	18	21	22	29	.37	1.35	1.49
F	Aster spp.	-	2	-	-	.03	-	-
F	Chaenactis douglasii	3	3	-	-	.01	-	-
F	Collinsia parviflora (a)	-	3	-	-	.00	-	-
F	Cruciferae	4	-	-	-	-	-	-
F	Cryptantha spp.	$_{a}$-	$_{c}$17	$_{ab}$4	$_{ab}$1	.06	.01	.00
F	Descurainia pinnata (a)	-	7	1	-	.01	.01	-
F	Gilia spp. (a)	-	3	-	-	.00	-	-
F	Lesquerella spp.	$_{b}$22	$_{a}$-	$_{a}$-	$_{a}$5	-	-	.01
F	Machaeranthera spp	-	1	-	-	.00	-	-
F	Melilotus officinalis	$_{c}$53	$_{b}$18	$_{a}$-	$_{a}$-	.16	-	-
F	Medicago sativa	$_{a}$1	$_{b}$28	$_{b}$27	$_{b}$22	1.64	4.81	2.38
F	Penstemon spp.	$_{a}$-	$_{b}$24	$_{b}$21	$_{a}$6	.13	.17	.04
F	Phacelia spp.	$_{b}$10	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Phlox austromontana	$_{a}$-	$_{b}$14	$_{a}$10	$_{a}$9	.25	.09	.19
F	Physaria chambersii	$_{a}$-	$_{b}$14	$_{b}$16	$_{a}$-	.03	.20	-
F	Polygonum douglasii (a)	-	$_{b}$10	$_{a}$1	$_{b}$11	.02	.00	.08
F	Sanguisorba minor	3	-	-	-	-	-	-
F	Senecio multilobatus	-	-	2	2	-	.03	.06
F	Sphaeralcea coccinea	$_{a}$11	$_{a}$12	$_{ab}$15	$_{b}$35	.25	.28	.75

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Tragopogon dubius	3	2	-	-	.03	-	-
F	Trifolium spp.	-	-	2	-	-	.03	-
F	Unknown forb-perennial	4	-	-	-	-	-	-
Total for Annual Forbs		0	23	2	11	0.05	0.01	0.07
Total for Perennial Forbs		134	156	125	109	3.00	7.01	4.94
Total for Forbs		134	179	127	120	3.05	7.02	5.02

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

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

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

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

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	-	.05
Cercocarpus montanus	-	.80
Juniperus osteosperma	2.00	1.79
Pinus edulis	3.59	7.81

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

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

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

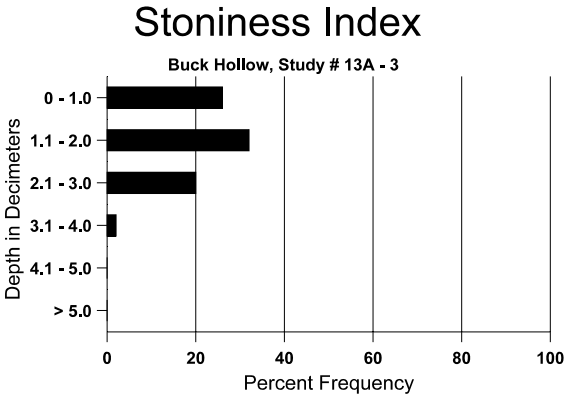
Species	Trees per Acre '99	Trees per Acre '04	Average diameter (in) '99	Average diameter (in) '04
Juniperus osteosperma	64	68	3.3	2.5
Pinus edulis	115	106	3.9	3.7

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
12.7	62.3 (12.6)	7.6	52.9	21.8	25.3	4.5	25.0	144.0	0.7



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

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

Days use per acre (ha)	
'99	'04
-	-
15 (37)	11 (28)
66 (163)	42 (104)
20 (49)	4 (9)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**666**	700	566	100	-	-	45	5	-	-	10	59/28
94	**40**	-	20	20	-	-	0	0	-	-	0	66/75
99	**0**	-	-	-	-	-	0	0	-	-	0	59/73
04	**20**	200	20	-	-	-	0	0	-	-	0	74/80
Atriplex canescens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	18/14
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	26/20
Cercocarpus montanus												
87	**66**	-	33	33	-	-	50	50	-	-	0	21/19
94	**100**	-	-	100	-	-	20	0	-	-	0	33/30
99	**100**	-	-	100	-	-	80	0	-	-	0	48/38
04	**100**	20	20	80	-	-	0	100	-	-	0	44/39
Juniperus osteosperma												
87	**33**	66	-	33	-	-	0	0	-	-	0	51/197
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	-	100	-	-	40	0	0	-	-	0	-/-
04	**120**	-	120	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
87	**33**	-	-	33	-	-	0	0	-	-	0	12/6
94	**0**	-	-	-	-	-	0	0	-	-	0	4/19
99	**20**	-	-	20	-	-	0	0	-	-	0	8/18
04	**20**	-	-	20	-	-	0	0	-	-	0	5/18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
87	**133**	33	100	33	-	-	0	0	-	-	0	35/24
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	-	80	20	-	20	0	0	-	-	0	-/-
04	**120**	-	40	80	-	-	0	0	-	-	0	-/-
Quercus gambelii												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	33/30
Symphoricarpos oreophilus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	30/55
99	**0**	-	-	-	-	-	0	0	-	-	0	26/52
04	**0**	-	-	-	-	-	0	0	-	-	0	26/46

Trend Study 13A-4-04

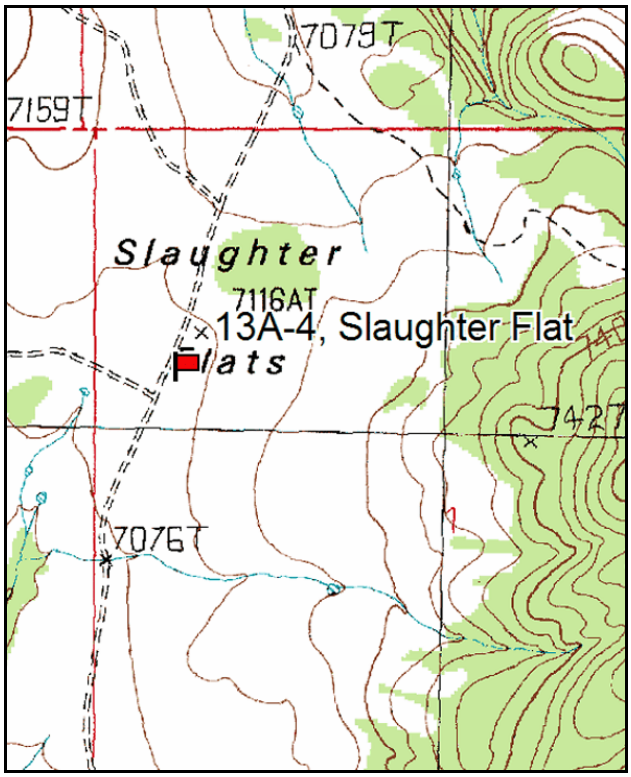
Study site name: Slaughter Flat . Vegetation type: Chained, Seeded P-J .

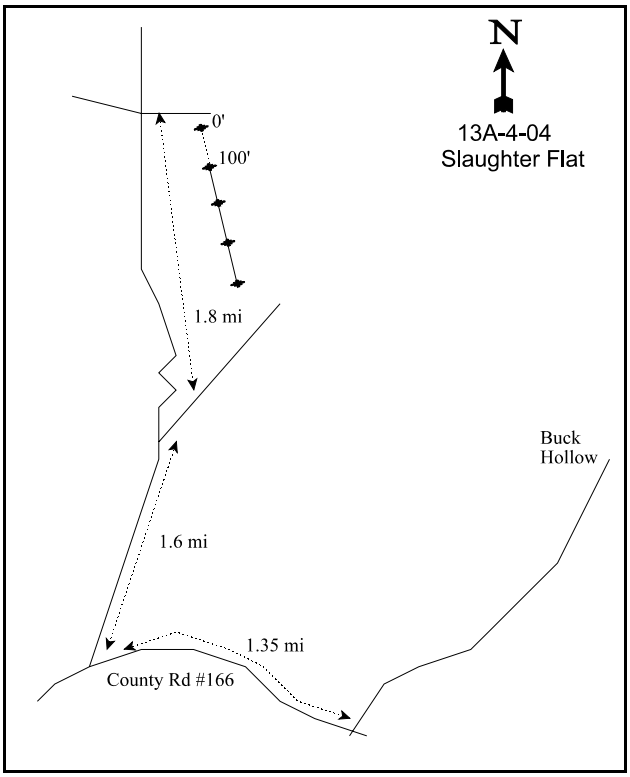
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Mount Tukuhnikivatz

Diagrammatic Sketch

Township 28S , Range 23E , Section 1

GPS: NAD 27, UTM 12S 4251102 N, 644400 E

DISCUSSION

Slaughter Flat - Trend Study No. 13A-4

The Slaughter Flat Study area has long been recognized as important big game winter range. The transect is located in an open flat valley between pinyon-juniper ridges to the east and west. The chaining extends to the north. Due to the level valley bottom, there is not a distinguishable aspect for the site and slope is negligible. The site elevation is approximately 7,100 feet, which drains to the west. In 1999, pellet group transects estimated 25 deer (62 ddu/ha), 53 elk (131 edu/ha), and 22 cow days use/acre (53 cdu/ha). In 2004, pellet group data estimated 27 deer (91 ddu/ha), 37 elk (91 edu/ha), and 1 cow days use/acre (2 cdu/ha). In 1974, 940 acres were chained and seeded. It is successionally now a sagebrush-grass community. This Forest Service land is part of the Squaw Spring grazing allotment which uses a rest/deferred rotation system from mid-June through mid-October.

The orange, sandy clay loam soil is moderately deep (effective rooting depth of almost 14 inches), with a loose structure on the surface. The soil has a neutral pH (7.2) and site potential may be limited by phosphorus levels (5.4 ppm). Values below 10 ppm may limit normal plant growth and development. There is soil loss from the bare interspaces and evidence of sheet and rill erosion, but no gullies are on the site. There is some pedestaling of the bunch grasses. The erosion condition class determined soil movement as stable in 2004.

Wyoming big sagebrush is the key browse species on the site. Identification of the *Artemisia* subspecies was difficult because of hybridization with other sagebrush subspecies and different varieties which may have been seeded onto the site after the chaining treatment. The most frequently found sagebrush subspecies on this site would be Wyoming big sagebrush. Wyoming sagebrush made up 60% of the browse cover in 1994, 56% in 1999, and 53% in 2004. There has been steady slight decrease in the sagebrush population since 1987. The population has gone from 3,298 plants/acre in 1987, 2,940 plants/acre in 1994, 2,560 plants/acre in 1999 and 2,340 plants/acre in 2004. Sagebrush loss has most likely been caused by years of drought and associated winter injury. The population of sagebrush shows moderate to heavy use. Percent decadency has increased from 10% in 1994, 20% in 1999, to 25% in 2004. Twenty-six percent of the population was classified as young in 1987, now this is only 2%. Seedling density has typically varied greatly through the years, 0% in 1987, 15% in 1994, 2% in 1999, and 19% in 2004.

The larger, more vigorous plants (which display characteristics of Basin big sagebrush) appear to produce the most seed and show only light to moderate hedging, as opposed to the appearance of moderate to heavy hedging on the relatively smaller, mature individuals that resemble more that of Wyoming big sagebrush. Low rabbitbrush is prominent because of its relatively high density and it provides 31% of the browse cover. Other more palatable browse species are uncommon, comprising only a minor percentage of the browse population.

In 1987, it was noted that grasses were an important vegetative component on this site and the most abundant perennial species were needle-and-thread, muttongrass, crested wheatgrass, and Indian ricegrass. Total grass cover in 1994 was 15%, which was 43% of the total vegetative cover at that time. Cheatgrass was fairly common throughout and dense in localized areas, yet it only made up 2% of the grass cover. Twenty species of forbs were encountered on the site, but all together they contributed to a little more than 3% cover. In 1999, forbs contributed less than 1% of the cover, but rose to over 3% in 2004. Of the eight perennial grass species, only needle and thread showed a significant increase. There were significant losses to needle-and-thread grass in 1999 (3% of grass cover), which was fairly abundant in 1994 and 2004 (40% and 23% of grass cover). There were significant losses to crested wheatgrass, Sandberg bluegrass, and western wheatgrass. Long-term drought has had a detrimental effect on most of the native grasses and forbs. Cheatgrass has greatly increased its downward influence on the successional development of this community. Cheatgrass was estimated at 2% of the grass cover in 1994, 36% in 1999, 27% in 2004.

1994 TREND ASSESSMENT

The trend for the soil is somewhat mixed, but the percentage of bare soil has not shown a significant change and the slight decrease in litter cover is to be expected with the extended drought. Trend for now is considered stable. The trend for the key browse is slightly down. Especially with a ratio of one in eight plants being dead. With the high biotic potential and establishment of the seedlings, this should turn around. The trend for the perennial species in the herbaceous understory is stable. The Desirable Components Index rated this site as excellent with a score of 69 due to good perennial grass and shrub cover.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable (3)
winter range condition (DC Index) - 69 (excellent) Wyoming big sagebrush type

1999 TREND ASSESSMENT

The trend for the soil is still somewhat mixed, however relative percent bare soil is very close to that of previous years. There appears to be some photographic evidence of more pedestaling of herbaceous species, but should be expected with the amount of bare soil there is on this site. Trend for soil is stable. The trend for the key browse is again slightly down. This is because the ratio of dead to live plants has increased from 1:8 (11%) to 1:5 (17%). Percent decadence has also increased from 10% to 20%. The percentage of decadent plants that were classified as dying has also increased from 33% to 36%. There has also been a significant increase in the low rabbitbrush population. The trend for the perennial species in the herbaceous understory would be down overall, even with the significant increases for crested wheatgrass and western wheatgrass. These increases have not made up for the decreases for the other five native perennial species. Cheatgrass is increasing to where it elevates the hazard of fire which would cause the loss of the sagebrush component and the communities use as a big game winter range. The Desirable Components Index rated this site as good with a score of 56 due to good perennial grass, increased decadence, and increased annual grasses (cheatgrass).

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - down (1)
winter range condition (DC Index) - 56 (good) Wyoming big sagebrush type

2004 TREND ASSESSMENT

The trend for soil is stable. Bare ground has remained at previous levels, although there is still some pedestaling around the base of plants. Trend for key browse continues to be slightly down. Density for Wyoming big sagebrush has continually declined since 1987. The main difference from 1999 to 2004 has been the number of young plants in the population. Use on sagebrush has increased from 54% to 87% showing moderate to heavy use. Percent decadency increased from 20% in 1999 to 25% in 2004. Percent dying has also increased from 7% in 1999 to 12% in 2004. Trend for the herbaceous understory is slightly down. Crested wheatgrass and western wheatgrass declined significantly, but needle-and-thread grass increased significantly. Overall, cheatgrass remained the same, but perennial grasses decreased. Forbs increased in percent cover and sum of nested frequency, but they contribute little (8%) to total vegetation cover. The Desirable Components Index rated this site as good with a score of 53 due to good perennial grass, increased decadence, and increased annual grasses (cheatgrass).

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 53 (good) Wyoming big sagebrush type

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{a}$57	$_{ab}$79	$_{c}$211	$_{b}$94	2.23	8.42	6.65
G	Agropyron smithii	$_{a}$8	$_{b}$42	$_{b}$64	$_{a}$13	.31	.49	.09
G	Bromus inermis	-	1	1	-	.00	.00	-
G	Bromus tectorum (a)	-	$_{a}$83	$_{b}$237	$_{b}$212	.32	7.39	5.36
G	Oryzopsis hymenoides	$_{a}$24	$_{b}$66	$_{a}$25	$_{a}$35	1.71	.83	1.22
G	Poa fendleriana	$_{c}$232	$_{b}$146	$_{a}$97	$_{a}$75	3.84	2.91	1.77
G	Poa secunda	$_{b}$20	$_{c}$47	$_{b}$14	$_{a}$-	.53	.07	-
G	Sitanion hystrix	$_{b}$24	$_{b}$18	$_{a}$1	$_{a}$4	.13	.03	.03
G	Stipa comata	$_{c}$221	$_{b}$168	$_{a}$26	$_{b}$135	6.00	.63	4.50
G	Vulpia octoflora (a)	-	1	1	5	.00	.00	.15
Total for Annual Grasses		0	84	238	217	0.32	7.39	5.51
Total for Perennial Grasses		586	567	439	356	14.77	13.41	14.28
Total for Grasses		586	651	677	573	15.10	20.81	19.80
F	Agoseris glauca	-	-	-	1	-	-	.00
F	Antennaria rosea	-	3	-	-	.00	-	.03
F	Arabis spp.	$_{a}$-	$_{b}$17	$_{a}$-	$_{a}$-	.04	-	-
F	Astragalus convallarius	$_{a}$11	$_{b}$35	$_{a}$3	$_{b}$28	1.37	.00	1.37
F	Castilleja chromosa	6	4	-	-	.04	-	-
F	Cirsium spp.	-	3	-	-	.00	-	-
F	Cordylanthus wrightii (a)	$_{ab}$16	$_{ab}$17	$_{a}$2	$_{b}$21	.04	.03	.15
F	Crepis acuminata	$_{b}$9	$_{ab}$5	$_{a}$-	$_{a}$2	.01	-	.00
F	Cryptantha spp.	$_{b}$12	$_{b}$8	$_{a}$-	$_{ab}$3	.02	-	.00
F	Draba reptans (a)	-	$_{c}$39	$_{b}$4	$_{a}$-	.09	.00	-
F	Erigeron pumilus	8	3	1	4	.00	.00	.03
F	Gayophytum ramosissimum(a)	-	$_{b}$13	$_{a}$-	$_{a}$-	.02	-	-
F	Lappula occidentalis (a)	-	$_{ab}$5	$_{a}$-	$_{b}$11	.01	-	.05
F	Microsteris gracilis (a)	-	$_{b}$73	$_{a}$15	$_{a}$7	.38	.03	.04
F	Petradoria pumila	-	3	-	-	.03	-	-
F	Phlox longifolia	$_{a}$-	$_{c}$98	$_{a}$-	$_{b}$37	.27	-	.17
F	Polygonum douglasii (a)	-	$_{c}$49	$_{a}$-	$_{b}$8	.10	-	.03

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Ranunculus testiculatus (a)	-	12	-	-	.02	-	-
F	Sphaeralcea coccinea	$_{a}$17	$_{b}$78	$_{b}$64	$_{b}$78	.57	.71	1.21
F	Taraxacum officinale	$_{ab}$1	$_{c}$12	$_{a}$-	$_{ab}$2	.04	-	.00
F	Tragopogon dubius	1	-	-	-	-	-	-
F	Trifolium gymnocarpon	$_{c}$118	$_{c}$102	$_{a}$3	$_{b}$47	.32	.00	.21
F	Unknown forb-perennial	3	-	-	-	-	-	-
F	Zigadenus paniculatus	$_{b}$15	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
Total for Annual Forbs		16	208	21	47	0.68	0.06	0.27
Total for Perennial Forbs		201	371	71	202	2.74	0.72	3.05
Total for Forbs		217	579	92	249	3.43	0.79	3.33

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

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

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

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

Species	Percent Cover '04
Artemisia tridentata wyomingensis	9.68
Chrysothamnus viscidiflorus viscidiflorus	5.76
Eriogonum microthecum	.01
Opuntia polyacantha	1.96
Pinus edulis	1.29

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

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

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

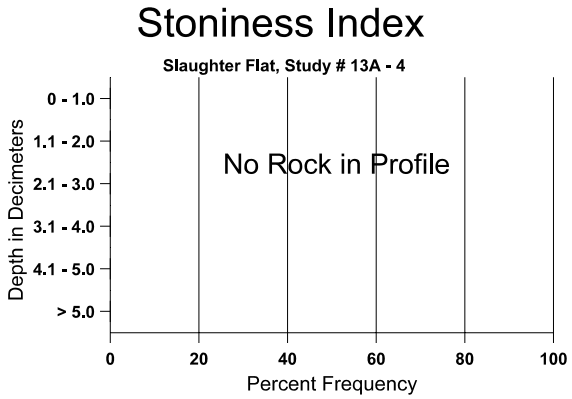
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	16	24	2.9	3.5
Pinus edulis	18	22	2.7	3.8

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
13.5	71.0 (10.5)	7.2	52.9	19.8	27.3	1.9	50.4	89.6	0.4



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

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	11	19	11
Elk	41	34	33
Deer	14	36	28
Cattle	1	1	1

Days use per acre (ha)	
'99	'04
-	-
53 (131)	37 (91)
25 (62)	27 (68)
22 (53)	1 (2)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**33**	-	33	-	-	-	0	100	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	44/54
99	**0**	-	-	-	-	-	0	0	-	-	0	37/51
04	**0**	-	-	-	-	-	0	0	-	-	0	52/67
Artemisia tridentata wyomingensis												
87	**3298**	-	866	2166	266	-	40	22	8	-	6	23/22
94	**2940**	440	380	2260	300	360	14	2	10	3	21	19/28
99	**2560**	60	420	1640	500	480	34	20	20	7	7	20/28
04	**2340**	440	40	1720	580	520	58	29	25	12	12	19/29

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus albicaulis												
87	**33**	-	-	33	-	-	0	100	0	-	0	31/28
94	**20**	-	-	-	20	-	0	0	100	-	0	32/27
99	**20**	-	-	-	20	-	100	0	100	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Chrysothamnus viscidiflorus viscidiflorus												
87	**4133**	100	1233	2400	500	-	3	0	12	-	0	5/10
94	**6960**	1380	580	6300	80	60	.28	0	1	.28	.28	5/12
99	**7340**	220	1120	6120	100	-	10	0	1	-	0	5/12
04	**6220**	20	120	5880	220	60	0	0	4	3	3	7/13
Coryphantha vivipara arizonica												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**40**	-	-	40	-	-	0	0	-	-	0	3/3
04	**20**	-	-	20	-	-	0	0	-	-	0	4/4
Eriogonum microthecum												
87	**33**	-	-	33	-	-	0	100	-	-	0	12/7
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	6/9
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
87	**232**	33	66	166	-	-	0	0	-	-	0	7/6
94	**200**	120	100	100	-	-	0	0	-	-	0	1/2
99	**40**	-	-	40	-	20	0	0	-	-	0	8/10
04	**120**	-	-	120	-	-	0	0	-	-	0	5/9
Juniperus osteosperma												
87	**33**	-	33	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Opuntia polyacantha												
87	**1166**	133	433	600	133	-	0	0	11	-	26	5/7
94	**2200**	200	560	1480	160	60	0	2	7	2	13	4/16
99	**2420**	40	340	1800	280	240	0	2	12	4	6	4/10
04	**2300**	-	260	1860	180	-	0	0	8	-	.86	5/11

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pediocactus simpsonii												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	20	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	20	20	-	-	-	0	0	-	-	0	-/-
04	**20**	-	20	-	-	-	0	0	-	-	0	-/-

Trend Study 13A-5-04

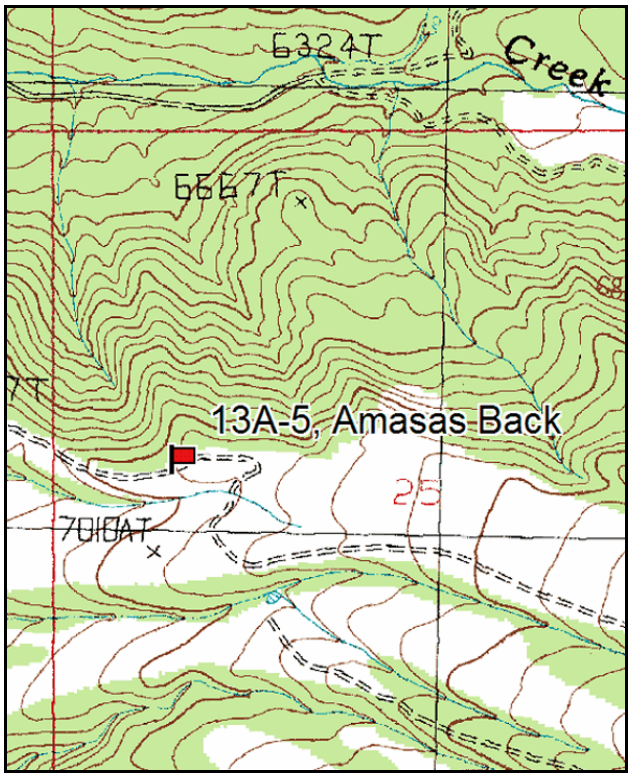
Study site name: Amasas Back . Vegetation type: Chained, Seeded P-J .

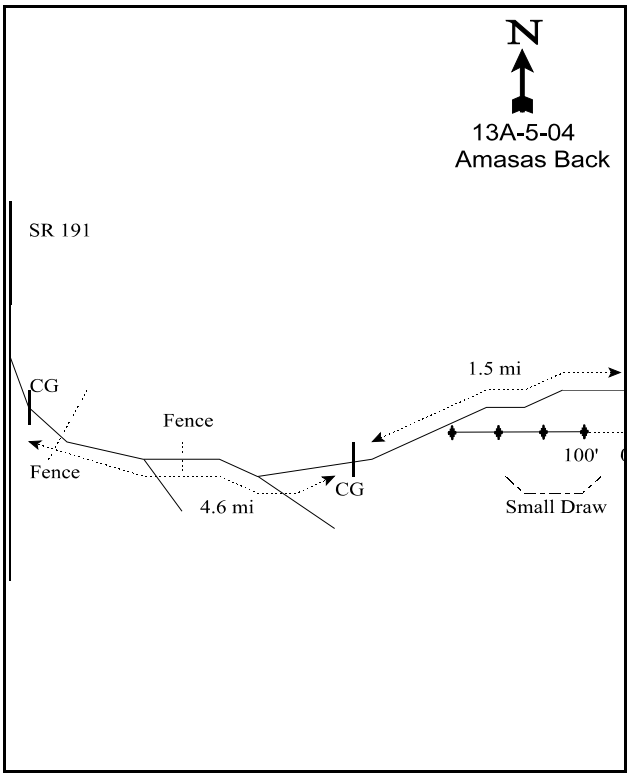
Compass bearing: frequency baseline 247 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Mount Tukuhnikivatz

Diagrammatic Sketch

Township 27S , Range 23E , Section 25

GPS: NAD 27, UTM 12S 4254123 N, 644396 E

DISCUSSION

Amasas Back - Trend Study No. 13A-5

The Amasas Back study site is another area of critical big game winter range on the west side of the LaSal mountains. This can be demonstrated by the pellet group transects done on the site in 1999 and 2004. Pellet group data from 1999 estimated 34 deer (84 ddu/ha) and 54 elk days use/acre (133 edu/ha). In 2004, pellet group data estimated 20 deer (50 ddu/ha) and 19 elk days use/acre (46 edu/ha). This study samples a 750 acre chaining and seeding project that was completed in 1978 on the lower elevational limits of Forest Service administered land. The site demonstrates moderate encroachment of pinyon and juniper which has initiated some discussion and planning for future treatment with a roller-chopper. The study is located at an elevation of about 7,000 feet on a moderately sloping (15-18%) hillside facing south into a dry wash and an untreated pinyon-juniper woodland type.

The soil is a very rocky, sandy clay loam with rocks on the surface ranging in size from large rocks to small boulders that have been left on the surface from past erosion. The soil appears to be moderately shallow (effective rooting depth of less than 10 inches) as indicated by the dominance of the shallow-rooted species, black sagebrush. There are some areas showing some compaction and some soil loss on cattle trails, but overall there appears to be little current erosion. The erosion condition class determined soil movement as stable in 2004. The site has a mildly alkaline soil (7.5 pH). Soil phosphorus could be a limiting factor at 7.5 ppm. Values below 10 ppm may limit normal plant growth and development. Percent organic matter is average for sites in this area. Winter annuals could be quite successful on this type of site with these warm soil temperatures (71°F at 23cm).

Black sagebrush is the key browse, although there may be some hybridization with Wyoming big sagebrush. Black sagebrush made up 57% of the browse cover in 1994, 39% in 1999, and 28% in 2004. Overall browse cover has increased, but this is predominantly due to pinyon-juniper increase. Density of black sagebrush has remained stable at 2,000 plants/acre in 1999 and 2004, although density decreased from 2,720 plants/acre in 1994. Percent decadence has remained at 17% for 1999 and 2004,but this is an increase from 8% in 1994. Young recruitment has decreased from 8% of the population in 1999 to only 1% in 2004. Vigor is good while utilization has increased to mostly moderate hedging classification. Other desirable browse plants are limited but include fourwing saltbush and antelope bitterbrush.

The pinyon pine and juniper are becoming more dominant on the chaining where many plants are at the height of 8-10 feet. Point quarter data from 1994 and 1999 show densities that are almost the same with estimates of 89 trees/acre for pinyon and 104 trees/acre for juniper. Average diameter of juniper was 3.8 inches while that of pinyon was 2.3 inches. Point quarter for 2004 estimated 101 pinyon trees and 99 juniper trees/acre with an average diameter of 2.6 inches for pinyon and 4.8 inches for juniper. Line-intercept estimated canopy cover for juniper and pinyon is just over 18%. The way it has increased from 1999 to 2004, canopy cover by 2009 will easily be greater than 25%. At this high a value, understory cover will generally on average be less than 2%. Without active management intervention, this site will further deteriorate, making it more difficult and costly to rehabilitate. At this time, a roller chopper would be the first choice for treating the area. It would do an excellent job of selectively removing unwanted pinyon and juniper trees and still leave most of the understory in place. Aerially seeding with a mixture of herbaceous species and/selected shrubs before the treatment would allow the p-j litter to cover the seed. Establishment of a good competitive understory is essential because of the high amounts of cheatgrass on the site.

The seeded wheatgrasses were more prevalent in the past, where now they provide about 31% of the grass cover, likely due to the drought conditions and competition from the increasing juniper and pinyon. Cheatgrass contributed 74% of the grass cover in 1994, 60% in 1999, and 55% in 2004. Decrease in cover is mostly due to drought conditions, nested frequency demonstrates a significant decrease. Perennial forb density

and diversity is low. Sixteen species were encountered in 1994, which has decreased to 11 species in 1999, and 9 species in 2004. The only forb species found with fair cover currently and in the past is rock goldenrod, although thickleaf peavine was fairly abundant in 1994. Rock goldenrod makes up 81% of the total forb cover.

1994 TREND ASSESSMENT

The soil trend is considered slightly improved, but stable overall. There has been some loss of the liter cover, which would be expected with the extended drought, but percent bare ground has decreased slightly. The browse trend is stable to improving with an increased biotic potential and stable rate of decadence. There was a slight increase in those considered in poor vigor, but this will turn around with more normal precipitation patterns. The increase in the number of broom snakeweed found on the site is likely due to the larger sample size taken in 1994 which better estimates plants with a clumped or discontinuous distribution. The trend for the herbaceous understory is down, as the perennial grass species have greatly decreased nested frequency values and the perennial forb species have increased slightly, but they have cover values half that of the grasses. The Desirable Components Index rated this site as fair with a score of 43 due to fair perennial grass, few young shrubs, and high annual grasses (cheatgrass).

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down (1)
winter range condition (DC Index) - 43 (fair) Black sagebrush type

1999 TREND ASSESSMENT

The soil trend is still considered stable. There has been some loss in litter cover since 1987, but it has been stable between 1994 and 1999. Percent bare soil has also remained about the same. The browse trend for the key species (black sagebrush) is down. In 1994, it provided 57% of the browse cover, now it has gone down to only 39%. Conversely, cover for pinyon and juniper has increased from 34% of the browse cover to now where it provides 57% of the cover. There were no dead plants noted in 1994, now the ratio of dead to live is 1:7.2 (14% dead). Percent decadence has also increased from 8% to 18%. All this change has occurred with mostly light to moderate use. The long-term drought and competition of increasing p-j trees, coupled with shallow soils and moderately high soil temperatures have caused significant losses to this population. There was a slight increase in those considered in poor vigor, but this should turn around with more normal precipitation patterns. The increase in the number of broom snakeweed found on the site has actually decreased, a typical response to drought. The trend for the herbaceous understory is slightly down for the perennial grasses and forbs. The annual component of the herbaceous species fluctuated, however, one thing that is constant is that cheatgrass is increasing. The Desirable Components Index rated this site as fair with a score of 42 due to fair perennial grass, few young shrubs, and high annual grasses (cheatgrass).

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 42 (fair) Black sagebrush type

2004 TREND ASSESSMENT

The trend for soil continues to be stable. Protective cover has remained similar to previous values. Bare soil has also remained about the same. The trend for key browse, black sagebrush, is slightly down. Black sagebrush cover has remained at roughly 7% and density is still around 2,000 plants/acre. Percent decadence is still at a moderate value of 17%. The ratio of dead plants to live plants increased from 1:7.2 (14%) in 1999 to 1:4.8 (21%) in 2004. Young recruitment is still low and is not producing enough young plants to replace those that are dying. Moderate-heavy hedging did increase from 37% to 57% which now show this use. The trend for the herbaceous understory is slightly down. Nested frequency for perennial forbs and grasses has decreased although cover has remained similar to previous values. Cheatgrass nested frequency decreased significantly, although it is still very abundant on the site. The Desirable Components Index rated this site as fair with a score of 39 due to decreased perennial grasses, few young shrubs, and high annual grasses (cheatgrass).

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 39 (fair) Black sagebrush type

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	94	65	83	78	2.66	3.08	3.42
G	Agropyron intermedium	$_{b}$137	$_{a}$48	$_{a}$49	$_{a}$37	1.01	1.23	1.18
G	Bromus japonicus (a)	$_{c}$31	$_{b}$7	$_{b}$2	$_{a}$-	.15	.01	-
G	Bromus tectorum (a)	-	$_{b}$317	$_{b}$333	$_{a}$280	16.43	9.10	8.30
G	Hilaria jamesii	-	13	22	17	.13	.66	.98
G	Oryzopsis hymenoides	$_{b}$56	$_{ab}$30	$_{ab}$24	$_{a}$19	1.12	.79	.86
G	Poa fendleriana	$_{b}$36	$_{ab}$26	$_{ab}$19	$_{a}$6	.43	.24	.08
G	Sitanion hystrix	$_{c}$64	$_{b}$33	$_{ab}$16	$_{a}$6	.14	.17	.10
G	Sporobolus cryptandrus	-	-	-	1	-	-	.15
Total for Annual Grasses		31	324	335	280	16.58	9.11	8.30
Total for Perennial Grasses		387	215	213	164	5.51	6.18	6.77
Total for Grasses		418	539	548	444	22.09	15.30	15.07
F	Arabis perennans	$_{c}$12	$_{bc}$6	$_{a}$-	$_{b}$2	.01	-	.00
F	Astragalus convallarius	$_{a}$-	$_{bc}$10	$_{c}$15	$_{b}$2	1.54	.43	.18
F	Astragalus coltoni	2	3	2	-	.03	.01	-
F	Castilleja linariaefolia	-	3	-	-	.01	-	-
F	Chenopodium fremontii (a)	-	-	-	1	-	-	.00
F	Cryptantha humilis	-	-	-	-	.00	-	-
F	Cymopterus spp.	-	-	1	-	-	.03	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Descurainia pinnata (a)	-	5	2	-	.01	.00	-
F	Draba reptans (a)	-	$_{c}$61	$_{b}$3	$_{a}$-	.15	.03	-
F	Erigeron pumilus	3	-	-	-	-	-	-
F	Gilia spp. (a)	-	$_{b}$36	$_{a}$5	$_{a}$14	.08	.01	.02
F	Lathyrus lanszwertii	$_{a}$2	$_{b}$81	$_{b}$56	$_{a}$8	2.56	.74	.10
F	Lesquerella spp.	-	1	6	-	.00	.01	-
F	Machaeranthera canescens	5	3	-	-	.00	-	-
F	Microsteris gracilis (a)	-	$_{c}$46	$_{a}$5	$_{b}$31	.12	.01	.09
F	Petradoria pumila	$_{a}$34	$_{b}$75	$_{b}$62	$_{ab}$48	4.05	2.96	2.20
F	Phlox longifolia	-	7	-	3	.02	-	.00
F	Ranunculus testiculatus (a)	-	6	-	-	.04	-	-
F	Sphaeralcea coccinea	-	6	8	9	.41	.07	.09
Total for Annual Forbs		0	154	15	46	0.40	0.07	0.12
Total for Perennial Forbs		58	195	150	72	8.67	4.26	2.60
Total for Forbs		58	349	165	118	9.07	4.33	2.72

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

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

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

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

Species	Percent Cover	
	'99	'04
Artemisia nova	-	10.10
Artemisia tridentata wyomingensis	-	.75
Atriplex canescens	-	.80
Gutierrezia sarothrae	-	.71
Juniperus osteosperma	1.00	12.80
Pinus edulis	-	5.23
Purshia tridentata	-	.10

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

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

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

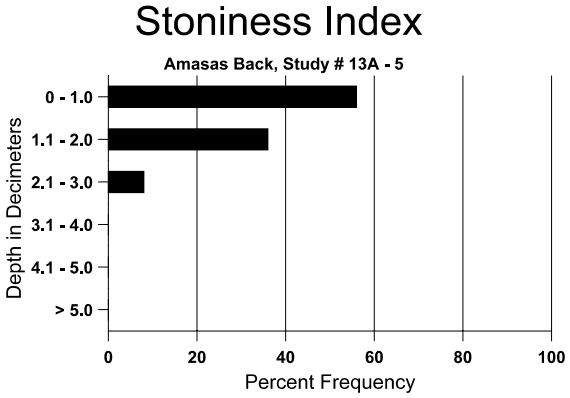
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	104	99	3.8	4.8
Pinus edulis	89	101	2.7	2.6

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
9.7	71.0 (9.1)	7.5	50.9	19.8	29.3	3.5	7.5	96.0	0.6



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

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	9	20	12
Elk	7	20	22
Deer	13	23	12

Days use per acre (ha)	
'99	'04
-	-
54 (133)	19 (46)
34 (84)	20 (50)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia nova												
87	**2333**	-	400	1733	200	-	27	1	9	-	10	12/16
94	**2720**	160	200	2300	220	-	22	1	8	1	23	18/31
99	**2020**	-	160	1500	360	280	31	6	18	5	6	17/27
04	**2000**	60	20	1640	340	420	52	5	17	7	7	14/24
Artemisia tridentata wyomingensis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	34/56
99	**40**	-	-	40	-	-	100	0	-	-	0	30/34
04	**60**	-	-	60	-	-	0	100	-	-	0	19/36

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Atriplex canescens												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**80**	-	20	60	-	-	0	0	0	-	0	36/44
99	**100**	-	40	40	20	-	60	40	20	-	0	34/40
04	**100**	-	-	100	-	-	40	60	0	-	0	38/52
Coryphantha vivipara arizonica												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**40**	-	20	20	-	-	0	0	-	-	0	3/8
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Ephedra viridis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**100**	-	20	80	-	100	0	80	-	-	0	11/6
99	**40**	-	-	40	-	-	0	50	-	-	0	19/23
04	**40**	-	-	40	-	-	50	0	-	-	0	15/27
Gutierrezia sarothrae												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**660**	40	120	420	120	20	0	0	18	3	3	8/11
99	**420**	-	80	340	-	100	0	0	0	-	0	8/11
04	**1600**	-	240	1360	-	20	0	0	0	-	0	7/11
Juniperus osteosperma												
87	**100**	-	-	100	-	-	0	0	-	-	0	46/31
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**220**	-	60	160	-	40	0	0	-	-	0	-/-
04	**160**	-	20	140	-	20	0	0	-	-	0	-/-
Opuntia erinacea												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	20	-	20	-	-	0	0	-	-	100	2/4
99	**0**	-	-	-	-	-	0	0	-	-	0	5/15
04	**40**	-	-	40	-	-	0	0	-	-	0	5/21
Pediocactus simpsonii												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**40**	-	20	20	-	-	0	0	0	-	0	1/3
04	**60**	-	-	40	20	-	0	0	33	33	33	4/7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**120**	-	40	80	-	-	0	0	0	-	0	-/-
04	**120**	-	20	80	20	-	0	0	17	17	17	-/-
Purshia tridentata												
87	**33**	-	-	33	-	-	100	0	-	-	0	5/11
94	**0**	-	-	-	-	-	0	0	-	-	0	16/29
99	**0**	-	-	-	-	-	0	0	-	-	0	19/43
04	**20**	-	-	20	-	-	0	100	-	-	0	13/31
Yucca baccata baccata												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	4/8
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 13A-6-04

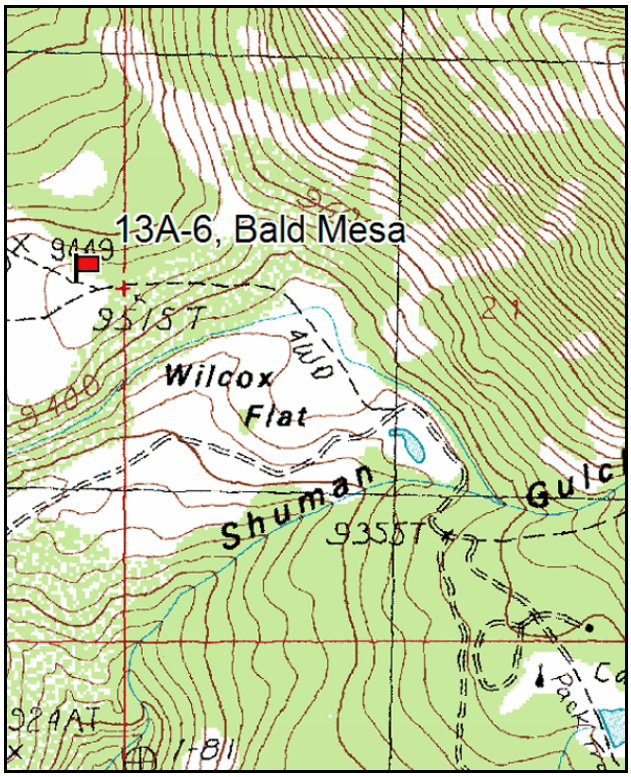
Study site name: Bald Mesa . Vegetation type: Mixed Mtn Brush .

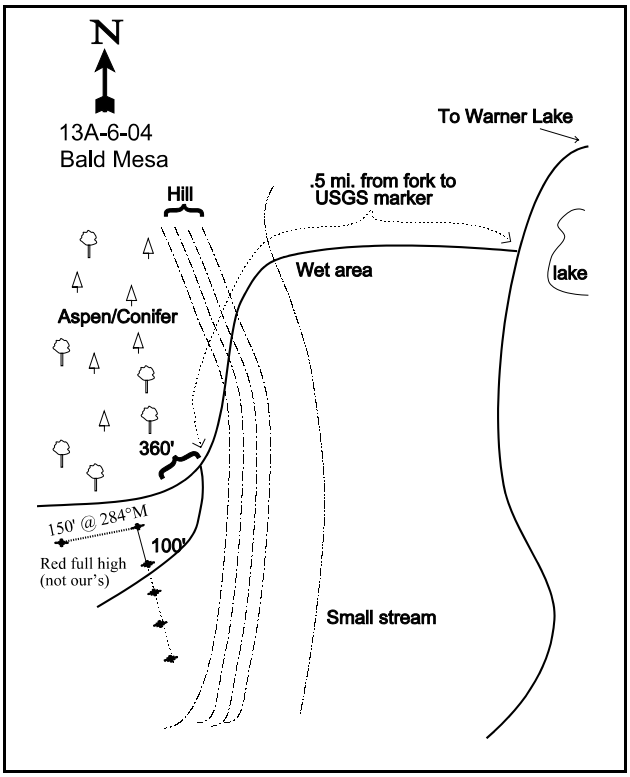
Compass bearing: frequency baseline 185 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Warner Lake

Diagrammatic Sketch

Township 26S , Range 24E , Section 20

GPS: NAD 27, UTM 12S 4265472 N, 649257 E

DISCUSSION

Bald Mesa - Trend Study No. 13A-6

Bald Mesa is just west of the high LaSal peaks. This trend study samples a typical high elevation mesa that supports a mountain brush-forb-grass vegetation type. This type occupies only a small percentage of the high country. Here, it is bounded to the north and east by aspen and conifer forests. This area is part of the Bald Mesa grazing allotment and is used mostly as summer range for cattle with some big game use. Pellet group data from 1999 estimated 9 elk (22 edu/ha) and 84 cow days use/acre (207 cdu/ha). Pellet group data from 2004 estimated 5 elk (13 edu/ha), 1 deer (3 ddu/ha), and 112 cow days use/acre (276 cdu/ha).

The fairly level mesa has a southwest aspect on a gentle 2% slope and an elevation of 9,500 feet. It is a productive site, rich in species and should receive annual precipitation in excess of 20 inches. The clay loam soil is slightly acidic (6.2 pH) and gravelly with scattered rock on the surface. Effective rooting depth is 15 inches. Phosphorus could be a limiting factor on this site at 6.1 ppm. Values below 10 ppm may limit normal plant growth and development. No significant erosion has occurred on the site, although the access roads (which have now been closed) are washed out and severely eroded. The erosion condition class determined soil movement as stable in 2004.

Snowberry forms the dominant shrub cover on this open site which comprised 67% of the shrub cover in 1994, 1999, and 2004. The plants are vigorous with mostly light use, but some showing moderate use. The mountain big sagebrush on the site showed little use and good vigor in 2004. Because of the moderately high elevation, it would not normally be used as a winter range. Consequently, browse is not a critical component for this site. Density for the mountain big sagebrush population for 1994 and 1999 was 620 plants/acre, and 1,540 for 2004. The browse component only makes up approximately 25% of the total vegetative cover. Other browse species found on the site include wax currant, Gooseberry currant, low rabbitbrush, and Wood's rose.

Herbaceous vegetation forms a diverse and dense understory. Forbs are abundant with them providing almost 49% in 1994, 41% in 1999, and 52% of the total vegetative cover in 2004. These species provide valuable summer forage. More than 30 forb species have been encountered on the site in 1994, 1999, and 2004. The most common species include Ballhead sandwort, Astragulus spp., Oregon fleabane, Silky lupine, and Silverweed cinquefoil. Grasses are also quite dense providing 23% of the vegetative cover in 1994, 33% in 1999, and 15% in 2004. Kentucky bluegrass makes up the bulk of the grass cover, but was significantly reduced in 2004 from previous readings. The majority of the herbaceous species on this site are classified as increasers with heavy grazing. The dense herbaceous understory accounts for a high amount of the vegetative cover (on average, 67% of the total vegetative cover).

1994 TREND ASSESSMENT

The soil trend is stable with percent bare ground at only 6%. Percent litter cover has decreased somewhat, but this has occurred on all sites with the extended drought conditions and will turn around with more normal precipitation patterns. The browse trend is mixed, for most all species it is stable except for mountain big sagebrush which has some downward population trends, but it only contributes 5% of the browse cover or 1% of the total vegetative cover. Another important consideration is that browse would not be a "key" species for this summer range. Trend for browse would therefore be considered stable and relatively insignificant for this range type. Trend for the herbaceous understory is slightly down with nested frequency values for grasses and forbs falling since 1987. This downward trend has most likely been caused by the long term drought we have been experiencing since 1985, coupled with moderately high use be livestock. The Desirable Components Index is not calculated for this site because it is a summer range.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly down (2)

1999 TREND ASSESSMENT

The soil trend is stable with percent bare ground down to only 5%. Percent litter cover has increased from 40% to 55%. The browse trend is mixed, but on average it only contributes 27% of the total vegetative cover. Another important consideration is that browse would not be a "key" species for this summer range. Trend for browse would therefore be considered stable. Trend for the herbaceous understory is down with lower nested frequency values. They are slightly down for grasses and substantially down for forbs which make up 55% of the herbaceous cover. This downward trend has mostly been caused by the many years of drought we have been experiencing since 1985 and the moderately high livestock use. The Desirable Components Index is not calculated for this site because it is a summer range.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly down (2)

2004 TREND ASSESSMENT

The trend for soil is slightly down. Percent bare ground increased from 4% relative cover to 11%. Litter decreased from 41% relative cover to 27%, although protective cover is still substantial enough to protect against most erosion events. Trend for key browse species (mountain big sagebrush) is up but not of consequence for this summer range. Therefore, trend for browse will be considered stable. Sagebrush density increased from 620 plants/acre in 1999 to 1,540 plants/acre in 2004. With persistent heavy use by livestock, the density of mountain big sagebrush would be expected to continue increasing, especially in association with continuing drought. Snowberry is also abundant, although both browse species are not considered "key" species for this summer range. Trend for herbaceous understory continues to be going down slightly. Recall that livestock use has continued to be high, on average since 1999, cow days use/acre has been 98 cow days use/acre. Nested frequency of forbs and grasses have continually decreased since 1987. Kentucky bluegrass, western yarrow, and common dandelion were the major grasses and forbs that declined. The Desirable Components Index is not calculated for this site because it is a summer range.

TREND ASSESSMENT
soil - slightly down (2)
browse - up (3)
herbaceous understory - slightly down (2)

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron spp.	[b]128	[a]-	[a]1	[a]-	-	.01	-
G	Bromus anomalus	1	5	-	-	.04	-	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Carex spp.	4	-	5	8	-	.03	.53
G	Dactylis glomerata	-	-	5	5	-	.04	.03
G	Koeleria cristata	a-	b35	b27	b25	.36	.21	.25
G	Phleum pratense	-	-	5	-	-	.15	-
G	Poa arida	b136	a28	a17	a3	.54	1.07	.03
G	Poa fendleriana	-	-	3	-	-	.03	-
G	Poa pratensis	b257	c332	c346	a237	12.42	22.36	8.07
G	Sitanion hystrix	a34	b57	ab45	ab40	.80	.72	.74
G	Stipa comata	b99	a49	a32	a28	1.14	.68	.33
G	Stipa lettermani	-	59	48	54	1.08	1.42	.90
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		659	565	534	400	16.42	26.75	10.90
Total for Grasses		659	565	534	400	16.42	26.75	10.90
F	Achillea millefolium	b102	b125	b110	a42	2.53	2.02	.49
F	Agoseris glauca	-	14	19	7	.08	.12	.07
F	Androsace septentrionalis (a)	16	-	-	-	-	-	-
F	Arenaria congesta	a181	b240	a195	b255	8.03	5.33	13.60
F	Arabis drummondi	b38	a-	a-	a-	-	-	-
F	Aster chilensis	a-	c50	a-	b12	.89	-	.24
F	Astragalus miser	d226	c191	b72	a-	7.73	3.42	-
F	Aster spp.	a-	a-	a-	b13	-	-	.15
F	Astragalus spp.	a-	a-	b179	b183	-	7.96	7.79
F	Castilleja linariaefolia	a-	c19	cd15	b3	.26	.30	.01
F	Carduus nutans (a)	-	-	-	-	-	-	.00
F	Calochortus nuttallii	a-	ab3	b13	ab5	.01	.08	.01
F	Chenopodium album (a)	-	-	1	-	-	.00	-
F	Cirsium calcareum	b51	c108	b52	a4	1.19	1.97	.19
F	Clematis hirsutissima	b13	a-	a-	a-	-	-	-
F	Comandra pallida	28	21	31	14	.33	.78	.10
F	Collinsia parviflora (a)	-	-	1	1	-	.00	.00
F	Crepis acuminata	15	18	18	2	.16	.45	.06
F	Delphinium nuttallianum	c75	b8	a-	ab6	.08	-	.02
F	Erigeron flagellaris	88	52	29	55	.33	.21	1.31
F	Eriogonum racemosum	61	65	56	56	1.35	.84	.89
F	Erigeron speciosus	ab39	bc65	a15	c80	1.98	.27	3.97
F	Eriogonum umbellatum	b12	b6	b2	a-	.01	.15	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Galium boreale	-	5	4	4	.53	.41	.18
F	Holosteum umbellatum (a)	-	-	5	-	-	.01	-
F	Ipomopsis aggregata	2	3	3	-	.00	.00	-
F	Lathyrus brachycalyx	-	-	-	-	-	.53	-
F	Lomatium dissectum	-	3	1	7	.00	.38	.53
F	Lupinus argenteus	-	8	-	-	.33	-	-
F	Lupinus sericeus	$_{b}$117	$_{a}$49	$_{a}$41	$_{a}$40	2.83	2.66	2.12
F	Lychnis drummondii	-	-	2	-	-	.01	-
F	Mertensia brevistyla	$_{b}$8	$_{ab}$3	$_{a}$-	$_{a}$-	.00	-	-
F	Penstemon crandallii	-	2	6	10	.03	.06	.45
F	Penstemon palmeri	$_{c}$49	$_{b}$4	$_{b}$4	$_{a}$-	.15	.03	-
F	Petradoria pumila	$_{a}$-	$_{b}$26	$_{b}$31	$_{b}$29	.92	.51	1.46
F	Penstemon strictus	$_{a}$-	$_{c}$32	$_{bc}$31	$_{b}$9	.52	.61	.09
F	Phlox spp.	-	3	3	-	.15	.03	-
F	Potentilla anersina	64	95	78	84	2.24	1.72	2.71
F	Polygonum douglasii (a)	-	$_{a}$1	$_{ab}$15	$_{b}$22	.00	.03	.05
F	Senecio integerrimus	$_{c}$197	$_{b}$84	$_{a}$29	$_{a}$25	1.18	.29	.26
F	Sedum lanceolatum	$_{c}$22	$_{a}$1	$_{a}$-	$_{a}$2	.00	-	.03
F	Taraxacum officinale	$_{c}$172	$_{b}$66	$_{b}$65	$_{a}$20	.39	1.35	.35
F	Thalictrum fendleri	-	-	3	-	-	.30	-
F	Trifolium spp.	1	-	3	-	-	.00	-
F	Unknown forb-perennial	$_{b}$34	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Zigadenus paniculatus	2	-	-	-	-	-	-
Total for Annual Forbs		16	1	22	23	0.00	0.05	0.06
Total for Perennial Forbs		1597	1369	1110	967	34.35	32.89	37.12
Total for Forbs		1613	1370	1132	990	34.36	32.94	37.18

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

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

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

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

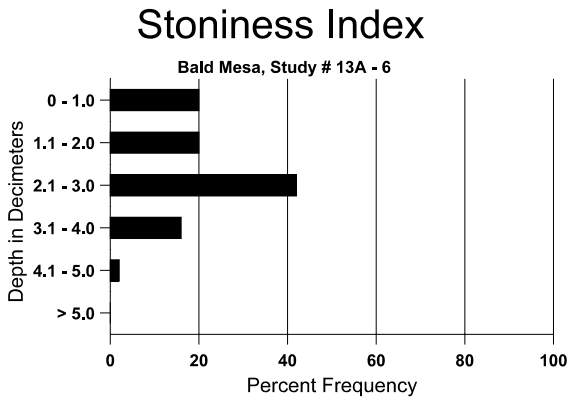
Species	Percent Cover '04
Artemisia tridentata vaseyana	.90
Chrysothamnus viscidiflorus lanceolatus	2.76
Ribes cereum cereum	2.95
Ribes montigenum	.15
Symphoricarpos oreophilus	18.35

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.0	49.6 (16.3)	6.2	40.2	32.6	27.3	5.0	6.1	2620.4	0.4



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

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

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

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
87	**933**	-	-	400	533	-	36	29	57	-	29	15/25
94	**620**	80	60	360	200	260	10	0	32	10	10	16/20
99	**620**	180	160	300	160	420	58	0	26	-	0	14/21
04	**1540**	-	680	760	100	40	1	0	6	4	4	13/17
Chrysothamnus viscidiflorus lanceolatus												
87	**2999**	133	1333	1200	466	-	44	9	16	-	0	13/21
94	**1340**	-	120	1220	-	-	0	0	0	-	0	14/18
99	**1060**	-	60	1000	-	20	4	0	0	-	0	14/18
04	**1320**	-	20	1300	-	-	8	0	0	-	0	13/18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Ribes spp.												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**180**	-	-	180	-	-	0	0	-	-	0	49/93
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Ribes cereum cereum												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	-	60	-	-	0	0	-	-	0	65/90
04	**60**	-	-	60	-	-	0	0	-	-	0	56/62
Ribes montigenum												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	-	60	-	-	0	0	-	-	0	34/37
04	**40**	-	-	40	-	-	0	0	-	-	0	26/24
Rosa woodsii												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	12/19
99	**20**	-	20	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	27/14
Sambucus racemosa												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**60**	-	-	60	-	-	0	0	-	-	0	29/40
99	**60**	-	20	40	-	-	0	0	-	-	0	35/39
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Sambucus racemosa melanocarpa												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	-	40	-	-	0	0	-	-	0	27/22
Symphoricarpos oreophilus												
87	**4798**	1866	3466	1066	266	-	31	1	6	-	0	25/23
94	**2100**	-	180	1920	-	-	0	0	0	-	0	22/50
99	**1400**	80	100	1140	160	20	13	1	11	-	0	25/42
04	**1360**	-	40	1280	40	-	0	0	3	1	1	21/48

Trend Study 13A-7-04

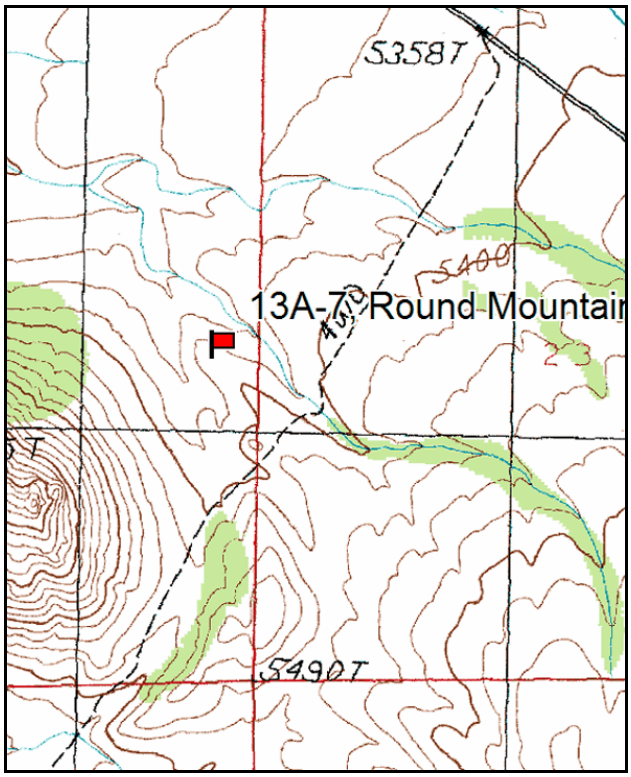
Study site name: Round Mountain . Vegetation type: Blackbrush .

Compass bearing: frequency baseline 165 degrees magnetic.

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

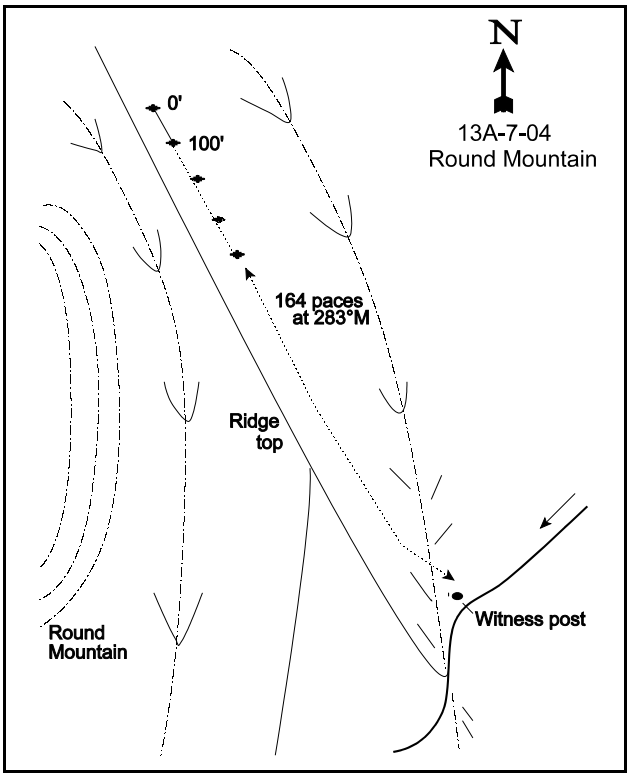
LOCATION DESCRIPTION

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



Map Name: Warner Lake

Township 25S , Range 23E , Section 22



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4275166 N, 643304 E

DISCUSSION

Round Mountain - Trend Study No. 13A-7

The Round Mountain study samples a blackbrush-sagebrush type near the center of Castle Valley, just east of Round Mountain, a prominent landmark. Castle Valley, on the northeast end of the LaSal Mountain range, is considered critical winter range for deer. Pellet group data from 1999 estimated 2 elk (5 edu/ha) and 78 deer days use/acre (193 ddu/ha). Pellet group data from 2004 estimated 106 deer days use/acre (263 ddu/ha). Much of the land in lower Castle Valley is managed by the Utah Division of State Lands and Forestry which allows winter use by cattle on this key wintering area. The study is located on a small ridge within the rolling foothills below Round Mountain. The elevation is 5,400 feet with a generally western exposure. Drainage of the area is northwest through Castle Valley to the Colorado River.

The soil is very rocky, both on the surface and within the soil. It is a moderately shallow, reddish sandy clay loam soil with an effective rooting depth of about 10 inches. It is mildly to moderately alkaline with a pH of 7.8. The most obvious limiting feature of the site is that the soil temperature at 10 inches is almost 70°F. This temperature would make it advantageous for annuals to dominate the herbaceous understory. Although it appears to be highly erodible, there is little evidence of current erosion. However, erosion has historically been a problem with large amounts of surface rock cover present. Current rock-pavement totals are quite high at almost 50%. Percent bare ground was fairly low, but only because of the high cover value for rock and pavement.

Shrubs provide the only forage available to deer in the winter. The key species, but not the most dominant, is Wyoming big sagebrush. The shallow-soiled ridge tops also support good populations of blackbrush. Wyoming big sagebrush made up 34% of the browse cover in 1994, 13% in 1999, and only contributes 5% of the browse cover in 2004. Density decreased from 1,720 plants/acre in 1999 to 680 plants/acre in 2004. Density plot information on sagebrush in 1987 appeared to indicate a stable population even when the plants showed heavy browsing use (64% of them at that time). In 1994, only 3% showed heavy use, 52% in 1999, and 85% in 2004. Percent decadence has been above 50% since 1994 and has rose to 85% in 2004. Since 1994, about 25% of the population has been classified as dying and this rose to 76% in 2004. This population is not displaying traits of a stable population. Seedlings (reproductive potential) and young (recruitment) were not sampled in 2004. This population is very susceptible to fire because of the amount of understory fine fuels (cheatgrass). All of the sagebrush would be lost if a wildfire occurred on this site because they are sensitive to fire and do not resprout after fire.

The blackbrush, which is more adapted to the high soil temperatures and drought, made up 46% of the browse cover in 1994, 52% in 1999, and 50% in 2004. The blackbrush shows moderate to heavy use. Density of blackbrush rose to a high in 1994 with 4,120 plants/acre. It then declined to 3,500 in 1999 and in 2004 the population was estimated at 3,720 plants/acre. Percent decadence increased from 2% in 1999 to 14% in 2004. Hedging on blackbrush increased from light to moderate use. Junipers are encroaching on this site. Point-center quarter data estimated 44 junipres/acre with an average diameter of 4.8 inches.

Herbaceous vegetation (grasses and forbs) are not an important component of this community; on average they only make up 28% of the total vegetative cover. Over 98% of the grass cover is contributed by annual grasses, mostly cheatgrass. Perennial grasses are few. All perennial species combined only contribute to less than one-tenth of one percent total cover. Mutton bluegrass is found mostly growing in the protection of shrub crowns. Total forb cover in 1999 and 2004 was less than 1%. There were 14 species of forbs found in 1994, 8 in 1999 and only 4 in 2004 of which all were annual species.

1994 TREND ASSESSMENT

The trend for soils would be slightly down because of the loss of much of the litter cover down to only 20% and relative percent bare ground has increased to 22%. The browse trend is down for Wyoming big sagebrush which is the primary key species for this site. More than 25% of the population is dead, a ratio of almost one in three plants. Biotic potential (number of seedlings) is zero, and the percentage of young plants (recruitment) has gone from 44% to only 3%. The trend for the herbaceous understory shows increased nested frequency values, but over 90% of the cover is contributed by annual species. Trend is down for the herbaceous understory. The Desirable Components Index rated this site as fair with a score of 31 due to low amount of perennial grasses, high decadent shrubs, and high annual grasses (cheatgrass).

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - down (1)
winter range condition (DC Index) - 31 (fair) Wyoming sagebrush type

1999 TREND ASSESSMENT

The trend for soils would be slightly down because of a continuing increases in percent cover for rock. The browse trend is down for both Wyoming big sagebrush and blackbrush which are the primary key species for this site. There have been losses in the population for both sagebrush and blackbrush, 26% and 15% respectively. More than one-third of the sagebrush population is dead. Biotic potential (number of seedlings) is zero, and the percentage of young plants (recruitment) is only 1%. The trend for the herbaceous understory shows increased nested frequency values, but over 90% of the cover is contributed by annual species. Trend is also down for the herbaceous understory. The Desirable Components Index rated this site as fair with a score of 29 due to low perennial grasses, high decadent shrubs, and high annual grasses (cheatgrass).

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - down (1)
winter range condition (DC Index) - 29 (fair) Wyoming sagebrush type

2004 TREND ASSESSMENT

The trend for soil is stable, but very poor condition. Sixty-two percent of the surface is bare soil or rock. Percent bare ground, vegetation, rock, and litter have remained similar to 1999 values. The browse trend for key species, Wyoming big sagebrush and blackbrush, is down. Percent cover for Wyoming big sagebrush has continually decreased to point where it provides less than 5% cover. Density has dramatically decreased from 1,720 plants/acre in 1999 to 680 in 2004. Eighty-five percent are now decadent, with three-fourths of these being classified as dying. Blackbrush is not declining as rapidly as sagebrush, but it too decreased in percent cover and percent decadence also increased as well. The trend for the herbaceous under story continues to be down. The understory is dominated by annuals, 96% is cheatgrass. Nested frequency of cheatgrass did decrease significantly, while cover and frequency are still high. The Desirable Components Index rated this site as poor with a score of 20 due to low abundance of perennial grasses, high decadence in shrubs, and high density of annual grasses (cheatgrass).

TREND ASSESSMENT
soil - stable (3) and very poor condition, it can't go down much further
browse - down (1)
herbaceous understory - down (1)
winter range condition (DC Index) - 20 (poor) Wyoming sagebrush type

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

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

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

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

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

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

Species	Percent Cover	
	'99	'04
Artemisia tridentata wyomingensis	-	1.00
Coleogyne ramosissima	-	13.69
Gutierrezia sarothrae	-	1.53
Juniperus osteosperma	4.00	5.34

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

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

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

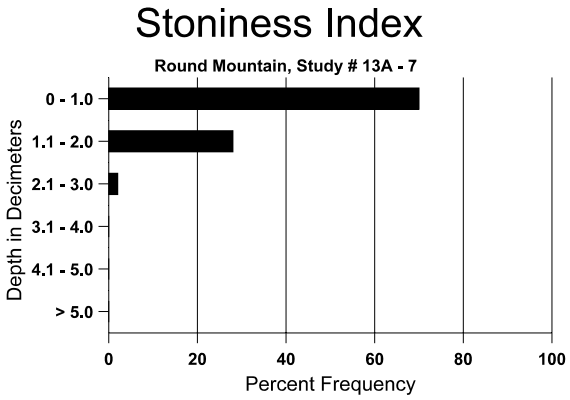
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	46	44	2.8	4.8
Pinus edulis	23	-	3.3	-

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
9.6	76.0 (9.3)	7.8	58.9	19.8	21.3	1.9	60.4	48.0	0.4



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

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

Days use per acre (ha)	
'99	'04
-	-
2 (5)	-
78 (193)	106 (263)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
87	**4799**	266	2133	1600	1066	-	33	64	22	.41	3	16/27
94	**2140**	-	60	720	1360	800	28	3	64	26	35	18/36
99	**1720**	-	20	820	880	840	38	52	51	23	23	18/29
04	**680**	-	-	100	580	1180	12	85	85	76	76	16/27
Atriplex canescens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	27/43
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Cercocarpus montanus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	20/32
Coleogyne ramosissima												
87	**1733**	66	733	1000	-	-	19	54	0	-	0	12/16
94	**4120**	-	20	3600	500	40	20	.48	12	-	10	13/26
99	**3500**	40	40	3400	60	40	23	7	2	.57	.57	16/30
04	**3720**	-	20	3180	520	180	53	21	14	4	4	12/26
Ephedra viridis												
87	**66**	-	-	66	-	-	0	100	-	-	0	4/2
94	**40**	-	20	20	-	-	50	0	-	-	0	19/22
99	**80**	-	60	20	-	-	0	25	-	-	0	25/31
04	**20**	-	-	20	-	-	0	0	-	-	0	23/27
Gutierrezia sarothrae												
87	**4799**	400	2200	2466	133	-	6	10	3	.83	3	8/6
94	**2220**	2880	620	1360	240	380	.90	0	11	2	2	9/11
99	**3560**	160	840	2600	120	340	0	0	3	2	2	7/10
04	**1840**	-	80	1740	20	200	0	0	1	1	1	8/10
Juniperus osteosperma												
87	**66**	-	66	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	20	40	20	-	-	0	0	-	-	0	-/-
04	**60**	-	40	20	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia spp.												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	12/7
04	**40**	-	20	20	-	-	0	0	-	-	0	10/28
Pinus edulis												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**20**	-	-	-	20	-	0	0	100	100	100	-/-

Trend Study 13A-8-04

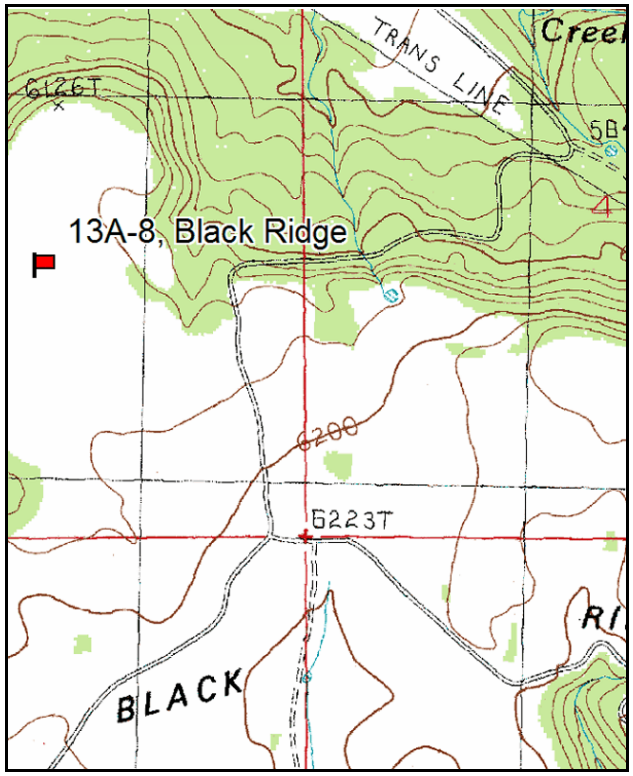
Study site name: Black Ridge . Vegetation type: Chained, Seeded, P-J .

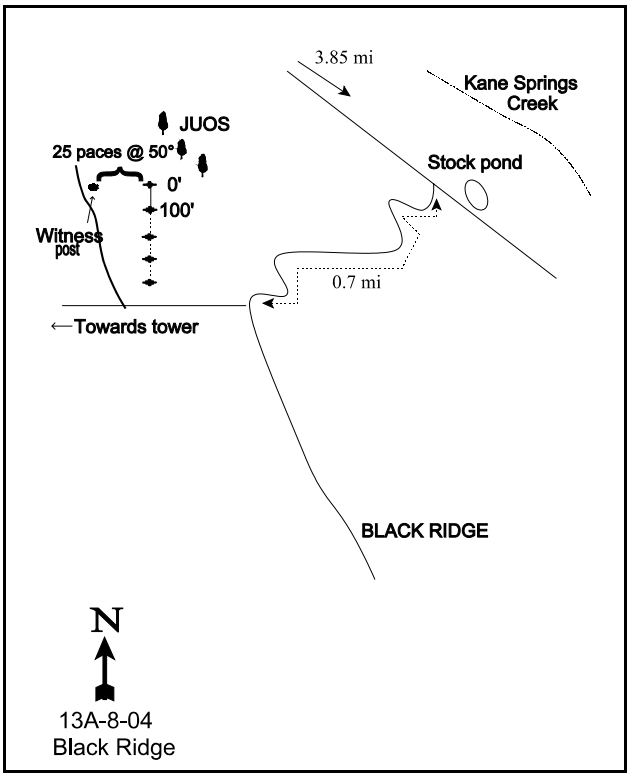
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

Travel south from Moab on SR 191 to just past mile marker 113, where a road turns off to Black Ridge and Yellow Circle Mine. Turn left and go 3.85 miles on the main road. Turn right and go 0.7 miles to the top of the ridge. Turn right onto a faint dirt road bearing west towards the relay tower. Go 0.15 miles to a faint fork. Bear right and continue 0.3 miles. Stop by a witness post on the right side of the road. The baseline starts 25 paces away from the witness post at 50°M. The 0-foot stake is tagged #7173.





Map Name: Kane Springs Diagrammatic Sketch

Township 28S , Range 23E , Section 5 GPS: NAD 27, UTM 12S 4250519 N, 638717 E

DISCUSSION

Black Ridge - Trend Study No. 13A-8

The Black Ridge study is one of the lower elevation critical deer winter ranges on the southwest side of the LaSal Mountains. The site is located approximately a one-half mile south of the mesas edge, near the middle of the chained area. Slope and aspect are negligible with an elevation of 6,100 feet. This large mesa, managed by the BLM, was chained many years ago and must have been seeded mostly to crested wheatgrass for that is the only seeded species present at this time. Deer use appears to be greatest along the north rim above Kane Springs Creek. Cattle use the Black Ridge allotment during the spring, as they move up the mountain to the U.S. Forest Service administered lands. Pellet group data from 1999 estimated 20 cow (49 cdu/ha) and 94 deer days use/acre (232 ddu/ha). Pellet group data from 2004 estimated 1 cow (4 cdu/ha), 63 deer (155 ddu/ha), and 3 elk days use/acre (8 edu/ha).

The soil is classified as an upland sandy clay loam. Soil on the site appears to be moderately deep (effective rooting depth of almost 16 inches) and mostly free of rock. The soil is mildly alkaline (7.5 pH). Besides annual precipitation, site potential can also be limited by the amount of phosphorus in the soil (5.8 ppm). Values below 10 ppm may limit normal plant growth and development. The erosion condition class determined soil movement as slight in 2004. There are no gullies, but pedestaling and soil movement due to high intensity storms are evident. Wind erosion does cause soil movement on this site due to the high percentage of unprotected, loose sandy soil.

Wyoming big sagebrush is the dominant browse on this site. In 1994, the sagebrush provided almost 15% cover with an estimated population of 4,180 plants/acre. In 1999, sagebrush provided only about 12% cover and their numbers had decreased to 3,300 plants/acre. In 2004, sagebrush provided 13% cover and density has continued to decrease to 2,880 plants/acre. Young plants were abundant in 1987, since then they have been minimal in numbers. Sagebrush seedlings were also high in 1987 and 1994, but none were recorded in 1999 or 2004. Hedging on sagebrush is moderate to heavy and vigor is good. Percent decadence increased from 3% in 1987, 23% in 1994, 13% in 1999, and 22% in 2004. A nearby clump of mature juniper shows pronounced highlining, but there is visibly very little evidence of invading young trees onto this dry site.

The seeding established a fair stand of crested wheatgrass, although it has significantly decreased nested frequency values from 1987 to 2004. In some places crested wheatgrass is almost a monoculture. Diversity is very low throughout this community. Other perennial grasses observed in the area include Indian ricegrass, bottlebrush squirreltail, and three-awn. Annual grasses made up almost 20% of the grass cover in 1994 and increased to 39% of the grass cover in 1999 and 2004. Forbs are almost nonexistent, contributing less than 1% of the vegetative cover and most are annual forbs. On average, Wyoming big sagebrush and crested wheatgrass make up 84% of the total vegetative cover.

1994 TREND ASSESSMENT

The trend for soil is stable even with the large amounts of bare ground and low litter cover because of the mitigating physical characteristics of the site. Browse trend is down because of the increased rate of decadency, increased numbers of plants expressing poor vigor, and fairly high ratio of dead to living plants. The herbaceous understory trend is stable with the nested frequency values for perennial species being fairly stable, but the understory species are still in fairly poor condition with regard to productivity and species diversity. The Desirable Components Index rated this site as fair with a score of 43 due to low perennial forbs, few young shrubs, and high annual grasses (cheatgrass).

TREND ASSESSMENT
soil - stable (3), but very poor condition
browse - down (1)
herbaceous understory - stable (3)
winter range condition (DC Index) - 43 (fair) Wyoming sagebrush type

1999 TREND ASSESSMENT

The tend for soil is slightly down with decreases in litter cover, decreases in vegetative cover, and increases in percent bare soil. Even with these poor conditions, erosion is minor on this site because of the moderating physical characteristics of the site. Trend for sagebrush continues to be down because of continued losses in numbers, strip frequency is decreasing, no seedlings, and percent young has decreased to only 4% of the population. The ratio of dead to living plants is still relatively high at one for every 10 plants. The herbaceous understory trend is slightly down for perennials as well as for annuals. Only a single forb was found on this site in 1999. The Desirable Components Index rated this site as fair with a score of 36 due to low perennial grasses and forbs, few young shrubs, and high annual grasses (cheatgrass).

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 36 (fair) Wyoming sagebrush type

2004 TREND ASSESSMENT

The trend for soil is stable. Percent cover of bare ground, litter, and vegetation have remained similar to 1999 values. Large amounts of bare ground exists, but flat terrain has kept erosion to a minimum. Trend for key browse, Wyoming big sagebrush, is down. Density of sagebrush has continued to decrease (3,330 plants/acre in 1999 to 2,880 in 2004), while percent decadence continues to rise (13% in 1999 to 22% in 2004). Young recruitment is minimal and is not replacing those plants which are dying. Trend for herbaceous understory is down slightly. Crested wheatgrass has continued to decline in nested frequency and forbs are not abundant, although a few more annual forbs appeared in 2004 compared to no forbs in 1999. The Desirable Components Index rated this site as fair with a score of 37 due to low perennial forbs, few young shrubs, and high annual grasses (cheatgrass).

TREND ASSESSMENT
soil - stable (3), but very poor condition
browse - down (1)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 37 (fair) Wyoming sagebrush type

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{b}$169	$_{ab}$142	$_{ab}$145	$_{a}$126	5.48	3.14	5.10
G	Aristida longiseta	-	8	4	-	.09	.03	-

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

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

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

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

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

Species	Percent Cover '04
Artemisia tridentata wyomingensis	18.51

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

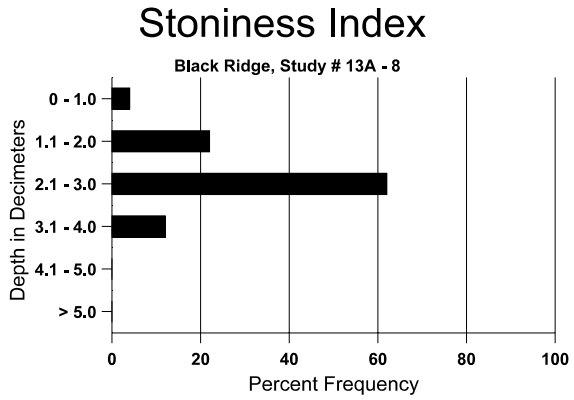
Species	Average leader growth (in) '04
Artemisia tridentata wyomingensis	1.2

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.7	67.0 (16.9)	7.5	56.9	19.8	23.3	10.4	5.8	19.2	0.4



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

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	59	17	12
Elk	-	-	1
Deer	45	29	24
Cattle	-	-	-

Days use per acre (ha)	
'99	'04
-	-
-	3 (8)
94 (232)	63 (155)
20 (49)	1 (4)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
87	**7832**	2833	5600	1966	266	-	38	12	3	-	1	23/33
94	**4180**	1060	260	2920	1000	520	16	4	24	3	18	19/32
99	**3300**	-	120	2740	440	320	55	42	13	4	4	19/30
04	**2880**	-	40	2200	640	340	44	52	22	9	9	18/32
Atriplex canescens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	16/24
04	**0**	-	-	-	-	20	0	0	-	-	0	-/-
Ephedra viridis												
87	**33**	-	-	33	-	-	100	0	-	-	0	20/22
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	41/38
Gutierrezia sarothrae												
87	**66**	33	33	33	-	-	0	0	-	-	0	12/13
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**60**	-	-	60	-	-	0	0	-	-	0	5/25
99	**20**	-	-	20	-	20	0	0	-	-	0	5/5
04	**20**	-	-	20	-	-	0	0	-	-	0	4/6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Sclerocactus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	2/3
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 13A-10-04

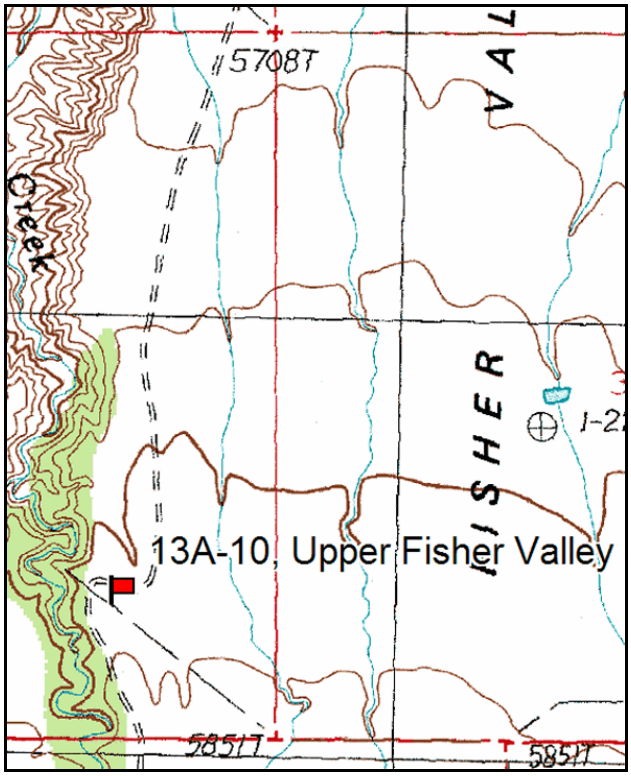
Study site name: Upper Fisher Valley . Vegetation type: Wyoming Big Sagebrush .

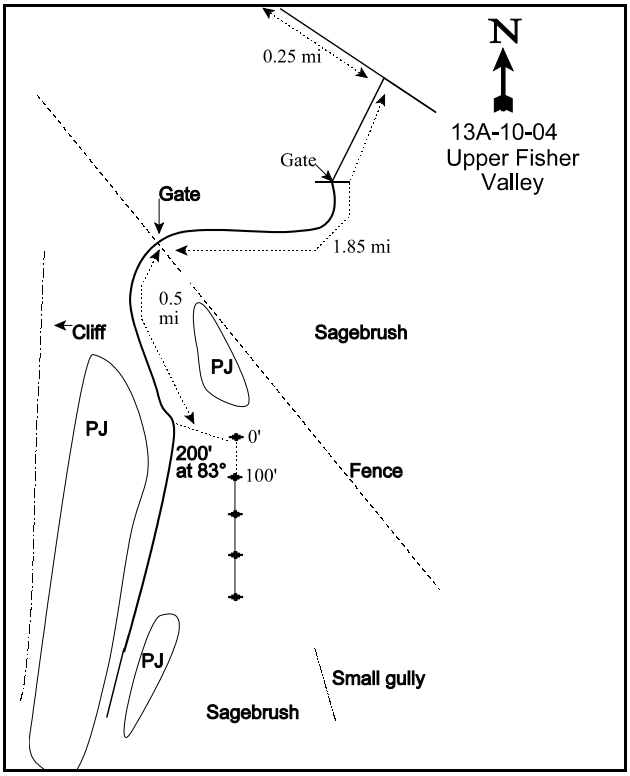
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Fisher Valley

Diagrammatic Sketch

Township 24S , Range 24E , Section 35

GPS: NAD 27, UTM 12S 4281334 N, 653351 E

DISCUSSION

Upper Fisher Valley - Trend Study No. 13A-10

Upper Fisher Valley is thought to be a critical wintering area for deer that migrate north and move off the LaSal Mountains. Pellet group surveys read in 1999 estimated 26 cow (64 cdu/ha) and 40 deer days use/acre (99 ddu/ha). Pellet group data from 2004 estimated 7 elk (17 edu/ha), 23 deer (56 ddu/ha), and 26 cow days use/acre (64 cdu/acre). This area is managed by the BLM and is part of the Fisher Valley grazing allotment. Much of the pinyon-juniper woodlands and sagebrush communities in this valley have been historically treated and seeded. The particular area of this study, along the rim of Onion Creek, was two-way chained in 1960 and seeded to crested wheatgrass. Now, 40 years later, there is a moderately dense stand of Wyoming big sagebrush with a fairly good understory of about 8-10% cover with approximately 10% of the understory being composed of cheatgrass.

This broad valley is almost level (4-5% slope) with a slight southerly aspect and an elevation of 5,800 feet. The reddish-brown, sandy clay loam soil appears to be moderately deep (effective rooting depth of almost 14 inches) on this site. Soil pH is neutral (6.8) with a low phosphorous content (7.8 ppm). Values below 10 ppm may limit normal plant growth and development. It is not rocky, but appears to have a carbonate layer at approximately 8-10 inches below the surface. Ground cover is poor with percent bare ground almost at 50%. Litter cover is found mainly under the shrubs and was very low in 1994 at 24%, 17% in 1999, and 19% in 2004. There are two well-defined natural gullies east of the transect which are still active. Due to the levelness of the terrain, erosion is not a serious problem, although there is some pedestaling of the grasses and some soil movement in the large bare interspaces. The erosion condition class determined soil movement as slight in 2004.

Wyoming big sagebrush is the dominant browse species as it made up 90% of the browse cover in 1994, 75% in 1999, and 67% in 2004. Density has continually declined; in 1987 there was 6,333 sagebrush plants/acre, 6,220 in 1994, 5,040 in 1999, and 4,060 in 2004. In 1987, the sagebrush population exhibited characteristics of an apparently increasing population with a majority of the individuals being classified as seedlings or young. In 1999 and 2004, no seedlings were recorded and young recruitment was less than 6% of the population. Percent decadence has increased from 7% in 1999 to 23% in 2004. Hedging is moderate to heavy on most plants and vigor is fairly good.

There are a few 8-10 foot tall junipers established on the flat. In 1999, the point quarter method established juniper density at only 10 trees/acre with an average diameter of 5.5 inches. They appear to be moving very slowly down-slope from the line of mature pinyon-juniper on the west edge of the study area, along the rim of the canyon. Broom snakeweed density has fluctuate between years; in 1987 it was abundant at 13,198 plants/acre, then it fell to 5,720 plants/acre in 1994. It rose again in 1999 to 13,220, then decreased again to 8,220 in 2004. Several of the plants are less than 8 inches high and 9 inches wide.

A fair stand of crested wheatgrass was established, but has diminished over the years. Most plants are found growing near or under sagebrush. Mutton blue grasses is the most dominate and provides the most cover. Other grasses include Galleta, bottlebrush squirreltail, and cheatgrass. Forbs are an insignificant source of forage on this site. There are several small species present, but none of which are very abundant.

1994 TREND ASSESSMENT

Soil trend on this site is stable to slightly improving, but still in very poor condition. The type of cover that will best protect this site from erosion comes from herbaceous species which only make up 35% of the total vegetative cover. There has been some improvement of the perennial grasses (crested wheatgrass and Sandberg bluegrass), with some slight loss of forbs. However, forbs collectively only make up about 10% of

the vegetative cover. The trend for the key browse, Wyoming big sagebrush, is up as only 8% of the population exhibited heavy use, while percent decadence is low at only 3%. Vigor is also good for the population. There has been a large increase in the estimated population, but much of this is from the much larger sample size taken in 1994. Yet, the increase is warranted because of the high biotic potential it had in 1987 and high percentage of plants that were classified as young at that time. The weedy increaser, broom snakeweed, has shown a dramatic decline since 1987. The trend for the herbaceous understory is stable with slight increases for two of the perennial grasses, but the forbs are still almost nonexistent on this site with the extended drought. The Desirable Components Index rated this site as good with a score of 57 due to low perennial forbs, moderate young shrubs, and a slight annual grasses problem (cheatgrass).

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - stable (3)
winter range condition (DC Index) - 57 (good) Wyoming sagebrush type

1999 TREND ASSESSMENT

Soil trend on this site is still considered stable, but still in very poor condition. There was a slight increase in cryptogamic cover, from 1% to 11%, but this is not usually a consistent or permanent change. The type of cover that will best protect this site from erosion comes from herbaceous species which only make up 35% of the total vegetative cover. The trend for browse is down for Wyoming big sagebrush because of the losses in density, decrease in cover, decrease in strip frequency, seedlings decreased 22% to zero, and percent young has fallen from 12% to only 6%. The weedy increaser, broom snakeweed, has shown a dramatic increase since 1994. The trend for the herbaceous understory is slightly down with nested frequency values for annuals and perennials going down. Forbs are almost nonexistent with the extended drought and total cover less than 1%. The Desirable Components Index rated this site as good with a score of 54 due to low perennial forbs, few young shrubs, and a slight annual grasses problem (cheatgrass).

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 54 (good) Wyoming sagebrush type

2004 TREND ASSESSMENT

The trend for soil is stable. Protective cover has remained the same, but bare ground is close to 50% of the total cover. Erosion is minimal due to relatively flat terrain. The trend for the key browse species, Wyoming big sagebrush, is continuing downward. Density has continued to decrease by about a 1,000 plants/acre every five years since 1994, while percent decadence has increased from 7% in 1999 to 23% in 2004. Seedling and young production has been very minimal since 1994 and the dead to live ratio increased from 1:126 in 1999 to 1:7 in 2004. The trend for the herbaceous understory is down slightly. Sandberg bluegrass (dominate grass) sum of nested frequency decreased significantly and most of the crested wheatgrass is growing predominantly under the sagebrush canopy. Forbs remain minimal and provide little protective cover or forage value. The Desirable Components Index rated this site as good with a score of 46 due to low perennial forbs, no young shrubs, and moderate decadence of key browse.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 46 (good) Wyoming sagebrush type

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	a63	b105	a72	ab75	2.48	.65	1.85
G	Agropyron intermedium	-	-	7	-	-	.04	-
G	Bouteloua gracilis	a-	a-	ab7	b17	-	.04	.18
G	Bromus tectorum (a)	-	106	104	94	.88	.38	1.01
G	Hilaria jamesii	94	93	79	75	.96	.80	.98
G	Poa secunda	ab224	bc246	c256	a174	3.77	6.50	4.48
G	Sitanion hystrix	bc24	a6	ab7	c45	.01	.21	1.02
G	Sporobolus cryptandrus	-	-	-	3	-	-	.03
G	Stipa comata	7	-	-	-	-	-	-
G	Vulpia octoflora (a)	-	b76	b61	a8	.16	.55	.04
Total for Annual Grasses		0	182	165	102	1.03	0.94	1.06
Total for Perennial Grasses		412	450	428	389	7.23	8.25	8.55
Total for Grasses		412	632	593	491	8.27	9.19	9.61
F	Astragalus amphioxys	7	4	-	-	.01	-	-
F	Calochortus nuttallii	1	-	-	-	-	-	-
F	Chenopodium fremontii (a)	-	-	-	3	-	-	.00
F	Cruciferae	1	-	-	-	-	-	-
F	Draba reptans (a)	-	b22	ab9	a-	.04	.02	.00
F	Erigeron pumilus	6	10	12	1	.02	.05	.03
F	Gilia spp. (a)	-	5	-	-	.01	-	-
F	Leucelene ericoides	-	1	2	1	.00	.03	.03
F	Lesquerella spp.	-	-	1	-	-	.00	-
F	Oenothera albicaulis (a)	1	-	-	-	-	-	-
F	Phlox austromontana	a21	ab21	b31	ab21	.81	.65	.27
F	Phlox longifolia	a-	a-	a-	b18	-	-	.13
F	Ranunculus testiculatus (a)	-	b14	a-	a-	.05	-	-
F	Sphaeralcea coccinea	b62	a22	a5	a6	.05	.01	.09
F	Tragopogon dubius	4	-	-	-	-	-	-
F	Unknown forb-perennial	1	-	-	-	-	-	-
Total for Annual Forbs		1	41	9	3	0.10	0.01	0.00

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
Total for Perennial Forbs		103	58	51	47	0.90	0.75	0.56
Total for Forbs		104	99	60	50	1.01	0.77	0.57

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

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

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

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

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

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

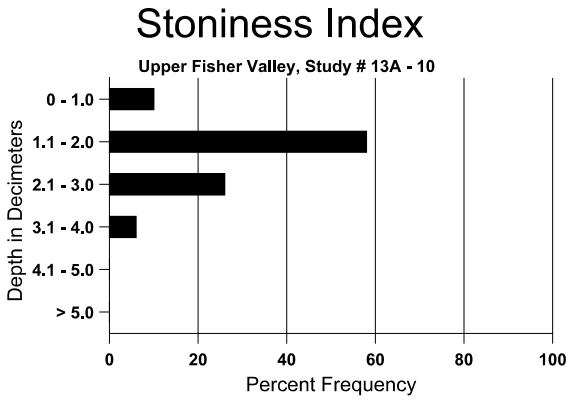
Species	Average leader growth (in)
	'04
Artemisia tridentata wyomingensis	2.3

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
13.9	65.0 (13.7)	6.8	58.9	15.8	25.3	1.6	7.8	73.6	0.4



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

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

Days use per acre (ha)	
'99	'04
-	-
40 (99)	23 (56)
-	7 (17)
26 (64)	26 (64)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
87	**6333**	3133	3200	2733	400	-	40	1	6	-	2	21/25
94	**6220**	1360	720	4920	580	40	7	0	9	3	11	17/27
99	**5040**	-	280	4420	340	40	47	5	7	4	4	22/34
04	**4060**	-	20	3120	920	560	60	12	23	9	9	19/30
Atriplex canescens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	43/66
99	**100**	-	-	100	-	-	100	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
87	**13198**	2600	5266	7466	466	-	.50	1	4	.30	2	11/9
94	**5720**	420	980	4700	40	20	.34	0	1	.34	.69	7/7
99	**13220**	60	3880	9040	300	400	0	0	2	1	1	10/10
04	**8220**	40	1440	6740	40	60	0	.48	0	-	.24	8/9
Juniperus osteosperma												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	20	-	20	-	-	0	0	-	-	0	-/-
04	**60**	-	40	20	-	-	33	0	-	-	0	-/-
Opuntia spp.												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	6/16
99	**0**	-	-	-	-	-	0	0	-	-	0	9/12
04	**80**	-	40	40	-	-	25	0	-	-	0	7/22
Pinus edulis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	20	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	20	-	-	-	0	0	-	-	0	-/-

Trend Study 13A-11-04

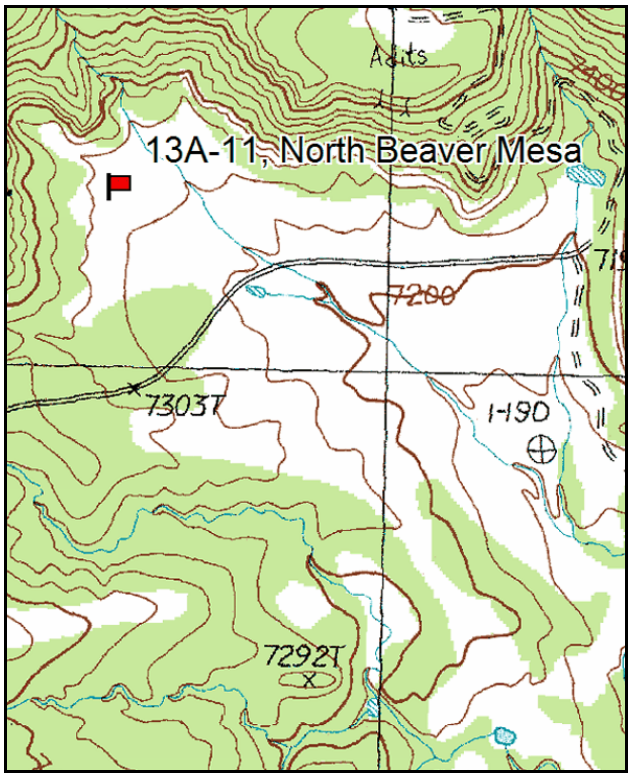
Study site name: North Beaver Mesa . Vegetation type: Big Sagebrush .

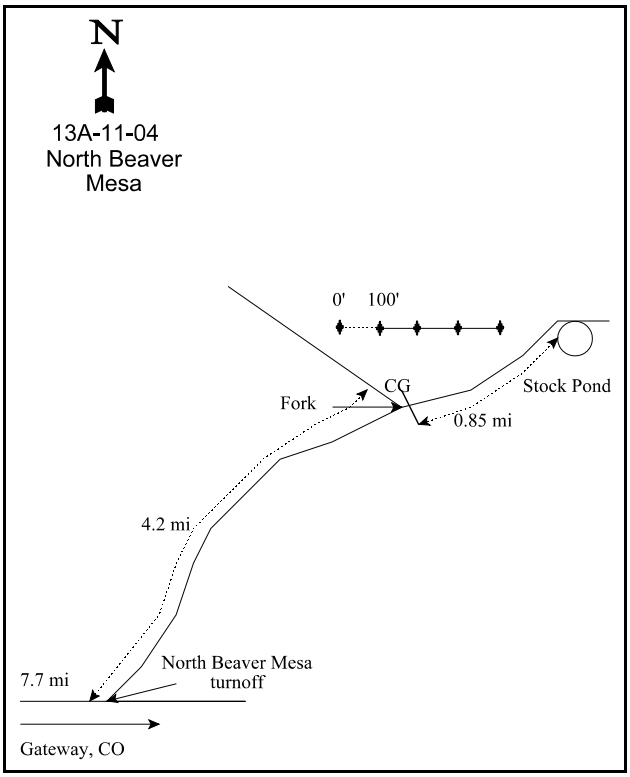
Compass bearing: frequency baseline 133 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the LaSal Mountain Loop and Gateway roads, travel east towards Gateway, Colorado for 7.7 miles to the North Beaver Mesa turnoff. Turn left and go 4.2 miles to the Polar Mesa/Fisher Valley Road. Continue straight through this fork, over a cattleguard and 0.85 miles to a stockpond at the head of a large sagebrush valley. The transect is located to the west (300 yards away @ 290°M) towards an alcove. It is marked by l-foot tall fence posts. The 0-foot baseline stake is furthest away and is tagged #7842.





Map Name: Fisher Valley Diagrammatic Sketch

Township 25S , Range 25E , Section 10 GPS: NAD 27, UTM 12S 4279393 N, 661326 E

DISCUSSION

North Beaver Mesa - Trend Study No. 13A-11

The North Beaver Mesa study is an area on the northeast side of the LaSal Mountains that receives a considerable amount of winter elk use. Pellet group data from 1999 estimated 46 deer (114 ddu/ha), 155 elk (383 elk days use/ha), and 17 cow days use/acre (42 cdu/ha) on the site. Pellet group data from 2004 estimated 3 deer (7 ddu/ha), 102 elk (251 edu/ha), and 7 cow days use/acre (18 cdu/ha). The deer use the area mostly as a transition range in the spring and fall, depending on the severity of the winter. The Beaver allotment is grazed by cattle in the spring and fall. In 1962, 1,000 acres within the allotment was chained or contour trenched and seeded. A roller-chopper was used to retreat other parts of the allotment in 1985 and 1987, but did not include this area. The study is located in the upper part of a large sagebrush valley, where the only evidence of vegetative treatments is the partially filled-in contoured trenches and presence of seeded species (crested wheatgrass, intermediate wheatgrass, smooth brome, and alfalfa).

The study has a southeast aspect on a slope of less than 5% and an elevation of 7,300 feet. In contrast, to the east and west of the contour trenches, there are some natural gullies, especially further down in the valley. The trenches unquestionably help to slow down water and soil movement. These water and soil catchments also support the greatest grass cover. The reddish-brown, sandy loam soil appears to be moderately deep (effective rooting depth of 15 inches). The soil is neutral to slightly alkaline (7.4 pH) with a phosphorous content of 8.9 ppm. Values below 10 ppm may limit normal plant growth and development. Livestock or wildlife have a heavy impact on this soil for trails and trampling have led to broken soil cover and soil movement.

The key browse on this site is Wyoming big sagebrush and on average makes up 81% of the browse cover, with a density of 5,900 plants per acre in 2004. Differences in density from 8,200 plants/acre to 5,900 in 2004 is mostly due to several young plants within the population in 1999. Almost half of the population was classified as young in 1987, declining to 18% by 1994, 22% in 1999, and to less than 1% in 2004. The percentage of seedlings to the population in 1987 was fairly good at 7%, increasing to 38% in 1994. It has since decreased again down to 6% in 1999 and finally to 0% in 2004. The density of mature plants has continually increased from 3,333 plants/acre in 1987, 4,300 in 1994, 4,840 in 1999, and finally to 5,160 in 2004. Hedging is light to moderate on most plants.

Pinyon-juniper and oak clumps dominate the surrounding slopes. Except for a few seedlings, they are not very abundant in the sagebrush dominated valley bottoms. The point quarter data from 1999 estimated a pinyon density of 42 trees/acre with a average diameter of 1.25 inches and juniper density at 23 trees/acre with an average diameter of 6.75 inches. Point quarter data from 2004 estimated 53 pinyon trees/acre with and average diameter of 2.1 inches, and junipers at 26 trees/acre with an average diameter of 3.2 inches. The available oak and scattered serviceberry have been highlined. White-stemmed rubber rabbitbrush is especially prevalent in the middle of the valley, with some plants showing moderate use. Other browse species are uncommon.

For elk range, the grass component is especially important with 85% of the grass cover coming from crested wheatgrass. Perennial grasses cover is 35% of the total vegetation on this site. Forb diversity is good with as many as 25 species sampled in 1994. However, only 15 species were sampled in 1999 and 2004 and they only provide a little over 4% total cover. The common hairy goldaster was the most abundant forb in 1994 and 1999, making up more than 50% of the forb cover, but provided only 8% of the forb cover in 2004. There are randomly scattered patches of alfalfa which were seldom picked up in the sampling design.

1994 TREND ASSESSMENT

The trend for soil is slightly improved, but still only in fair condition. Percent bare ground has gone down to a

relative 26% with litter cover decreasing slightly. Soils would be in much better condition if the herbaceous cover could be increased. This could occur with some rest from heavy early summer use. Browse trend is slightly up even with the slight decrease noted in the population estimate. Much of the change is from the much larger sample size used in 1994. The population shows the characteristics of an expanding population with low rates of decadency and very high biotic potential. The trend for the perennial herbaceous understory is slightly down with depressed nested frequency values. The Desirable Components Index rated this site as excellent with a score of 77 due to moderate perennial grasses, several young shrubs, and low decadence of key browse.

TREND ASSESSMENT
soil - slightly up (4)
browse - slightly up (4)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 77 (excellent) Wyoming sagebrush type

1999 TREND ASSESSMENT

The trend for soil is basically unchanged and stable. Percent bare ground had gone down from the high in 1987 of 37% to 30% in 1994, with no change in 1999. Soils would be in much better condition if the herbaceous cover could be increased. This could occur with some type of management system of rest and deferment from heavy and continuous early summer use. Browse trend is slightly up with increases in the sagebrush population, which on average makes up 85% of the browse cover. The population shows the characteristics of an expanding population with relatively low rates of decadency, and variable yet characteristically good biotic potential. The trend for the herbaceous understory is stable with increases for grasses but some losses for the forbs. The slight decrease in forb nested frequency is more than compensated for by the increase in grasses. The Desirable Components Index rated this site as excellent with a score of 86 due to high perennial grass cover, several young shrubs, and low decadence of key browse.

TREND ASSESSMENT
soil - stable (3)
browse - slightly up (4)
herbaceous understory - stable (3)
winter range condition (DC Index) - 86 (excellent) Wyoming sagebrush type

2004 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground has not changed since 1994 at about 30%, but large patches of bare ground are found between shrubs. Due to slight slope erosion has been kept to a minimum. Trend for key browse species Wyoming big sagebrush is stable. Density of mature plants has continually increased since 1994. Seedling and young recruitment was less than 1% in 2004, which in past years has been fairly high. Trend for the herbaceous understory is slightly down with a significant loss of perennial grasses and forbs as indicated by the sum of nested frequency and sum of quadrat values. Grass and forb percent cover was also slightly lower from previous years. The Desirable Components Index rated this site as still excellent even with a lower score of 66. This lower value was due to some losses to the perennial component (grasses and forbs), few young shrubs, and a slight decrease in sagebrush cover.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 66 (excellent) Wyoming sagebrush type

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

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Machaeranthera canescens	15	26	16	5	.05	.31	.04
F	Medicago sativa	-	10	4	10	.42	.18	.69
F	Microsteris gracilis (a)	$_{a}$-	$_{b}$16	$_{b}$17	$_{c}$50	.04	.03	.27
F	Oenothera coronopifolia	$_{c}$39	$_{b}$11	$_{a}$-	$_{a}$-	.03	-	-
F	Oxybaphus linearis	-	1	-	-	.00	-	-
F	Petradoria pumila	1	-	-	-	-	-	-
F	Phlox longifolia	9	4	6	2	.01	.03	.01
F	Polygonum douglasii (a)	$_{a}$-	$_{a}$1	$_{a}$8	$_{b}$31	.00	.01	.15
F	Ranunculus testiculatus (a)	-	-	-	4	-	-	.01
F	Senecio multilobatus	3	-	-	-	-	-	-
F	Sphaeralcea coccinea	11	12	13	5	.05	.14	.18
F	Tragopogon dubius	$_{b}$17	$_{ab}$4	$_{a}$-	$_{a}$-	.01	-	-
F	Trifolium spp.	4	-	-	-	-	-	-
F	Unknown forb-perennial	$_{b}$11	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
Total for Annual Forbs		0	45	26	90	0.11	0.05	0.47
Total for Perennial Forbs		430	290	205	115	4.54	4.13	2.87
Total for Forbs		430	335	231	205	4.65	4.19	3.34

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

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

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

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

Species	Percent Cover	
	'99	'04
Artemisia tridentata wyomingensis	-	20.91
Chrysothamnus nauseosus	-	.61
Eriogonum microthecum	-	.28
Gutierrezia sarothrae	-	2.11
Opuntia spp.	-	.50
Pinus edulis	.80	2.73
Quercus gambelii	.40	.60

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

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

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

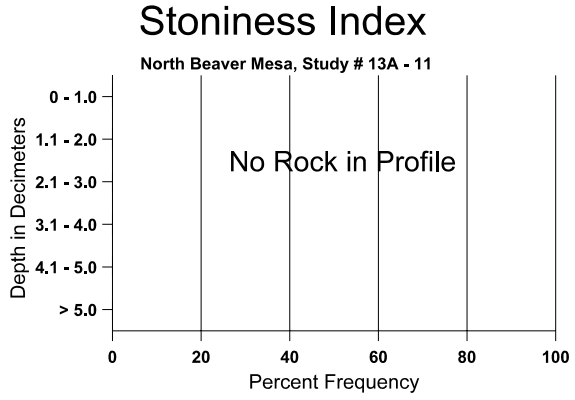
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	23	26	6.8	3.2
Pinus edulis	42	53	1.3	2.1

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.1	61.0 (13.9)	7.4	70.9	11.8	17.3	1.6	8.9	92.8	0.4



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

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

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

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**100**	-	60	40	-	-	0	20	-	-	0	15/11
99	**60**	-	60	-	-	-	0	0	-	-	0	36/34
04	**0**	-	-	-	-	-	0	0	-	-	0	17/15
Artemisia frigida												
87	**600**	66	600	-	-	-	0	11	-	-	0	-/-
94	**100**	-	-	100	-	-	0	0	-	-	0	8/9
99	**100**	-	-	100	-	-	0	0	-	-	0	10/5
04	**20**	-	-	20	-	-	0	0	-	-	0	14/10
Artemisia tridentata wyomingensis												
87	**10332**	733	5066	3333	1933	-	38	4	19	.38	2	19/22
94	**6140**	2340	1120	4300	720	420	31	4	12	4	11	16/28
99	**8200**	460	1840	4840	1520	660	52	10	19	5	5	24/36
04	**5900**	-	40	5160	700	1160	45	19	12	6	6	18/26
Atriplex canescens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**60**	-	20	40	-	-	67	0	-	-	0	16/19
99	**80**	-	60	20	-	-	25	0	-	-	0	20/15
04	**20**	-	-	20	-	-	0	100	-	-	0	21/16
Atriplex confertifolia												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	100	-	-	0	16/12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Ceratoides lanata												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	100	-	-	0	14/4
Chrysothamnus nauseosus												
87	**332**	-	66	200	66	-	20	20	20	-	40	34/25
94	**240**	20	60	160	20	-	0	0	8	-	17	29/26
99	**200**	-	80	80	40	-	0	0	20	-	0	20/32
04	**100**	-	-	80	20	-	0	0	20	-	0	20/20
Eriogonum microthecum												
87	**600**	-	600	-	-	-	0	0	0	-	0	-/-
94	**620**	60	140	480	-	-	13	0	0	-	0	11/8
99	**540**	-	80	420	40	-	7	19	7	-	0	7/6
04	**380**	-	-	360	20	-	11	37	5	5	5	10/8
Gutierrezia sarothrae												
87	**666**	-	600	66	-	-	0	0	0	-	0	6/5
94	**1820**	400	140	1660	20	20	0	0	1	1	1	10/11
99	**1200**	-	160	1040	-	-	50	0	0	-	0	8/8
04	**1540**	-	-	1540	-	-	0	0	0	-	0	10/12
Opuntia spp.												
87	**266**	66	-	266	-	-	0	0	-	-	50	4/14
94	**280**	-	-	280	-	-	0	0	-	-	0	4/9
99	**160**	-	60	100	-	-	0	0	-	-	0	5/13
04	**460**	-	-	460	-	-	0	0	-	-	0	5/15
Pinus edulis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**80**	20	60	20	-	-	0	0	-	-	0	-/-
04	**100**	-	80	20	-	-	0	0	-	-	0	-/-
Quercus gambelii												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**180**	-	100	40	40	60	22	0	22	22	22	29/28

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	20	20	-	-	0	0	-	-	0	13/17

Trend Study 13A-12-04

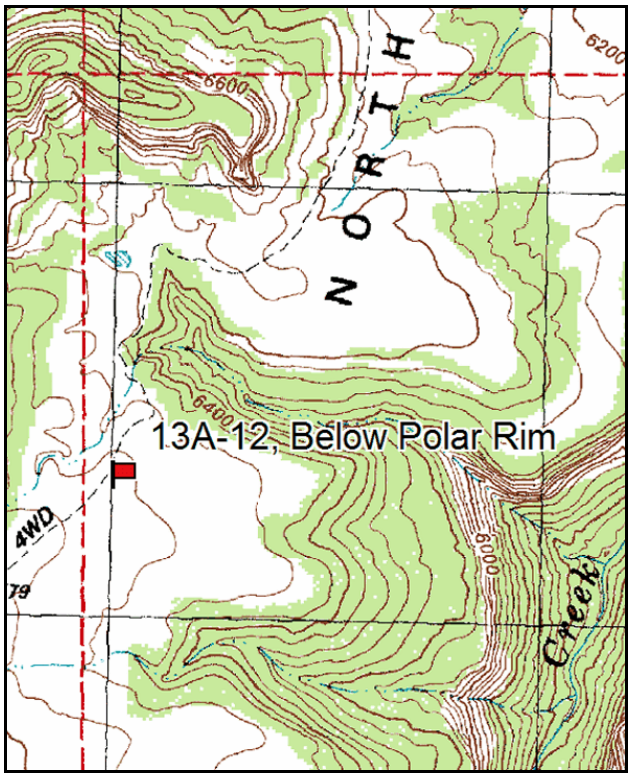
Study site name: Below Polar Rim . Vegetation type: Chained, Seeded P-J .

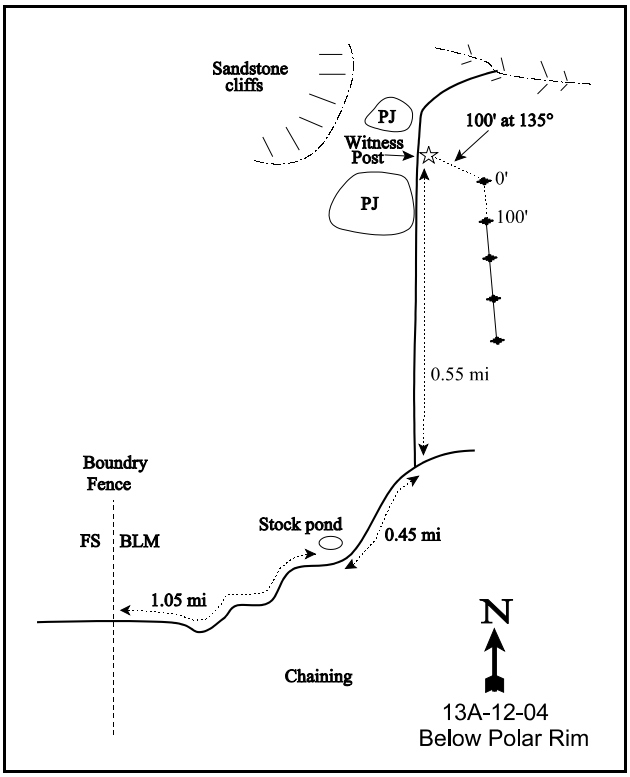
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of La Sal Mountain Loop and Gateway roads, travel east towards Gateway, Colorado for 7.7 miles to the North Beaver Mesa turnoff. Turn left and go 4.2 miles to the Polar Mesa/Fisher Valley road. Continue straight through this fork, over a cattle guard and 0.85 miles to a stock pond and study 13A-12-87. Continue 0.45 miles to a fork by another stock pond. Turn right, go 0.35 miles to an intersection. Turn left and proceed 0.6 miles to a boundary fence. Continue on the road 1.05 miles, winding through the large chaining, to a stock pond. Cross the pond and continue 0.45 miles to a fork. Keep left on the main road and continue 0.55 miles to a fence post on the right side of the road. The 0-foot baseline stake, tagged #7857, is 100 feet away at 135°.





Map Name: Dolores Point North

Diagrammatic Sketch

Township 25S , Range 25E , Section 1

GPS: NAD 27, UTM 12S 4280295 N, 665003 E

DISCUSSION

Below Polar Rim - Trend Study No. 13A-12

The Below Polar Mesa Rim range trend study samples a large chaining on lower Beaver Mesa. The 1,540 acre treatment of this pinyon-juniper covered mesa was two-way-chained and seeded in 1969. The site is on a bench that slopes gently south towards the rim of Beaver Canyon with an elevation of 6,500 feet. The site currently supports a population of Wyoming big sagebrush and a few pinyon trees. This BLM land is part of the Taylor allotment and is grazed by cattle from winter to spring. It is thought to be used almost equally by deer and elk in the winter. The pellet group data from 1999 estimated 13 deer (32 ddu/ha), 94 elk (232 edu/ha), and 52 cow days use/acre (128 cdu/ha). Pellet group data from 2004 estimated 19 deer (46 ddu/ha), 34 elk (83 edu/ha), and 31 cow days use/acre (75 cdu/ha). Deer and elk use is winter/early spring while cattle use was from last season.

The soil is a sandy clay loam which has a neutral (6.7 pH) soil reaction and has no rock or gravel on the surface. The effective rooting depth is 15 inches. Percent organic matter is quite low (1.6 %) and amount of phosphorous in the soil could be limiting with only 6.5 ppm. Values below 10 ppm may limit normal plant growth and development. Percent bare ground has stayed fairly consistent between 35 and 40% through the years. The herbaceous species provide some protective cover from erosion, but the lack of significant slope is also helpful. The erosion condition class was determined to be stable in 2004.

The key browse species on this chaining is Wyoming big sagebrush. It has consistently made up 31 to 32% of the total vegetative cover since 1994. Percent decadence has always been below 10%, although in 2004 it increased to 12%. Percent dead within the population has been less than 4% for all readings, although the number of dead plants to every live plant has increased to 1:7 in 2004 versus 1:91 in 1999. The percent young age class has varied greatly, however on average it has been 28% through all readings. Most of the population shows only light to moderate use. There are a few scattered fourwing saltbush and ephedra plants. Other woody plants on the site are increasers like broom snakeweed, pricklypear cactus, and pinyon pine. Their populations are currently low, providing less than 1% of the total plant cover, except for pinyon pine which is 13% of the total vegetation. Point quarter data for 2004 estimated 47 pinyon pine trees/acre with an average diameter of 4.4 inches.

A fair stand of crested wheatgrass has been a major component of the herbaceous understory, but has decreased from 18% of the grass cover in 1994 and 1999 to 7% in 2004. The most common native, blue grama, provides on average almost 55% of the grass cover and provides excellent soil protection, although it produces little forage. The larger grasses such as crested wheatgrass, needle-and-thread, galleta, and sand dropseed provide more readily available forage. Forbs, although fairly diverse, are not as important in terms of forage production as they only contribute on average about 8% of the total vegetative cover.

1994 TREND ASSESSMENT

Soil trend for this site has slightly improved with less bare soil and an excellent herbaceous cover. The browse trend is slightly improved with increased density, lower percent decadency, and good vigor for Wyoming big sagebrush. The herbaceous understory is good, even with the extended drought conditions. Trend is stable for the perennial herbs. The Desirable Components Index rated this site as excellent with a score of 66 due to good shrub cover, high perennial grass cover, but had a low amount of young shrubs.

TREND ASSESSMENT
soil - slightly up (4)
browse - slightly up (4)
herbaceous understory - stable (3)
winter range condition (DC Index) - 66 (excellent) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Soil trend for this site has shown little change with good herbaceous cover. The browse trend is stable with continued low percent decadency and good vigor for Wyoming big sagebrush. The herbaceous understory is good, however with the continued dry conditions, there is a slight decline in the sum of nested frequency values for the perennial species and even for the annual species. Trend is slightly down. The Desirable Components Index rated this site as excellent with a score of 81 due to good shrub cover, high perennial grass cover, and a high amount of young shrubs.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 81 (excellent) Wyoming big sagebrush type

2004 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground has stayed fairly consistent between 35 and 40% through the years. Protective cover has remained fairly stable, some fluctuation in vegetation cover due to drought conditions. Trend for key browse, Wyoming big sagebrush, is stable. Densities overall have changed little, most change is due to fluctuation in the young age class. Utilization continues to be light to moderate and vigor is good. Trend for the herbaceous understory is down. Nested frequency for crested wheatgrass, needle-and-thread, sand dropseed, and bottlebrush squirreltail all decreased significantly. Several of these species (crested wheatgrass) provided much of the herbaceous forage. Forbs are diverse, but provide little vegetation cover or forage. The Desirable Components Index rated this site as good with a score of 53 due to good shrub cover, fair perennial grass cover, and no young shrubs.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down (1)
winter range condition (DC Index) - 53 (good) Wyoming big sagebrush type

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{b}$139	$_{b}$145	$_{b}$126	$_{a}$56	3.17	3.07	.69
G	Bouteloua gracilis	$_{b}$212	$_{a}$177	$_{ab}$201	$_{ab}$202	6.89	9.97	6.67
G	Bromus tectorum (a)	-	53	40	22	.32	.50	.08
G	Hilaria jamesii	$_{b}$22	$_{b}$22	$_{ab}$13	$_{a}$-	.09	.13	.00

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

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

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

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

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

Species	Percent Cover	
	'99	'04
Artemisia tridentata wyomingensis	-	18.63
Eriogonum microthecum	-	.28
Gutierrezia sarothrae	-	.35
Opuntia spp.	-	.30
Pinus edulis	3.40	5.50

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

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

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

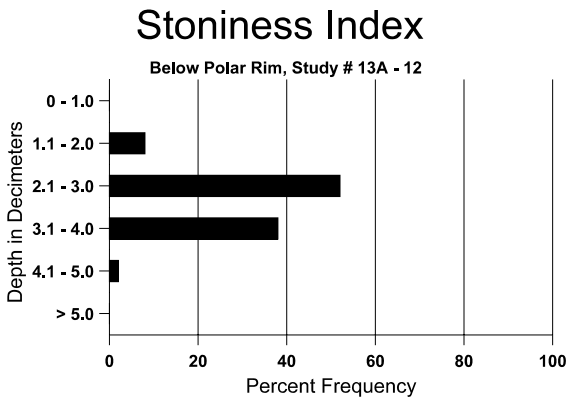
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	20	-	1.0	-
Pinus edulis	71	47	3.3	4.4

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.1	66.3 (10.9)	6.7	58.9	19.8	21.3	1.6	6.5	60.8	0.3



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

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

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

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
87	**7732**	533	5466	1933	333	-	21	7	4	-	.86	20/31
94	**13800**	-	220	13100	480	100	2	0	3	.72	10	15/21
99	**10900**	380	4400	5520	980	120	47	14	9	.73	.91	18/31
04	**6580**	160	20	5760	800	920	58	10	12	4	4	18/27
Atriplex canescens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**40**	20	-	40	-	-	100	0	-	-	0	20/24
99	**80**	-	-	80	-	-	0	0	-	-	0	21/13
04	**20**	-	-	20	-	-	0	100	-	-	0	17/14
Eriogonum microthecum												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**360**	-	-	360	-	-	0	0	-	-	0	4/10
99	**120**	-	60	60	-	-	0	0	-	-	0	11/8
04	**200**	-	-	200	-	-	10	70	-	-	0	8/7
Gutierrezia sarothrae												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**100**	-	-	80	20	20	0	0	20	-	0	8/9
99	**140**	-	60	80	-	-	0	0	0	-	0	8/12
04	**340**	-	20	320	-	20	0	0	0	-	0	8/10
Opuntia spp.												
87	**1266**	200	400	733	133	-	0	0	11	-	21	3/13
94	**620**	20	-	600	20	-	10	0	3	-	0	3/9
99	**560**	20	180	320	60	-	0	0	11	11	11	4/9
04	**600**	-	60	520	20	-	0	0	3	3	3	5/12
Pediocactus simpsonii												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**200**	-	20	180	-	-	0	0	-	-	0	1/3
Pinus edulis												
87	**0**	133	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	-	20	80	-	-	0	0	-	-	0	-/-
04	**120**	-	40	80	-	20	0	0	-	-	17	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Sclerocactus whipplei												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	1/4
99	**200**	40	140	60	-	-	0	0	-	-	0	1/2
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 13A-14-04

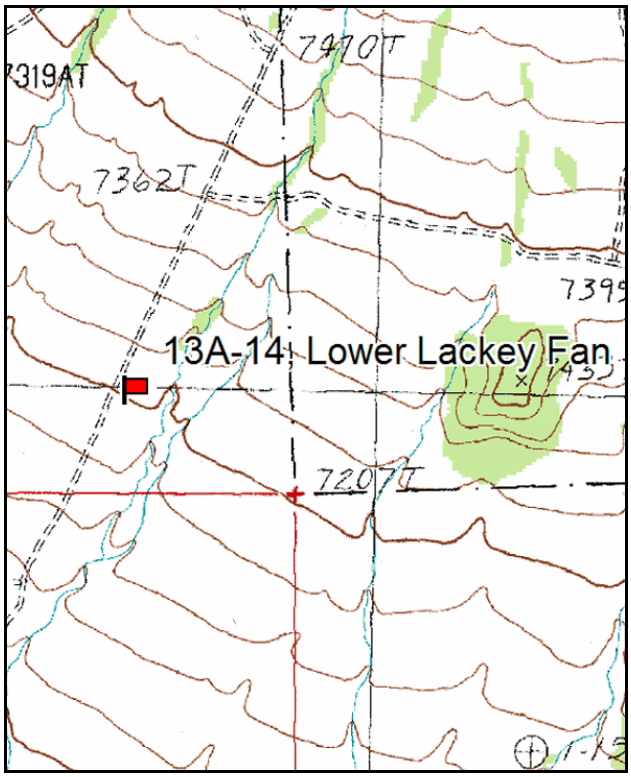
Study site name: Lower Lackey Fan . Vegetation type: Wyoming Big Sagebrush .

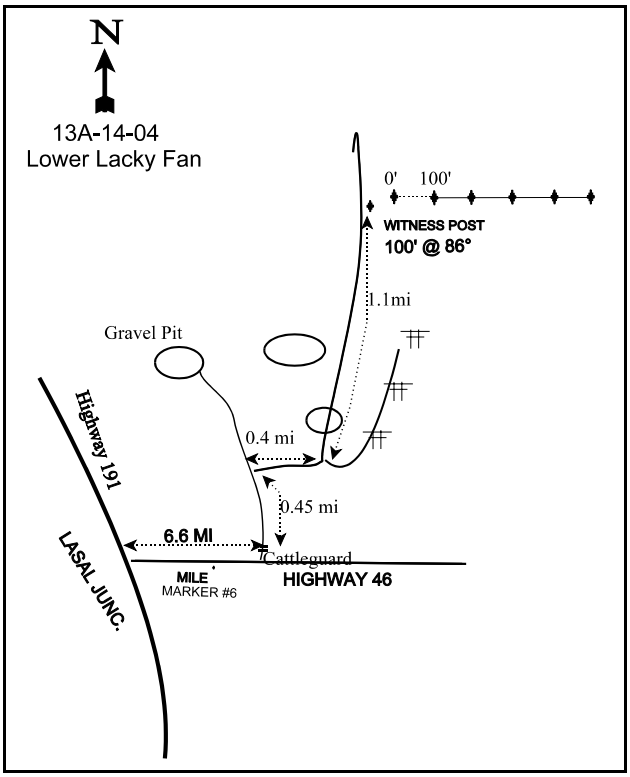
Compass bearing: frequency baseline 86 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: LaSal West

Diagrammatic Sketch

Township 28S , Range 24E , Section 27

GPS: NAD 27, UTM 12S 4243961 N, 650438 E

DISCUSSION

Lower Lackey Fan - Trend Study No. 13A-14

The Lower Lackey Fan site was established in 1994 and is located on the lower southwest slopes of the LaSal Mountains at 7,200 feet in elevation. It is on a fairly flat ridge with scattered pinyon and juniper with a moderate density of Wyoming big sagebrush and fairly abundant crested wheatgrass. The sagebrush in the past has been sprayed and seeded to crested wheatgrass. This new area is thought to be particularly important to elk during the winter. The pellet group data from 1999 estimated 34 elk (84 edu/ha), 20 deer (49 ddu/ha), and 12 cow days use/acre (30 cdu/ha). Pellet group data from 2004 estimated 52 elk (129 edu/ha), 7 deer (18 ddu/ha), and 7 cow days use/acre (16cdu/ha). This area is managed by the BLM and is part of the Hatch Point grazing allotment.

The site has a moderately shallow (effective rooting depth of almost 11 inches), reddish-brown, sandy clay loam soil with abundant rock within the profile and on the surface . The soil reaction is neutral (7.2 pH). Phosphorous could be a limiting factor on the site at 8.1 ppm. Values below 10 ppm may limit normal plant growth and development. The soil has a combined rock and pavement cover of 21% with a relatively low litter cover of 30%. Percent bare ground is not as high as some other sagebrush/grass sites with a scattered population of pinyon and juniper. There is some evidence of soil movement, but this is mitigated by the lack of a steep slope. The erosion condition class was determined to be slight in 2004.

The key browse species is Wyoming big sagebrush with a moderate density of 4,920 plants/acre in 1994, 3,880 in 1999, and 3,860 in 2004. The population appears to be steady, although seedling production decreased from 86% in 1994, to 14% in 1999, to 0% in 2004. The young age class has had similar trends. Additionally, the proportion of the population that is classified as dead has gone up from 5% in 1994, 14% in 1999, to 19% in 2004, but percent decadence decreased from 29% in 1999 to 15% in 2004. With additional precipitation in 2004, perhaps the population will stabilize. Strip frequency also suggests a temporary stabilizing trend. Utilization is moderate to heavy, but vigor appears to be good.

The scattered pinyon and juniper provides some valuable cover for wintering animals during critical periods of winter. In 1999, point quarter estimated both pinyon and juniper trees to be 6 trees/acre with an average diameter of 4 inches and 5.8 inches. A very low density of heavily used bitterbrush are scattered throughout the community. The increaser, broom snakeweed has fluctuated in density, in 1994 it was estimated at 1,800 plants/acre. It increased substantially to 20,060 plants/acre in 1999, but decreased to 5,260 in 2004. This is its typical response to wet and dry cycles. It is found in thick clumped patches.

The herbaceous understory is primarily composed of grasses which make up, on average, 91% of the herbaceous cover. There are primarily only two grass species found on the site, crested wheatgrass and cheatgrass. Crested wheatgrass provided 42% of the cover in 2004, which just more than Wyoming big sagebrush at 25%. Cheatgrass decreased significantly in nested frequency in 2004, which has been fairly abundant in the past, but still has the potential to increase again. Forbs were diverse in 1994 at 23 species, although nearly half were small annual species. Only 6 species were sampled in 1999 and 4 in 2004. All together, forbs provided only 8% of the total cover in 1994, now they provide about 2% in 2004.

1994 APPARENT TREND ASSESSMENT

Because it is a new site there is no previous data to compare with. Inasmuch as the herbaceous species provide nearly 50% of the vegetative cover and percent bare ground is 29%, the soil on the site is considered stable, but only in fair condition. The apparent browse trend is considered up with excellent seedling and young production on Wyoming big sagebrush. Age class distribution is good with a moderately low percentage of decadent plants. The herbaceous understory is stable, but the percentage of annual grass should be watched

closely; any increase may indicate a downward trend for the site. The Desirable Components Index rated this site as good with a score of 57 due to good shrub cover, moderate annual grass cover, and few forbs.

winter range condition (DC Index) - 57 (good) Wyoming big sagebrush type

1999 TREND ASSESSMENT

The trend for soil is slightly up, but still in poor condition. The decrease in bare soil is mostly because of increases in cheatgrass and broom snakeweed cover, both increasers. The browse trend has taken an unexpected turn downward as sagebrush has experienced decreases in cover, seedling production, and the percentage of young in the population. The population density has also decreased by 21% as shown by the decrease in strip frequency. Also, increases in decadency and the percent of the population classified as dead point to a downward trend. There has also been an unusually large increase in the broom snakeweed population. The herbaceous understory is somewhat mixed. There have been increases for crested wheatgrass, but increases for cheatgrass as well. The forbs only made up 17% of the herbaceous cover in 1994, but have since been reduced to less than 1% of the herbaceous cover. Overall, trend is up for the herbaceous species, however the annual grass component should be watched closely as further increases would probably mean losses of other herbaceous species and a reduction in the number of sagebrush seedlings becoming established. The Desirable Components Index rated this site as good with a score of 49 due to decreased shrub cover, moderate annual grass cover, and increase in percent decadence of shrubs.

TREND ASSESSMENT
soil - slightly up (4)
browse - down (1)
herbaceous understory - up (5)
winter range condition (DC Index) - 49 (good) Wyoming big sagebrush type

2004 TREND ASSESSMENT

Trend for soil is down slightly. Percent bare ground increased as well as rock and pavement cover. Increases in rock and pavement suggest soil movement. The erosion condition class indicates some active soil movement and the presences of a few gullies. Trend for key browse Wyoming big sagebrush is stable. Density has remained similar to 1999 and percent decadence decreased from 29% in 1999 to 15% in 2004. Young and seedling production are low, but seedhead production was moderate and annual leader growth averaged almost 2 inches. Trend for herbaceous understory is considered stable with slight increases in nested values for perennial species, but not enough to change the trend. Cheatgrass decreased significantly in nested frequency, while crested wheatgrass increased in percent cover. The Desirable Components Index rated this site as good with a score of 59 due to increase in perennial grass cover, decreased annual grass cover, and decreased percent decadence of shrubs.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - slightly up (3)
winter range condition (DC Index) - 59 (good) Wyoming big sagebrush type

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

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{a}$225	$_{b}$309	$_{b}$285	7.54	10.15	16.17
G	Bromus tectorum (a)	$_{b}$175	$_{b}$206	$_{a}$80	3.18	3.51	1.23
G	Vulpia octoflora (a)	-	8	5	-	.02	.01
Total for Annual Grasses		175	214	85	3.18	3.53	1.24
Total for Perennial Grasses		225	309	285	7.54	10.15	16.17
Total for Grasses		400	523	370	10.73	13.69	17.41
F	Astragalus convallarius	$_{b}$24	$_{a}$3	$_{b}$19	.14	.01	.61
F	Chenopodium spp. (a)	$_{b}$11	$_{a}$-	$_{a}$-	.02	-	-
F	Comandra pallida	$_{b}$24	$_{a}$-	$_{a}$-	.06	-	-
F	Collinsia parviflora (a)	$_{b}$26	$_{a}$4	$_{a}$-	.09	.00	-
F	Cryptantha nevadensis	$_{b}$39	$_{a}$-	$_{a}$-	.06	-	-
F	Cryptantha spp.	$_{b}$20	$_{a}$-	$_{a}$-	.04	-	-
F	Dalea searlsiae	2	-	-	.00	-	-
F	Descurainia pinnata (a)	$_{b}$14	$_{a}$-	$_{ab}$4	.02	-	.15
F	Draba nemorosa (a)	$_{b}$42	$_{a}$-	$_{a}$-	.08	-	-
F	Erigeron pumilus	-	-	-	-	.00	-
F	Gayophytum ramosissimum(a)	$_{b}$22	$_{a}$-	$_{a}$-	.04	-	-
F	Gilia spp. (a)	$_{b}$18	$_{a}$-	$_{a}$-	.04	-	-
F	Heterotheca villosa	-	4	-	-	.03	-
F	Ipomopsis aggregata	2	1	1	.00	.00	.00
F	Machaeranthera spp	1	-	-	.00	-	-
F	Microsteris gracilis (a)	$_{b}$60	$_{a}$6	$_{a}$-	.32	.01	-
F	Oxybaphus linearis	2	-	-	.01	-	-
F	Phlox longifolia	3	-	5	.01	-	.01
F	Ranunculus testiculatus (a)	$_{b}$158	$_{a}$-	$_{a}$-	.73	-	-
F	Salsola iberica (a)	3	-	-	.01	-	-
F	Schoencrambe linifolia	$_{b}$27	$_{a}$-	$_{a}$-	.07	-	-
F	Sisymbrium altissimum (a)	-	-	-	.00	-	-
F	Sphaeralcea coccinea	5	-	-	.38	-	-
F	Tragopogon dubius	5	-	-	.01	-	-
F	Trifolium spp.	3	-	2	.03	-	.03
Total for Annual Forbs		354	10	4	1.37	0.01	0.15
Total for Perennial Forbs		157	8	27	0.84	0.05	0.65
Total for Forbs		511	18	31	2.22	0.07	0.81

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

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

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

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

Species	Percent Cover	
	'99	'04
Artemisia tridentata wyomingensis	-	10.71
Chrysothamnus depressus	-	.01
Gutierrezia sarothrae	-	2.48
Juniperus osteosperma	-	.05
Pinus edulis	5.19	6.26
Purshia tridentata	-	.21
Quercus gambelii	4.00	3.59
Yucca spp.	-	2.65

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

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

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

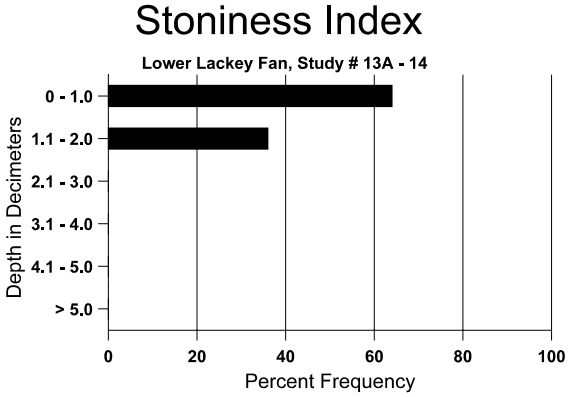
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	6	-	5.8	-
Pinus edulis	6	-	4.0	-

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
10.7	69.7 (10.4)	7.2	52.9	25.8	21.3	2.1	8.1	76.8	0.5



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

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

Days use per acre (ha)	
'99	'04
-	-
34 (84)	52 (129)
20 (49)	7 (18)
12 (30)	7 (16)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
94	**4920**	4240	1760	2140	1020	260	9	2	21	11	13	25/36
99	**3880**	560	720	2020	1140	700	52	13	29	5	6	20/28
04	**3860**	-	240	3060	560	900	54	30	15	10	11	18/29
Chrysothamnus depressus												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	3/6
04	**240**	-	40	200	-	-	50	0	-	-	0	6/10
Ephedra viridis												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	43/63
Eriogonum microthecum												
94	**40**	-	-	40	-	-	0	0	-	-	0	9/11
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	20	0	0	-	-	0	10/14
Gutierrezia sarothrae												
94	**1800**	1720	520	1220	60	60	0	0	3	1	1	10/10
99	**20060**	880	5720	14020	320	100	.69	0	2	.59	.59	11/11
04	**5260**	200	1440	3580	240	900	0	0	5	2	3	7/7
Juniperus osteosperma												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	20	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Leptodactylon pungens												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	9/7
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	6/13
Pediocactus simpsonii												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	1/3
Pinus edulis												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Purshia tridentata												
94	**20**	-	-	20	-	-	0	0	-	-	0	13/27
99	**80**	-	-	80	-	-	0	75	-	-	0	17/35
04	**80**	-	40	40	-	-	50	50	-	-	0	27/61
Yucca spp.												
94	**360**	-	-	360	-	-	0	0	0	-	0	24/38
99	**440**	-	40	400	-	40	0	0	0	-	0	18/29
04	**600**	-	180	400	20	-	0	0	3	3	3	22/30

Trend Study 13A-15-04

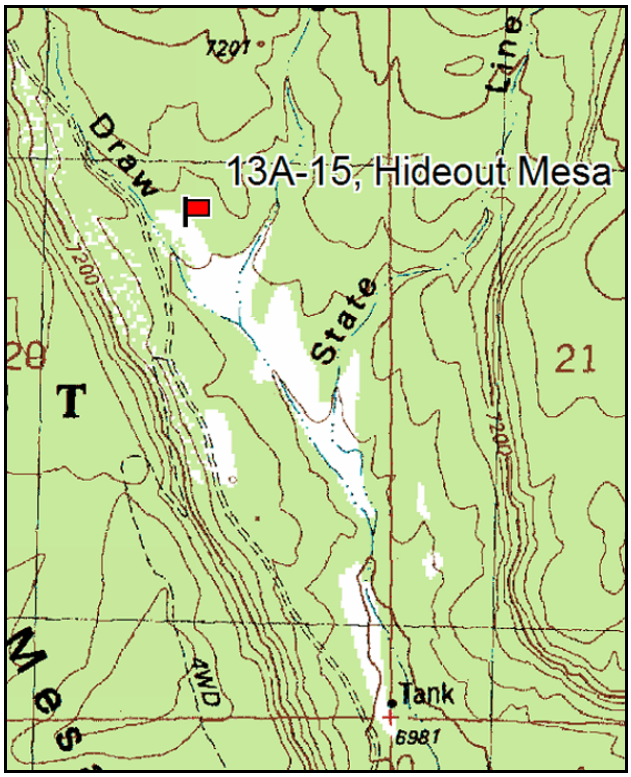
Study site name: Hideout Mesa . Vegetation type: Sagebrush-Grass Burn .

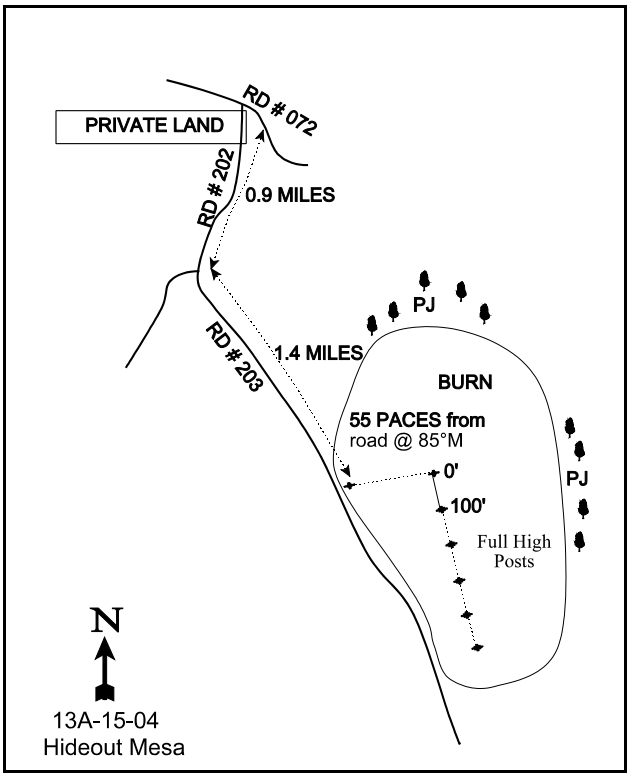
Compass bearing: frequency baseline 155 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Ray Mesa

Diagrammatic Sketch

Township 28S , Range 26E , Section 20

GPS: NAD 27, UTM 12S 4246851 N, 668312 E

DISCUSSION

Hideout Mesa - Trend Study No. 13A-15

Hideout Mesa is a site that was selected because of it's recognized importance to an increasing elk population. It is located within the southeast lower benches of the LaSal Mountains, just west of the Colorado-Utah state line. It is in one of the bottom's of the many shallow canyons which are surrounded by several rugged flat-topped mesa's. This study is inside a shallow canyon bottom of sagebrush and grass, within a moderately large opening of thick pinyon-juniper woodland in association with scattered Ponderosa pine. The area burned around 1994 and in 2002 a fire came within one-third of mile to the study site. Pellet group data from 1999 estimated 11 deer (27 ddu/ha), 36 elk (89 edu/ha), and 50 cow days use/acre (124 cdu/ha). There are two well worn livestock trails that run through the site. Pellet group data from 2004 estimated 11 elk (27 edu/ha) and 22 cow days use/acre (54 cdu/ha). This area is managed by the Forest Service and is part of the South Paradox grazing allotment.

The site has an elevation of 7,100 feet with a southeast aspect and slope of about 3%. The shallow and narrow canyon bottom has a moderately shallow (effective rooting depth of only 10 inches) sandy clay loam soil with very little rock or pavement on the surface or within the profile. Soil pH is neutral (7.2) with good amounts of phosphorous, one of only a few sites with above 10 ppm of phosphorous. Past erosion problems are evident due to a large gully nearby that has been active historically. The site has a fairly good vegetative cover, with on average almost 55% of the cover coming from herbaceous species, which gives the best protection from high intensity summer storms. Percent bare ground is fairly high for this kind of site, but it has been about the same since 1994.

The most common browse species on this site in order of abundance are mountain big sagebrush, fringed sagebrush, low rabbitbrush, and broom snakeweed. There are a few scattered plants of serviceberry, fourwing saltbush, and rubber rabbitbrush. The key browse species on this site is mountain big sagebrush which appears to be increasing in numbers and on average provides 76% of the browse cover. The proportion of seedlings to the population for this site was 196% in 1994, 3% in 1999, and 46% in 2004. Percent young age class has increased from 27% in 1994 to 54% in 1999, then decreased to 9% in 2004. Percent decadence has decreased from 17% in 1994 down to 13% in 1999 and 2004. The sagebrush population appears to be doing well with a well distributed age class.

The herbaceous understory is diverse with 13 species of grasses and 37 species of forbs being identified in 2004. Western wheatgrass, blue grama, prairie junegrass, and needle-and-thread grass made up 88% of the grass cover in 1994 and 72% in 1999. By 2004, those same grasses only accounted for 23% of the grass cover. However, cheatgrass only made up 0% of the grass cover in 1994, 18% in 1999, and increased to 73% in 2004. This change in species composition has greatly increases the likelihood of another wildfire occurring in the area. Initially after the burn, annual grasses (cheatgrass and sixweeks fescue) made up less than one percent of the grass cover. The herbaceous understory has many forb species, yet only one has a consistent cover value greater than one percent. Scarlet globemallow has a cover value on average of almost 2%.

1994 APPARENT TREND ASSESSMENT

The soil trend, with the available data, would be stable with almost 60% of the vegetative cover coming from the herbaceous species. Litter cover is fairly good even with the recent fire. Relative percent bare ground is moderately high at 30%, but this is mitigated by the high amounts of litter and herbaceous cover. The browse trend is up with most of the key species showing characteristics of an increasing population, especially the mountain big sagebrush population. The herbaceous understory is stable to increasing. The Desirable Components Index rated this site as good with a score of 74 due to high number of young key browse species, good perennial grass cover, decreased annual grass cover, and moderate decadent shrubs.

winter range condition (DC Index) - 74 (good) Mountain big sagebrush type

1999 TREND ASSESSMENT

The soil trend appears to be stable with percent bare soil almost equal to what it was in 1994. Some litter cover was lost from 1994, but that was compensated for by increases in cryptogamic cover. On average about 60% of the vegetative cover comes from herbaceous species. The browse trend is up, especially for the key species (mountain big sagebrush) which continues to show characteristics of an increasing population. The herbaceous understory is stable to increasing even with the losses some forbs which is compensated for by the grasses. The Desirable Components Index rated this site as good with a score of 72 due to moderate number of young key browse species, increase in annual grass cover, and moderate decadent shrubs.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - stable (3)
winter range condition (DC Index) - 72 (good) Mountain big sagebrush type

2004 TREND ASSESSMENT

The trend for soil continues to be stable. Percent bare ground is similar to 1994 and 1999 estimates. Protective cover has not changed much from 1999, although cryptogamic cover decreased back to 1994 levels of 2% total cover. Trend for key browse mountain big sagebrush is up. The number of mature sagebrush plants increased from 2,180 plants/acre in 1999 to 3,620 in 2004. Utilization was light, vigor is good, and annual leader growth averaged almost 2 inches. Sagebrush seedlings were abundant this year, although the number of young plants was lower than previous years. Trend for the herbaceous understory is down. Several of the perennial grasses decreased significantly in nested frequency, specifically Western wheatgrass, prairie junegrass, and mutton bluegrass. Cheatgrass increased significantly from 9% of the total cover in 1999 to 31% in 2004. Quadrat frequency also increased significantly for cheatgrass from 38% to 71%. Forbs are diverse with 37 species being sampled, but they contribute little to overall cover. This site is now highly susceptible to fire because of the large increase in fine fuels contributed by cheatgrass. The Desirable Components Index rated this site as poor with a score of 46 due to large increase in cheatgrass, decrease in perennial grasses, and few young key browse species.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - down (1)
winter range condition (DC Index) - 46 (poor) Mountain big sagebrush type

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

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
G	Agropyron intermedium	a-	a-	b20	-	-	.10
G	Agropyron smithii	b276	b252	a75	4.98	3.68	.52
G	Bouteloua gracilis	58	50	52	1.16	.72	.85

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
G	Bromus tectorum (a)	$_{a}$26	$_{b}$127	$_{c}$269	.04	2.81	12.30
G	Carex spp.	1	5	10	.00	.02	.05
G	Hilaria jamesii	6	4	5	.19	.03	.01
G	Koeleria cristata	$_{b}$216	$_{b}$169	$_{a}$35	3.82	4.17	.35
G	Oryzopsis hymenoides	3	9	11	.18	.09	.01
G	Poa fendleriana	$_{b}$29	$_{b}$45	$_{a}$3	.12	.46	.00
G	Poa pratensis	5	-	-	.01	-	-
G	Poa secunda	$_{a}$-	$_{c}$56	$_{b}$19	-	.59	.31
G	Sitanion hystrix	$_{b}$54	$_{ab}$25	$_{a}$16	.95	.19	.25
G	Sporobolus cryptandrus	-	9	1	-	.04	.00
G	Stipa comata	$_{a}$51	$_{ab}$86	$_{b}$102	1.24	2.47	2.12
G	Vulpia octoflora (a)	3	4	3	.00	.03	.01
Total for Annual Grasses		29	131	272	0.04	2.85	12.31
Total for Perennial Grasses		699	710	349	12.69	12.50	4.61
Total for Grasses		728	841	621	12.74	15.35	16.92
F	Agoseris glauca	-	2	1	-	.00	.01
F	Alyssum alyssoides (a)	4	-	1	.01	-	.00
F	Androsace septentrionalis (a)	$_{a}$-	$_{b}$45	$_{a}$2	-	.10	.00
F	Artemisia ludoviciana	29	23	13	.53	.57	.39
F	Astragalus miser	9	3	-	.39	.03	-
F	Castilleja linariaefolia	6	-	-	.06	-	-
F	Calochortus nuttallii	-	-	3	-	-	.01
F	Chenopodium fremontii (a)	$_{a}$-	$_{a}$-	$_{b}$21	-	-	.04
F	Chenopodium leptophyllum(a)	-	-	3	-	-	.01
F	Cirsium undulatum	4	1	1	.03	.00	.03
F	Comandra pallida	$_{b}$94	$_{a}$-	$_{a}$-	.69	-	-
F	Collinsia parviflora (a)	$_{b}$39	$_{a}$1	$_{a}$2	.07	.00	.00
F	Crepis acuminata	-	1	5	-	.03	.09
F	Cryptantha spp.	6	-	13	.02	-	.07
F	Cymopterus spp.	4	-	-	.00	-	.00
F	Descurainia pinnata (a)	3	-	1	.01	-	.00
F	Draba nemorosa (a)	$_{b}$75	$_{a}$11	$_{a}$7	.16	.03	.01
F	Erigeron divergens	-	-	8	-	-	.06
F	Erigeron flagellaris	-	-	1	-	-	.03
F	Erigeron spp.	8	-	-	.02	-	-
F	Erigeron pumilus	$_{b}$42	$_{a}$14	$_{a}$17	.09	.08	.11

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
F	Eriogonum racemosum	11	6	2	.17	.05	.01
F	Gayophytum ramosissimum(a)	4	-	5	.00	-	.01
F	Gilia spp. (a)	$_{b}$148	$_{a}$1	$_{a}$5	.32	.00	.01
F	Grindelia squarrosa	$_{b}$41	$_{a}$-	$_{a}$-	.15	-	-
F	Heterotheca villosa	12	11	5	.08	.36	.38
F	Ipomopsis aggregata	10	-	-	.02	-	-
F	Lappula occidentalis (a)	$_{a}$13	$_{a}$12	$_{b}$61	.04	.03	.32
F	Linum lewisii	4	7	4	.01	.06	.03
F	Lupinus spp.	4	1	5	.01	.03	.01
F	Machaeranthera canescens	$_{b}$27	$_{a}$6	$_{a}$2	.06	.01	.00
F	Microsteris gracilis (a)	$_{a}$38	$_{b}$114	$_{a}$10	.09	.36	.01
F	Oenothera pallida	5	7	1	.03	.03	.00
F	Orthocarpus spp. (a)	-	4	-	-	.00	-
F	Penstemon caespitosus	$_{b}$14	$_{a}$-	$_{b}$18	.70	-	.60
F	Penstemon comarrhenus	2	5	7	.00	.01	.28
F	Penstemon spp.	$_{b}$20	$_{b}$29	$_{a}$-	.07	1.27	-
F	Phlox longifolia	$_{b}$36	$_{a}$19	$_{a}$10	.08	.03	.02
F	Plantago patagonica (a)	$_{b}$77	$_{ab}$50	$_{a}$29	.32	.10	.16
F	Polygonum douglasii (a)	$_{ab}$28	$_{b}$38	$_{a}$3	.05	.09	.01
F	Ranunculus testiculatus (a)	2	-	3	.01	-	.00
F	Sphaeralcea coccinea	129	132	125	1.72	1.23	1.68
F	Tragopogon dubius	-	-	3	-	-	.04
F	Trifolium spp.	11	2	4	.02	.00	.01
F	Zigadenus paniculatus	6	8	12	.01	.02	.02
Total for Annual Forbs		431	276	153	1.09	0.74	0.63
Total for Perennial Forbs		534	277	260	5.02	3.86	3.93
Total for Forbs		965	553	413	6.12	4.60	4.56

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

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

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

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

Species	Percent Cover '04
Amelanchier utahensis	.21
Artemisia frigida	2.34
Artemisia tridentata vaseyana	15.91
Atriplex canescens	.48
Chrysothamnus depressus	.03
Chrysothamnus nauseosus	.13
Chrysothamnus viscidiflorus viscidiflorus	2.23
Eriogonum microthecum	.05
Gutierrezia sarothrae	.56
Opuntia spp.	.11
Pinus edulis	.46

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

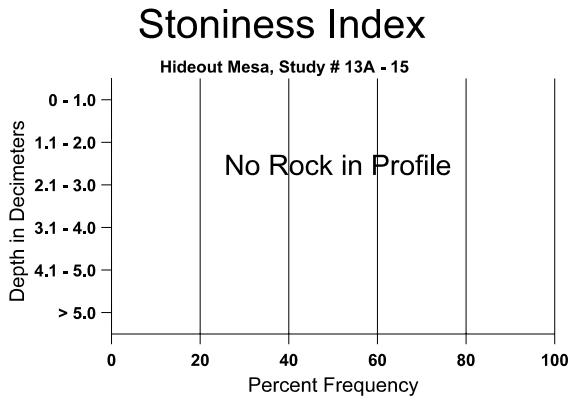
Species	Average leader growth (in) '04
Artemisia tridentata vaseyana	1.7

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
10.0	63.7 (13.3)	7.2	50.9	28.6	20.6	2.2	18.6	227.2	0.5



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

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

Days use per acre (ha) '99	'04
-	-
36 (89)	11 (27)
11 (27)	-
50 (124)	22 (54)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
94	**20**	-	-	20	-	-	0	0	-	-	0	20/24
99	**20**	-	-	20	-	-	0	100	-	-	0	30/28
04	**20**	-	-	20	-	-	0	100	-	-	0	28/26
Artemisia frigida												
94	**3660**	40	480	3080	100	60	0	0	3	-	0	8/11
99	**5040**	160	1220	3740	80	40	8	.79	2	1	1	6/6
04	**3080**	380	120	2940	20	20	5	15	1	-	1	12/10
Artemisia tridentata vaseyana												
94	**4600**	9000	1260	2540	800	2760	4	0	17	5	19	20/24
99	**6500**	200	3500	2180	820	2320	16	2	13	1	2	24/31
04	**4700**	2160	440	3620	640	500	18	.42	14	4	4	19/26
Atriplex canescens												
94	**80**	-	-	80	-	-	0	0	-	-	0	21/16
99	**140**	60	40	100	-	-	29	29	-	-	0	22/20
04	**100**	-	-	100	-	-	60	40	-	-	0	27/24
Chrysothamnus depressus												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	-	60	-	-	0	0	-	-	0	4/12
04	**200**	-	-	200	-	-	0	0	-	-	0	4/7
Chrysothamnus nauseosus												
94	**40**	-	-	40	-	-	0	0	-	-	0	29/32
99	**20**	-	-	20	-	-	0	0	-	-	0	27/32
04	**60**	-	-	60	-	-	0	0	-	-	0	22/25
Chrysothamnus viscidiflorus viscidiflorus												
94	**1180**	180	140	1040	-	40	0	0	-	-	3	7/15
99	**1600**	-	220	1380	-	20	4	0	-	-	0	6/10
04	**1540**	-	20	1520	-	-	1	0	-	-	0	8/11
Coryphantha vivipara arizonica												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	-	60	-	-	0	0	-	-	0	3/4
04	**40**	-	-	40	-	-	0	0	-	-	0	3/4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Eriogonum microthecum												
94	**120**	-	-	120	-	-	0	0	-	-	0	9/11
99	**300**	-	100	200	-	-	27	0	-	-	0	7/6
04	**200**	-	-	200	-	-	0	0	-	-	0	7/8
Gutierrezia sarothrae												
94	**840**	120	40	720	80	-	0	0	10	5	5	7/11
99	**720**	-	100	580	40	40	0	0	6	-	0	6/6
04	**580**	-	40	540	-	-	0	0	0	-	0	7/9
Opuntia spp.												
94	**160**	-	60	100	-	-	13	0	-	-	0	3/9
99	**140**	20	20	120	-	-	0	0	-	-	0	4/10
04	**160**	-	20	140	-	-	0	0	-	-	0	4/7
Pinus edulis												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-

Trend Study 13A-16-04

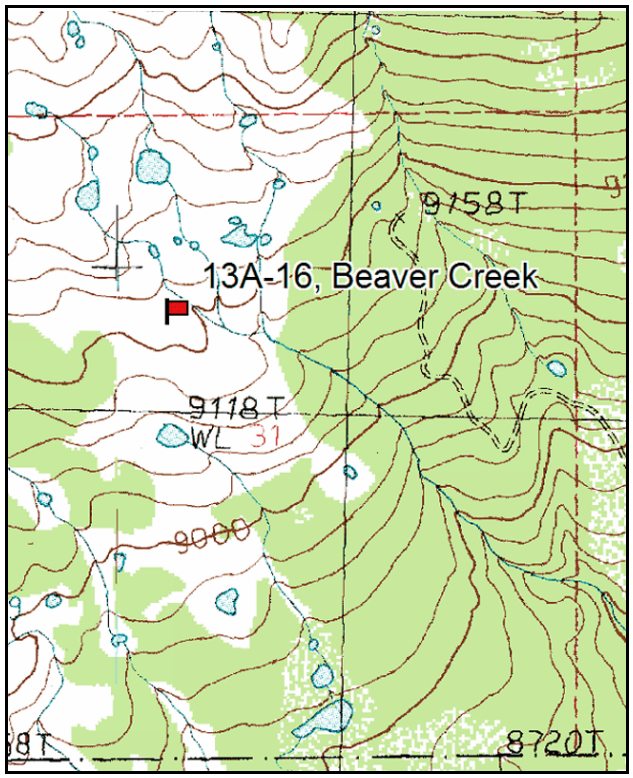
Study site name: Beaver Creek . Vegetation type: Aspen Meadow .

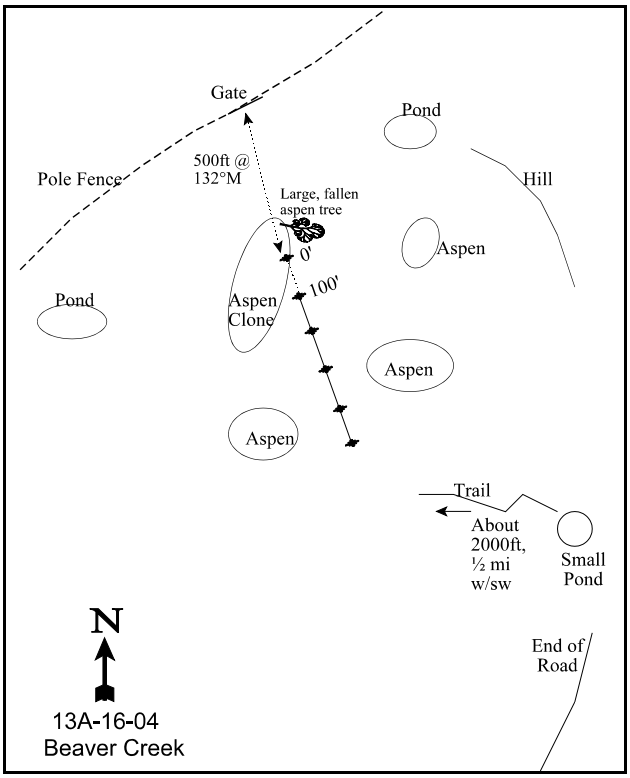
Compass bearing: frequency baseline 122 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Mount Peale

Diagrammatic Sketch

Township 27S , Range 25E , Section 31

GPS: NAD 27, UTM 12S 4253213 N, 656550 E

DISCUSSION

Beaver Creek - Trend Study No. 13A-16

Beaver Creek was established in 2004 to replace East La Sal Pass (13A-2) study site. This site is located just southeast of Mount Peale and is located on state land. It samples an aspen meadow that receives high elk and livestock use in the spring/summer. Pellet group data from 2004 estimated 42 elk (104 edu/ha), 5 deer (13 ddu/ha), and 66 cow days use/acre (163 cdu/ha). Elk were observed near the site in 2004. The site has an elevation of 9,000 feet with a south aspect and a slope of about 10-12%.

The soil is classified as a loam. Soil on the site appears to be moderately deep (effective rooting depth of almost 16 inches) with few rock or pavement on the surface, but abundant a few inches below the surface. Soil pH is moderately acidic (5.6) with good amounts of phosphorous and potassium. Organic matter is abundant at 6%. The site has good vegetative cover (60%), while 76% of the vegetative cover comes from herbaceous species. Herbaceous cover gives the best protection for soils from high intensity summer storms. Percent bare ground is minimal, most exposed soil was from gofer activity. The erosion condition class was determined to be stable in 2004.

Snowberry forms the dominant shrub cover on this open site which comprises 76% of the shrub cover in 2004. The plants are vigorous with light to no use. Because of the elevation and not generally used as a winter range, browse is not a critical component for this site. The browse only makes up approximately 24% of the total vegetative cover. Other browse species found on the site include: Utah juniper, Gambel oak, aspen, Gooseberry currant, and Wood's rose. Most of the aspen are large and old, with very little young recruitment.

Herbaceous vegetation forms a diverse and dense understory. Forbs are abundant with them providing almost 39% of the total vegetative cover. The most common species include: Pacific aster, western yarrow, Silky lupine, and common dandelion. These species provide valuable summer forage for wildlife. Grasses are also quite dense providing 37% of the vegetative cover. Kentucky bluegrass, an increaser with moderate to heavy grazing, makes up the bulk of the grass cover. Other common species include Mountain brome, Intermediate wheatgrass, and Subalpine needlegrass. The majority of the herbaceous species, especially the forbs, on this site are increasers with heavy grazing. The dense herbaceous understory accounts for 76% of the total vegetative cover.

2004 APPARENT TREND ASSESSMENT

Soil shows no sign of erosion due to extensive vegetative and litter cover. Very little pavement or rock on surface, but is abundant within the profile, meaning little active erosion. Browse species are not a critical component of this spring/summer range, although young aspen may provide forage. Only mature aspen trees were encountered suggesting that young trees are most likely being browsed. Understory vegetation has good ground cover, which is dominated by Kentucky bluegrass, mountain brome, and intermediate wheatgrass. Forbs are also abundant in the understory and provide valuable forage.

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

Type	Species	Nested Frequency '04	Average Cover % '04
G	Agropyron trachycaulum	70	1.64

Type	Species	Nested Frequency '04	Average Cover % '04
G	Bromus anomalus	13	.36
G	Bromus carinatus	64	1.17
G	Carex spp.	21	.53
G	Dactylis glomerata	6	.03
G	Poa pratensis	320	17.14
G	Stipa columbiana	59	2.28
G	Stipa lettermani	5	.06
Total for Annual Grasses		0	0
Total for Perennial Grasses		558	23.26
Total for Grasses		558	23.26
F	Achillea millefolium	167	4.25
F	Agoseris glauca	2	.00
F	Androsace septentrionalis (a)	3	.01
F	Aster chilensis	184	6.17
F	Chenopodium fremontii (a)	53	.44
F	Cirsium spp.	17	.64
F	Crepis acuminata	5	.01
F	Cymopterus spp.	13	1.49
F	Descurainia pinnata (a)	58	1.50
F	Draba spp. (a)	15	.10
F	Erigeron flagellaris	1	.00
F	Geranium spp.	12	.10
F	Labiatae	3	.04
F	Lathyrus brachycalyx	53	1.30
F	Lappula occidentalis (a)	7	.16
F	Lepidium spp. (a)	10	.07
F	Lupinus argenteus	48	4.59
F	Potentilla spp.	25	.71
F	Stellaria jamesiana	23	.28
F	Swertia perennis	2	.63
F	Taraxacum officinale	143	2.11
F	Tragopogon dubius	5	.03
Total for Annual Forbs		146	2.29
Total for Perennial Forbs		703	22.40
Total for Forbs		849	24.70

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

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

Type	Species	Strip Frequency '04	Average Cover % '04
B	Juniperus osteosperma	-	1.99
B	Populus tremuloides	8	.53
B	Quercus gambelii	1	.41
B	Ribes montigenum	1	.30
B	Rosa woodsii	7	.36
B	Symphoricarpos oreophilus	48	11.50
Total for Browse		65	15.10

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

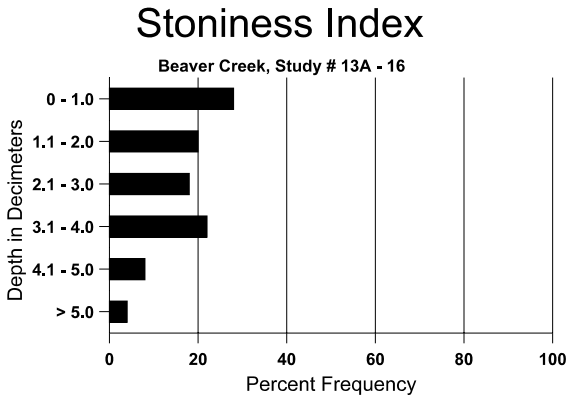
Species	Percent Cover '04
Populus tremuloides	24.23
Quercus gambelii	.60
Ribes montigenum	1.45
Rosa woodsii	.58
Symphoricarpos oreophilus	24.36

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

Cover Type	Average Cover % '04
Vegetation	60.12
Rock	.33
Litter	46.62
Bare Ground	7.81

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.6	48.4 (17.8)	5.6	46.3	34.4	19.3	6.3	28.1	515.2	0.6



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

Type	Quadrat Frequency '04	Days use per acre (ha) '04
Elk	2	42 (104)
Deer	-	5 (13)
Cattle	18	66 (163)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Populus tremuloides												
04	**200**	-	140	60	-	-	10	30	-	-	0	-/-
Quercus gambelii												
04	**40**	-	40	-	-	-	0	0	-	-	0	13/7
Ribes montigenum												
04	**20**	-	-	20	-	-	0	0	-	-	0	34/86
Rosa woodsii												
04	**380**	-	-	380	-	-	0	0	-	-	0	13/10
Symphoricarpos oreophilus												
04	**2080**	40	140	1920	20	-	0	0	1	-	0	30/47

Trend Study 13A-17-04

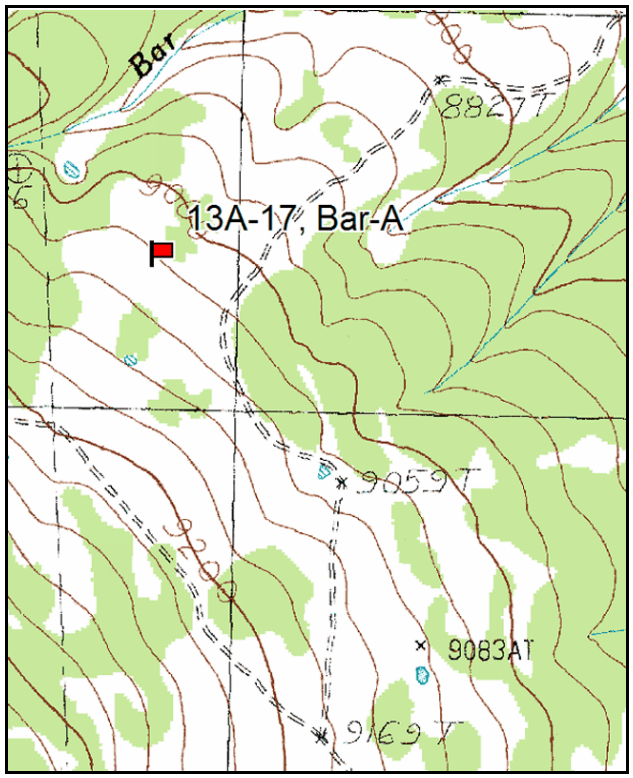
Study site name: Bar-A . Vegetation type: Aspen Meadow .

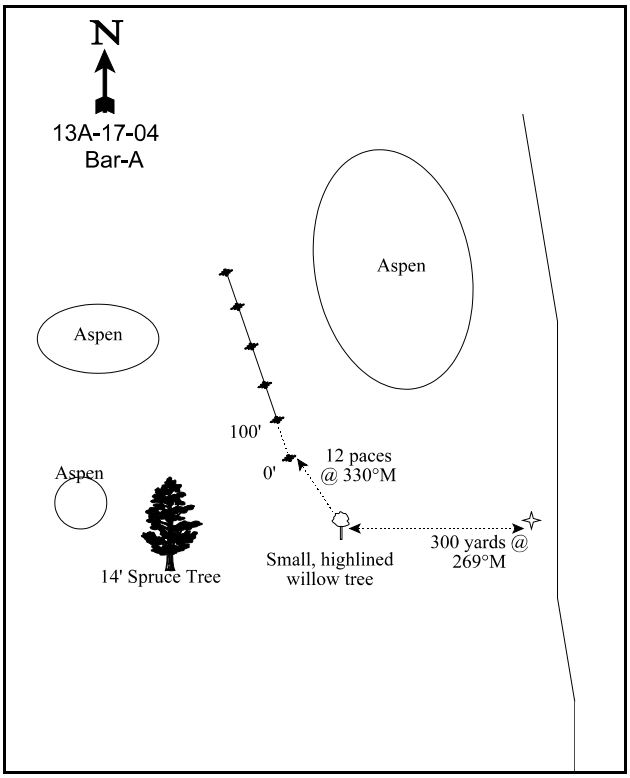
Compass bearing: frequency baseline 345 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Mount Waas

Diagrammatic Sketch

Township 26S , Range 25E , Section Unsurveyed

GPS: NAD 27, UTM 12S 4264347 N, 660791 E

DISCUSSION

Bar-A - Trend Study No. 13A-17

The Bar-A study site was established in 2004 to replace Taylor Flat (13A-9) study site, which has shown little wildlife use in past readings. This site is located on state land just northeast of Mount Tomasaki. This new site is thought to be used heavily by elk and livestock in the spring/summer. The area samples a meadow surrounded by aspen trees. The site has an elevation of 9,000 feet with a north aspect and a slope of about 5-8%. Pellet group data from 2004 estimated 21 elk (51 edu/ha), 7 deer (17ddu/ha), and 44 cow days use/acre (109 cdu/ha).

The soil is classified as a loam. Soil on the site is deep (effective rooting depth of almost 18 inches) with few rocks or pavement on the surface or within the profile. Soil pH is slightly acidic (6.1) with a high amount of organic matter at 6%. Phosphorous could be a limiting factor on the site at 4.9 ppm. Values below 10 ppm may limit normal plant growth and development. The site has good vegetative cover that comes from herbaceous species, which gives the best protection from high intensity summer storms. Percent bare ground is minimal, most exposed soil was from gofer activity. The erosion condition class was determined to be stable in 2004.

Browse species are minimal on this summer range and are not critical to this site. Browse species contribute less than 1% of the vegetative cover. Silver sagebrush is found in patches on the site and is moderately hedged. Other browse species found on the site include Bush cinquefoil and aspen which surrounds the meadow.

Herbaceous vegetation forms a diverse and dense understory. Grasses and forbs are abundant with them providing almost 100% of the total vegetative cover in 2004. Forbs accounted for 60% of the vegetative cover. The most common species include Rocky mountain iris, western yarrow, aster spp., and orange sneezeweed. Rocky mountain iris and orange sneezeweed are both increasers with grazing. They are also poor in forage value for wildlife and livestock. Rocky mountain iris accounts for 17% of total vegetation and orange sneezeweed, which is considered poisonous to livestock and wildlife, accounts for 6%. Grasses are also quite dense providing 40% of the vegetative cover in 2004. Kentucky bluegrass makes up the bulk of the grass cover. Other common species include Thurber fescue, Intermediate wheatgrass, and Subalpine needlegrass. The majority of the herbaceous species on this site are increasers with heavy grazing.

2004 APPARENT TREND ASSESSMENT

Soil shows no sign of erosion due to abundant vegetative and litter cover. Very little pavement or rock on surface or within the profile. Browse species are not a critical component of this spring/summer range, although silver sagebrush provides some forage. Surrounding young aspens may also provide some browse. Understory vegetation has excellent ground cover, which is dominated by Kentucky bluegrass, Thurber fescue, and intermediate wheatgrass. Forbs are also abundant in the understory and provide fair forage.

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

Type	Species	Nested Frequency '04	Average Cover % '04
G	Agropyron trachycaulum	90	1.20

Type	Species	Nested Frequency '04	Average Cover % '04
G	Bromus anomalus	18	.16
G	Bromus inermis	15	.15
G	Carex spp.	21	.38
G	Festuca ovina	1	.03
G	Festuca thurberi	35	2.58
G	Koeleria cristata	8	.06
G	Muhlenbergia spp.	3	.06
G	Poa bulbosa	5	.15
G	Poa pratensis	412	23.08
G	Stipa columbiana	38	1.57
G	Stipa comata	14	.18
G	Stipa lettermani	40	1.11
Total for Annual Grasses		0	0
Total for Perennial Grasses		700	30.73
Total for Grasses		700	30.73
F	Achillea millefolium	284	9.53
F	Agoseris glauca	27	.29
F	Antennaria rosea	25	.97
F	Androsace septentrionalis (a)	25	.13
F	Arabis spp.	2	.01
F	Arenaria spp.	49	.85
F	Aster spp.	226	4.76
F	Calochortus gunnisoni	4	.01
F	Carduus nutans (a)	2	.03
F	Cirsium spp.	30	1.26
F	Collomia linearis (a)	8	.01
F	Cymopterus spp.	14	.10
F	Erigeron flagellaris	9	.16
F	Eriogonum ovalifolium	4	.00
F	Geranium richardsonii	5	.33
F	Helenium hoopesii	74	4.26
F	Iris missouriensis	209	13.61
F	Lathyrus lanszwertii	144	2.91
F	Lupinus argenteus	15	.34
F	Phlox spp.	217	3.34
F	Polygonum douglasii (a)	35	.18

Type	Species	Nested Frequency '04	Average Cover % '04
F	Potentilla gracilis	28	.53
F	Senecio integerrimus	36	.64
F	Stellaria jamesiana	11	.10
F	Taraxacum officinale	119	1.88
F	Tragopogon dubius	5	.03
Total for Annual Forbs		70	0.35
Total for Perennial Forbs		1537	46.01
Total for Forbs		1607	46.36

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

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

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

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

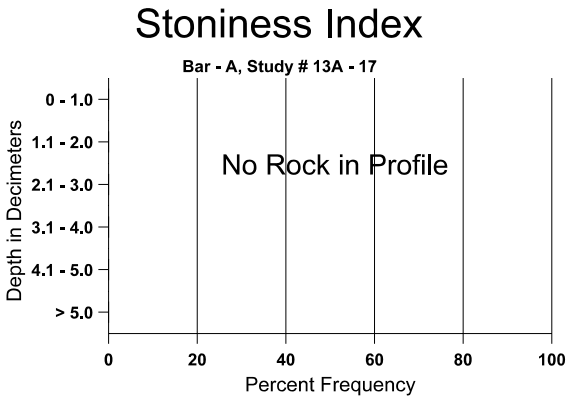
Species	Percent Cover '04
Artemisia cana	.20
Potentilla fruticosa	.20

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

Cover Type	Average Cover % '04
Vegetation	71.99
Rock	.87
Pavement	.97
Litter	30.81
Bare Ground	12.83

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
18.4	46.0 (17.3)	6.1	49.0	33.5	17.5	6.0	4.9	192.0	0.6



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

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

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia cana												
04	**100**	-	-	100	-	-	80	0	-	-	0	19/27
Potentilla fruticosa												
04	**20**	-	-	20	-	-	0	0	-	-	0	17/33

SUMMARY

WILDLIFE MANAGEMENT UNIT 13A - LASAL MOUNTAINS

The higher elevation, transitional, and elk winter range on the south side of the LaSals was sampled with two transects in relatively recent chainings at Two Mile (site #1), and Buck Hollow (site #3). These sites have good potential. Presently, the grass component is fairly vigorous and productive. The rest/rotation spring cattle grazing schedule should leave adequate grass standing for elk fall/winter use. Browse is diverse on the Two Mile site with a cover value of almost 34%, but browse is still limited on Buck Hollow where total browse cover is only 4% with 77% of the cover coming from pinyon. There is generally light to moderate use. Vegetative trends are slightly up for Two Mile site and stable for the Buck Hollow site. The chainings in the foothills around the southwest slope are in a later stage of succession, with the study at Amasas Back (site #5) showing an increasing dominance of pinyon-juniper. These two species have increased their cover values from 34%, to 57%, to 61% of the browse cover in 2004. Diversity and density of desirable browse are limited on this area. Vegetative trend is slightly down and will probably continue until the area is retreated. Both Slaughter Flat (site #4) and Black Ridge (site #8) have very similar trends with declining populations of Wyoming big sagebrush and declining trends for herbaceous understory species.

Three studies were established on North Beaver Mesa. The low elevation site at Beaver Canyon (#13) receives light use in most years. This site was suspended in 1999. There is good winter range for deer and especially elk on the chaining at Below Polar Rim (site #12). Trends appears stable for browse and soil, but down for the herbaceous understory. The North Beaver Mesa site (#11) receives moderately heavy use by both cattle and elk. Soil and browse trend is stable, but herbaceous is slightly down

In the two large valleys on the north side of the LaSals, one study was established in Castle Valley at Round Mountain (site #7) and one in Upper Fisher Valley (site #10). These sites provide critical deer winter range and both have obviously continuing downward browse trends. The lower elevation site (#7) has a much lower density with moderate to heavy use and 76% of the population is dying. Grass cover for this site is only about 7%. However, 98% of this cover is contributed by cheatgrass. The browse population has gone down to only 680 plants/acre. Trend is down for all measured vegetative parameters. The Upper Fisher Valley site (#10) is also experiencing downward trends for browse and herbaceous species. There is not much cheatgrass cover on this site, as it contributes only 11% of the grass cover at this time. The major concern for this site is that broom snakeweed has increased from 5,720 in 1994 to 13,220 plants/acre in 1999. It decreased to 8,220 plants/acre in 2004, but could increase with increased precipitation. Soil trend is generally stable to slightly improving with large increases in cryptogamic cover in 1999 (1% to 11%), although this decreased again in 2004 (5%).

Another three studies were done on summer range. East LaSal Pass (#2) and Taylor Flat (#9) both showed relatively little big game use and were replaced with two new sites in 2004, Beaver Creek (#16) and Bar-A (#17). Soil and vegetative trends are stable. On Bald Mesa (#6), the black sagebrush appears stable and has a dense understory of grass and forb species. Abundant shrub and herbaceous forage is available. Bar-A (#17) is located on state land is heavily used by domestic livestock. The undesirable Rocky mountain iris is abundant and may decrease the grasses on the study site. Currently, 38% of the herbaceous cover is contributed by weedy increaser species.

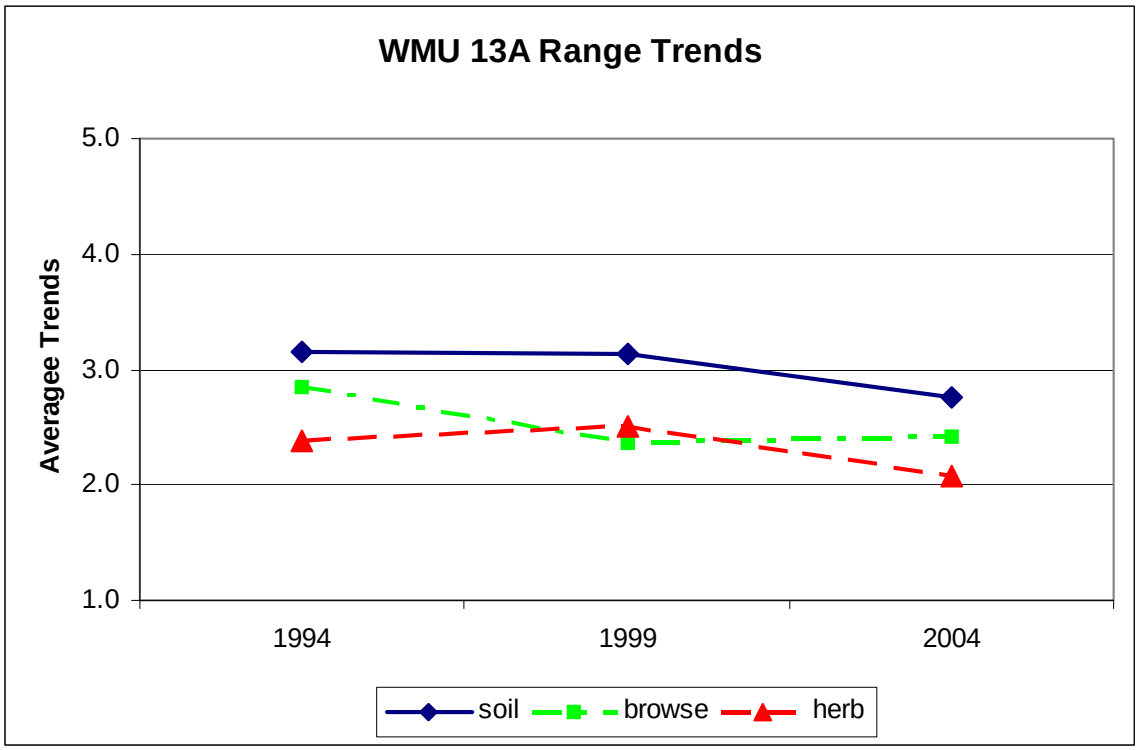
Two additional sites (Lower Lacky Fan #14 and Hideout Mesa #15) were added in 1994 after meetings with Interagency personnel. These sites were added to our study list because of the increases in the elk population. The Lower Lacky Fan (#14) site is located on the southwest slopes of the LaSal Mountains. This wintering area shows moderate use by elk and deer, and relatively high use by cows. The key browse species is Wyoming big sagebrush which is showing a significant downward trend in 1999, but has somewhat stabilized in 2004. Another area of concern for this site is the phenomenal increase in the broom snakeweed population,

although the density decreased greatly with drought conditions. Hideout Mesa (#15) is located within the southeast lower benches of the LaSal Mountains. Cattle use on the site is heavy, with moderate to light use for elk and deer. The trend for the key browse (mountain big sagebrush) is upward.

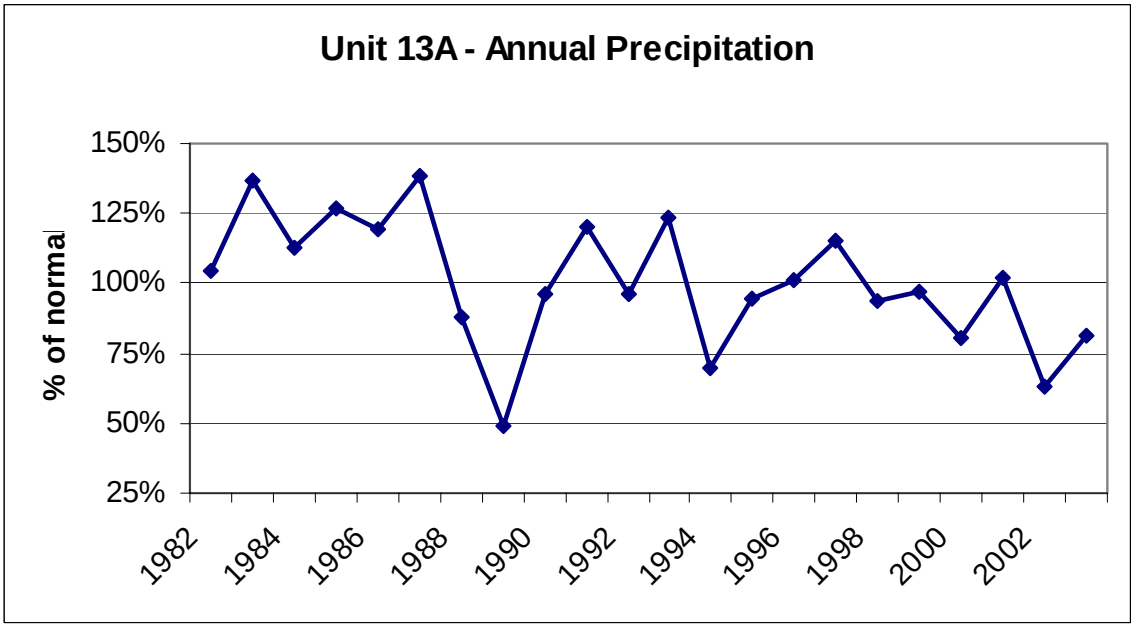
Due to major land use by livestock in the LaSal unit, strategies necessary to maintain the critical big game habitat are necessary. Monitoring range trends and grazing practices are especially important on those areas which show increasing livestock, deer and elk use trends. The Division must continue to work with land management agencies, especially the state, to help maintain and improve critically key areas. Cooperative habitat improvement projects have been successful in the past. Proposed followup roller-chopper treatments and seedings should be jointly funded to help mitigate costs.

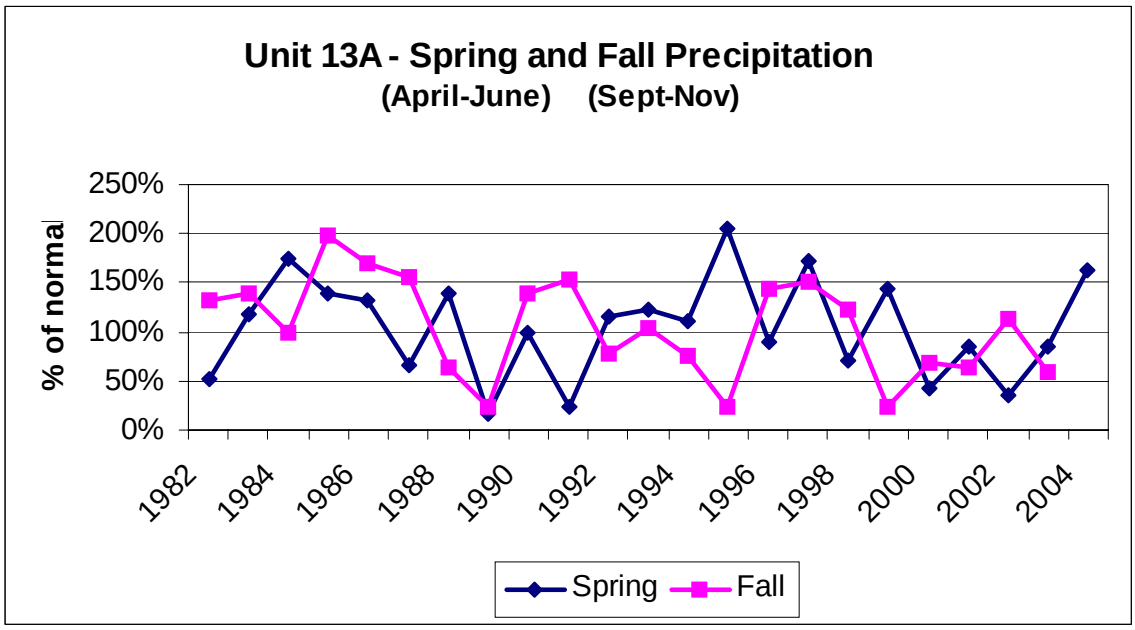
Average Range Trends -- WMU 13A La Sal Mountains

	1994	1999	2004
soil	3.2	3.1	2.8
browse	2.8	2.4	2.4
herb	2.4	2.5	2.1
	13 sites	14 sites	12 sites



Precipitation graphs for the La Sal Mountain unit. Data is percent of normal precipitation averaged for 3 weather stations on the La Sal Mountains, Moab, and Castle Valley (Utah Climate Summaries 2004).





Trend Summary

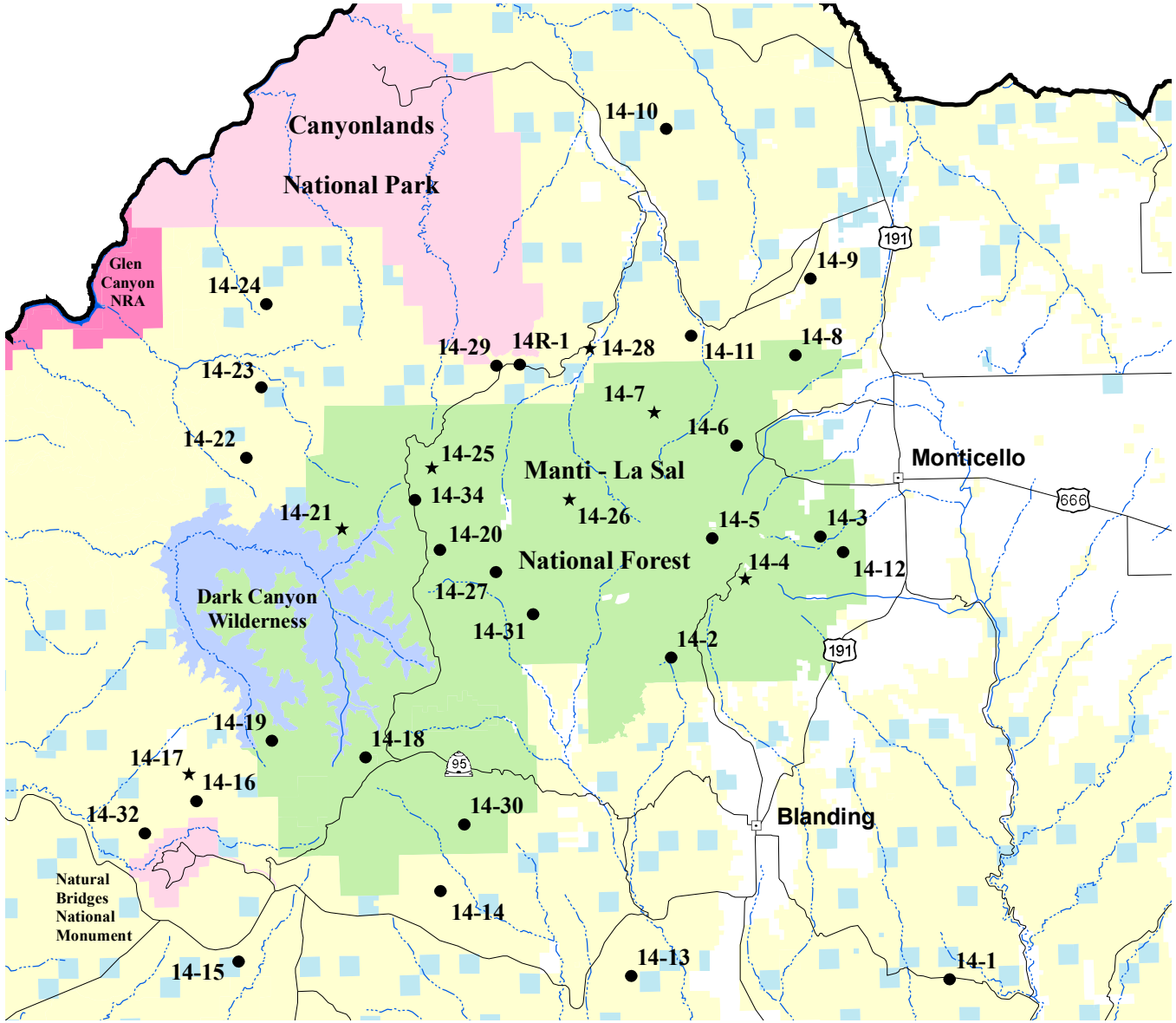
Site	Category		1994	1999	2004
13A-1 Two Mile chaining	soil	est	2	3	3
	browse	est	2	2	2
	herbaceous understory	est	1	3	4
13A-2 East La Sal Pass	soil	est	3	3	susp
	browse	est	3	3	
	herbaceous understory	est	3	3	
13A-3 Buck Hollow	soil	est	3	5	2
	browse	est	3	3	3
	herbaceous understory	est	3	3	3
13A-4 Slaughter Flat	soil	est	3	3	3
	browse	est	2	2	2
	herbaceous understory	est	3	1	2
13A-5 Amasas Back	soil	est	3	3	3
	browse	est	3	1	2
	herbaceous understory	est	1	2	2
13A-6 Bald Mesa	soil	est	3	3	2
	browse	est	3	3	3
	herbaceous understory	est	2	2	2
13A-7 Round Mountain	soil	est	2	2	3
	browse	est	1	1	1
	herbaceous understory	est	1	1	1
13A-8 Black Ridge	soil	est	3	2	3
	browse	est	1	1	1
	herbaceous understory	est	3	2	2

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

Site	Category	1987	1994	1999	2004
13A-9 Taylor Flat	soil	est	3	4	susp
	browse	est	3	3	
	herbaceous understory	est	3	3	
13A-10 Upper Fisher Valley	soil	est	3	3	3
	browse	est	5	1	1
	herbaceous understory	est	3	2	2
13A-11 North Beaver Mesa	soil	est	4	3	3
	browse	est	4	4	3
	herbaceous understory	est	2	3	2
13A-12 Below Polar Rim	soil	est	4	3	3
	browse	est	4	3	3
	herbaceous understory	est	3	2	1
13A-13 Beaver Canyon	soil	est	5	susp	susp
	browse	est	3		
	herbaceous understory	est	3		
13A-14 Lower Lackey Fan	soil		est	4	2
	browse		est	1	3
	herbaceous understory		est	5	3
13A-15 Hideout Mesa	soil		est	3	3
	browse		est	5	5
	herbaceous understory		est	3	1
13A-16 Beaver Creek	soil				est
	browse				est
	herbaceous understory				est
13A-17 Bar-A	soil				est
	browse				est
	herbaceous understory				est

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

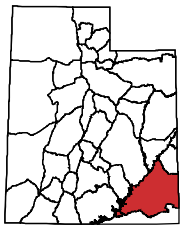
Management Unit 14



Transect location
Suspended site
National Forest
BLM
State of Utah
Private land
National Park/Monument
National Recreation Area
National Wilderness Area
Water body
River or stream
Intermittent stream
Road

N

Unit Location



Map Scale 1:525,000 (1 inch = 8.3 miles)

WILDLIFE MANAGEMENT UNIT 14 - SAN JUAN

Boundary Description

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

Management Unit Description

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

Abajo Mountains

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

The normal winter range is found on various sized and shaped mesas at middle elevations. The upper elevational limit of most deer use during normal winters is approximately 7,000 feet. During mild winters however, the range may remain open up to 8,000 feet.

The desert shrub type is found at low elevations along the northern boundary. This type is used by deer only in the most severe winters. The sagebrush-grass and pinyon-juniper types are found side by side on the mesa tops of the normal winter range which are very important to wintering deer. The sagebrush-grass type provides quality forage while the pinyon-juniper type, though relatively unproductive, provides important thermal cover. The pinyon-juniper-mountain brush type is the most productive, but is usually excluded from use by deep snow during the more harsh winters. The pinyon-juniper-sagebrush type is scattered throughout larger tracts of pinyon-juniper and is also important during severe winters.

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

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

Elk Ridge

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

The aspen type probably merits special management considerations since it is prone to invasion and replacement by the less productive conifer species. The meadow type also receives considerably use and is probably equally important. The mountain brush type is a distinct type, but also serves as understory for much of the conifer type on this unit which is dominated by ponderosa pine. As part of the Range Inventory Project, Giunta and Musclow (1983), established 12 permanent transects with five line intercepts each on the summer range in 1981. Their impressions were that vegetative trend was stable on the top of Elk Ridge and slightly downward on the periphery around the rim, especially in the aspen type. Data from 1986 corroborated with their findings on the summer range. They outlined three general objectives which should be incorporated into management plans for the future. The first was to improve the productivity and desirability of the montane forest for big game with small clear cuts, especially within a few hundred meters of the plateau rim. The second objective was an accelerated schedule of strategically located water developments. These should allow more even distribution of both livestock and wildlife and allow a greater density of both. The third goal was to maintain or improve the habitat near the plateau rim. The most promising approach would be aspen manipulation and management.

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

The sagebrush-grass type, dominated by *Artemisia* shrubs, blue grama and needle-and-thread grass, are found in Beef Basin and on Black Mesa, two important critical winter ranges. The mountain brush-grass type occupies the upper 1% of the winter range and has the highest rate of production. However, this type is inaccessible during severe winters. The pinyon-juniper type is most prominent and occupies the majority of the winter range. This type is relatively unproductive but provides good thermal and escape cover for deer that use the adjacent, more productive types. Pinyon-juniper with mountain brush, like the mountain brush type, is found in the upper elevations of the winter range. It provides quality deer forage in normal winters but can be inaccessible to deer in severe winters. The pinyon-juniper-sagebrush type is fairly open and interspersed throughout larger tracts of pinyon-juniper woodland and is important to wintering deer in both normal and

severe winters. Most of the treated and seeded areas are within pinyon-juniper communities. These chaining projects, done mostly in the 1960's to improve range for livestock, have also benefitted big-game. These seeded areas should be preserved for both big-game and livestock use. With trends on most overused sagebrush communities going down, herbicide and seeding treatments have been done on several areas to open up the sagebrush and make them more productive and increase their vigor.

Beef Basin Field Trips

The Beef Basin area has been a concern to managers since the early 1980's. It has been over grazed by livestock and to some extent by deer for some years, with range conditions and trends continuing to decline. This area receives concentrated winter deer use, while surrounding wintering areas support numbers below their range carrying capacities. Cattle graze the area usually from the first of November to the end of June each year. The BLM completed some fencing and water developments in the early 1980's to help more evenly distribute livestock use on the area. Post season antler less deer permits have been issued in the past to help alleviate the perceived problems in the Beef Basin area, but what is the real problem with the area? Two field trips have been organized through the years involving personnel from the Utah Division of Wildlife Resources and the BLM. One occurred in 1988 and another in 1992. The first trip addressed the problem with the loss of the cool season grasses and the die-off and decline in vigor of many of the Wyoming big sagebrush within the open park areas of the pinyon-juniper woodland. Some of the open park areas of sagebrush exhibited the effects of the high water years of 1983 through 1985 when some of the lower sagebrush parks had almost standing water on them for long periods of time, especially in the late spring and early summer. The lower areas of these open parks are where most of the sagebrush death was observed. There did not appear at the time to be excessive use in these areas on the sagebrush to warrant that kind of death. The most serious issue is the successive season of use. Another possible problem with the very high precipitation years was with the high snow cover for longer periods of time than normal, increases the incidence of snow mold. The lack of snow since those wet years, in conjunction with a prolonged drought and cold temperatures, can also cause a great deal of winter injury to the sagebrush. The concern here is that even with much lower deer populations, the trend for Wyoming sagebrush is still going downward, indicating that deer should not be considered the primary cause for the downward trend in the sagebrush population. Some important points that should be brought up with regard to the first field trip are: 1) With the drought period after 1985, most all cool season grasses have been eliminated by an excessively long (season of use) grazing season, from the fall to the end of June; 2) With little or no cool season grasses, cattle use has turned to sagebrush. Sagebrush cannot sustain itself with continuous use from the early fall through May and June without detrimental effects, for they are evergreen in habit with most of their carbohydrate reserves available in their stems and leaves. Consequently, making them more susceptible to damage with repeated fall and late spring use. The warm season species are not deleteriously affected when grazed in the cooler seasons, for they were all increasing substantially in their respective densities (winterfat, fourwing saltbush, and blue gramma) during the same time period when the trend for sagebrush and cool season grasses was going down. A small barbed wire exclosure on one area demonstrated healthier sagebrush with a good understory of cool season grasses which supports the belief that continuous and excessive livestock use in the early fall through late spring and early summer can cause or accelerate the loss of the cool season grasses and eventually the decline and losses in sagebrush when the grasses are gone.

The second field trip was to try and determine the problem with the open sagebrush parks and what could be done to turn around the downward trend. This trip also further documented the losses of the cool season herbaceous understory with continued declines in vigor and losses to the sagebrush population. On site, it was determined that further studies be initiated to help determine what was causing the continued downward trends in the sagebrush populations and what methods could be employed to improve vigor of the sagebrush and help restore the herbaceous understory. The pilot studies were stopped by the BLM before we were able to initiate the preliminary studies.

Livestock Grazing

Abajo Mountains

Heavy livestock use beginning in the late 1800's caused deterioration of the range. According to 1940's records, over 4,000 cattle and 72,000 sheep were using the winter range each year (Mann and Wallace 1983). Range use is much more controlled and conditions have improved since then. Extensive areas of pinyon-juniper were chained and seeded in the 1960's. Although wildlife cover requirements were not considered at the time (chained areas were large and usually square with no regard for cover or edge effect), they still provided many benefits to the big game populations. Alkali Flat and Harts Draw are the most critical deer wintering areas. Other areas of concentration are Shay Mesa, Indian Creek, Deerneck Mesa through Step Hill, Cedar Point, Montezuma Canyon, and Recapture Wash.

Elk Ridge

Livestock grazing is the primary land use for the herd unit. Pioneers began grazing livestock in the 1880's. By the 1940's, records indicate that over 10,000 cattle and 12,000 sheep were authorized to graze on the winter range. Plummeting sheep and wool prices in the 1950's caused ranchers to convert to cattle operations. Since the 1960's, approximately 4,500 cattle have been authorized to graze on the winter range. In addition, 2,127 cattle and 49 horses are permitted to graze on six allotments on the summer range. Other important land uses are logging, oil and gas exploration, mining, wood cutting, and recreation. Extensive areas of Elk Ridge are covered by ponderosa pine which provide large amounts of quality saw timber. Most of the area has been logged once and selective cuts are scheduled for the future. Oil and gas exploration has increased in recent years while mining operations are suspended due to low uranium prices. Activities associated with these land uses need to be closely monitored and steps taken to minimize and mitigate negative impacts on the water quality and on the range and associated wildlife populations.

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

Wildlife Management Unit Objectives

A herd of 20,500 wintering deer (13,500 on Abajo Mountain portion and 7,000 on the Elk Ridge portion) is the current objective for Unit 14. The herd composition of 15 bucks per 100 does, with 30% of the bucks three-point or better is sought for on the Abajo Mountain portion of unit 14. On Elk Ridge, the objective is to achieve 30 bucks per 100 does, with 50% of the bucks being three-point or better.

The target for elk is to achieve a population of 1,300 wintering elk (1,000 west of Highway US-191 and 300 east of Highway US-191). On the west site of US-191, the objective is to achieve a composition of 35 bulls per 100 cows, with 50% of the bulls 2.5 years or older. On the east side of Highway-191, a herd composition of 25 bulls per 100 cows, with 50% of the bulls 2.5 years or older is sought.

Trend Study Site Establishment

The deer winter range of the San Juan-Blue Mountain unit was inventoried by Coles and Pederson in 1966 (published in 1967 as Pub. No. 67-1). They inventoried the summer range in 1967 (Coles and Pederson 1968). In 1981, 9 permanently staked line-intercept transects were established on the summer range with the intention of obtaining baseline data for monitoring range trend (Giunta and Musclow 1983). In the spring of 1986, local interagency personnel selected four of the most crucial line-intercept studies to be reread. These 4 line-intercept transects were reread and replaced with the interagency trend studies. Seven additional interagency trend studies were established in the summer of 1986. In 1994, an additional study was established. In 1999, 11 trend studies were reread on the Abajo Mountain portion of unit 14, while 10 were monitored in 2004.

Twelve line-intercept transects were established on the Elk Ridge portion of unit 14 in 1981. Five of the 12 were reread and replaced by interagency trend studies in 1986, and an additional 11 study sites were selected and added to the monitoring schedule. All of these study sites were reread in 1992 and 1999. A few sites were also read in 1994, including a new trend study site which was established at Lower Deer Flat. In 2004, 2 summer range sites were suspended and replaced with a new one which is more of a key area. A special study was established in 2001 and reread in 2004 to monitor a prescribed fire near Salt Creek Mesa.

Trend Study 14-1-04

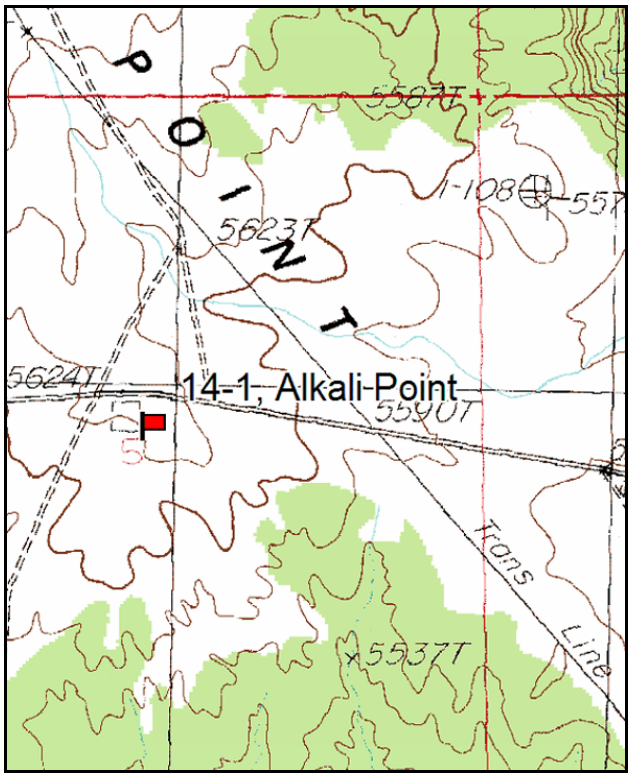
Study site name: Alkali Point . Vegetation type: Wyoming Big Sagebrush .

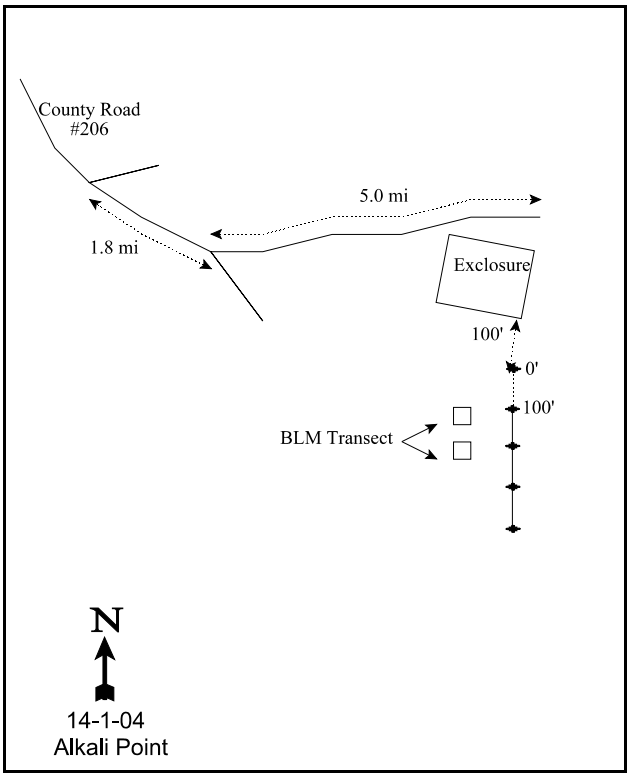
Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Bradford Canyon

Diagrammatic Sketch

Township 38S , Range 24E , Section 5

GPS: NAD 27, UTM 12S 4152864 N, 649932 E

DISCUSSION

Alkali Point - Trend Study No. 14-1

Alkali Point is an area that is an important wintering area for deer moving southwest off the Abajo Mountains. The long and flat tablelands are cut by intermittent-flow canyons which support pinyon-juniper woodlands with open Wyoming big sagebrush flats. This study is a Wyoming big sagebrush community that has been invaded by cheatgrass. There is a BLM exclosure and transect 100 feet to the north, but the exclosure is in need of repair and does not exclude livestock. The site drains to the southwest and has a slope of about 5% with an elevation of 5,600 feet. Water is limited on the flat. Past use on the area has included spring cattle grazing. Deer pellet groups are abundant, with an average of 45 deer days use/acre (111 deer days use/ha) from 1986 to 1995. Pellet group data from 1999 estimated 135 deer days use/acre (333 deer days use/ha). In 2004, deer use was still high at 103 deer days use/acre (255 ddu/ha). Cattle use was 4 cow days use/acre (11 cdu/ha). Two elk days use/acre (5 edu/ha) were also estimated. Human activity includes gas and oil exploration, drilling, pipeline and road construction, livestock grazing, and recreational activities.

The soil is moderately deep with an estimated effective rooting depth of nearly 16 inches. Soil texture is a sandy clay loam with a slightly alkaline pH (7.4). Phosphorus and potassium levels are both low at 5.8 ppm and 54.4 ppm respectively. Phosphorus levels below 10 ppm and potassium levels below 70 ppm may limit plant growth and development. Protective ground cover is composed primarily of sagebrush with an understory of annual cheatgrass. Percent bare ground has increased from 42% in 1986 to 53% in 1994, then down to 30% by 1999 as cheatgrass increased. Bare ground increased to 45% in 2004 and the ratio of bare ground to protective cover (vegetation, litter, and cryptogams) decreased from 1:2.8 to 1:2.1.

The dominant browse species is Wyoming big sagebrush which made up 87% of the total browse cover in 1999. The sagebrush stand has become overly mature with no sign of reproduction and high decadence found during all readings. Density of sagebrush was estimated at 4,399 plants/acre (mostly decadent) in 1986, declining to 2,680 in 1994. Much of the difference in density is probably due to the much larger sample used in 1994, but it is apparent that the population has declined. Dead plants, first counted in 1994, totaled 860 plants/acre. As dead plants have increased in 1999 and 2004, density has declined. Data from 1999 estimated 2,160 live plants/acre with 1,300 dead plants. In 2004, density was 2,100 plants/acre with 1,380 dead plants. Percent decadency has continued to increase. In 1994 it was high at 63%, it increased to 80% in 1999, and increased again to 90% in 2004. While decadence has always been high, poor vigor has not always been high. In 1999, only 18% of the population showed poor vigor, but this increased to 85% of the population in 2004. Utilization was extremely heavy in 1986 with 88% of the plants sampled displaying heavy use. The level of use declined in 1994 with only 13% of the sagebrush being heavily browsed. In 1999, utilization was heavy on 46% of the plants sampled. This increased to 64% in 2004. Leader growth (1.3 inches in 2004) and seed production are poor. Drought conditions and competition from winter annuals have prevented sagebrush reproduction.

Broom snakeweed increased in density and cover in 2004. In 1999, it provided 13% of the total browse cover. This increased to 42% of the total browse cover in 2004. There were 6,840 plants/acre estimated in 1994. Density declined in 1999 to 4,660, but increased to 7,960 in 2004. Cover was also at an all time high of 6% in 2004. There are a few Juniper on the flat, but they do not appear to be aggressively increasing and provide very little escape or thermal cover.

The herbaceous understory is poor and dominated by annual grasses, cheatgrass and sixweeks fescue. Annuals were not included in the sample in 1986. In 1994 cheatgrass provided 63% of the grass cover. The only common perennial grass encountered that year was bottlebrush squirreltail. By 1999, cheatgrass increased significantly and provided 92% of the grass cover and 90% of the total herbaceous cover. Cheatgrass declined significantly in 2004. In 1999, cheatgrass was found in 100% of quadrats, but was only found to 80% of the

quadrats in 2004. Cover declined from 23% in 1999 to 14% in 2004. In 1999, spring precipitation was 235% of normal, which led to a very high amount of cheatgrass. In 2004, spring precipitation was 93% of normal. Cheatgrass cover and abundance was still high in 2004, which can lead to destructive wildfires. Sixweeks fescue frequency declined significantly in 2004. Bottlebrush squirreltail declined significantly in 1999 and has not increased since. Annual forbs were common in 2004. Nuttall milkvetch, which is an annual, increased significantly in 2004 and made up 55% of the total forb cover. Other common forbs are storksbill and annual stickseed.

1986 APPARENT TREND ASSESSMENT

There appears to be a downward trend in terms of Wyoming big sagebrush. Use appears heavy with growth and reproduction appearing generally poor. Also, much of the new growth is unavailable due to the hedged and stiff character of the older shrubs. Diversity is very limited, especially for the herbaceous component. Soil trend is down because of poor ground cover and continued soil loss.

1994 TREND ASSESSMENT

Wyoming big sagebrush has not been as heavily used as previously reported. However, the percentage of the plants with poor vigor has nearly doubled from 21% to 49%, while percent decadency has remained similar. In addition, 54% of the decadent plants sampled were classified as dying. Density has declined, although some of the change may be due to the greatly increased sample size used in 1994. Dead plants, first sampled in 1994 number 860 plants/acre which would indicate a population decline. Reproduction is poor with some seedlings sampled but no young. Broom snakeweed has increased from 5,999 plants/acre in 1986 to 6,840 plants/acre in 1994. There were many seedlings encountered in 1994 (2,380 plants/acre), which would indicate a expanding population. As in 1986, herbaceous understory is not very diverse with three grasses and two forbs comprising 86% of the understory cover. Cheatgrass is the most abundant grass followed by six-week fescue, both are annuals. Soil trend is down with an 11% increase in bare ground from 42% in 1986 to 53% in 1994. Litter cover decreased from 46% in 1986 to 24% in 1994. The Desirable Components Index (see methods) rated this site as poor with score of 16 due to high decadence, no young shrubs, and low perennial grass cover.

TREND ASSESSMENT
soil - down (1)
browse - down (1)
herbaceous understory - stable (3)
winter range condition (DC Index) - 16 (poor) Wyoming big sagebrush type

1999 TREND ASSESSMENT

The soil trend is slightly up due to a decline in percent bare ground from 52% to 30% and an increase in litter cover from 24% to 42%. However, these improvements are due primarily to the dramatic increase in cheatgrass. Erosion is not currently a problem. The browse trend is down due to a decline in population density, an increase in heavy utilization, and an increase in percent decadency from 63% to 80%. There is no reproduction, and leader growth and seed production are poor. On the positive side, broom snakeweed has declined in density from 7,240 to 4,660 plants/acre. Trend for the herbaceous understory is also down due to a decline in perennial grasses and forbs and a dramatic increase in cheatgrass. Quadrat frequency of cheatgrass remained similar (99 to 100) but nested frequency increased significantly and cover increased 6 fold from 4% to 23%. The DCI score is -13 which is rated as very poor. Decadence is high, reproduction is low, perennial grasses are rare, and annual grasses are very high which negatively impacts the score.

TREND ASSESSMENT
soil - slightly up (4)
browse - down (1)
herbaceous understory - down (1)
winter range condition (DC Index) - -13 (very poor) Wyoming big sagebrush type

2004 TREND ASSESSMENT

The soil trend is down due to an increase in bare ground and decrease in litter cover, indicating that soil trend based on annual species is not a dependable trend indicator. The ratio of protective cover (vegetation, litter, and cryptogams) to bare ground decreased from 1:2.8 to 1:2.1. The browse trend is once again down. Density and cover only declined slightly, but percent decadency increased from 80 to 90%. Decadent plants classified as dying increased from 18 to 78%. There are no young or seedling plants to replace the decadent and dying population. Heavy use also increased to 64%. Broom snakeweed had a high increase in both density and cover. It now makes up 42% of the total browse cover. The herbaceous understory trend is slightly up, but still in very poor condition. Cheatgrass declined significantly, but is still very abundant (quadrat frequency of 80%) and has over 14% cover. This makes this site susceptible to fire and prevents reproduction of sagebrush. Forbs are comprised of mostly annuals and are more abundant than they were in 1999. The DCI score is still very poor as none of the shrub parameters have improved and the herbaceous understory is made up of mostly cheatgrass.

TREND ASSESSMENT
soil - down (1)
browse - down (1)
herbaceous understory - slightly up (4)
winter range condition (DC Index) - -11 (very poor) Wyoming big sagebrush type

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

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Bromus tectorum (a)	-	a287	b388	a261	3.65	22.55	14.39
G	Hilaria jamesii	5	11	6	6	.12	.16	.07
G	Oryzopsis hymenoides	-	9	6	7	.19	.04	.09
G	Sitanion hystrix	b111	b105	a16	a8	1.42	.20	.10
G	Vulpia octoflora (a)	-	b171	b159	a9	.36	1.65	.02
Total for Annual Grasses		0	458	547	270	4.01	24.21	14.41
Total for Perennial Grasses		116	125	28	21	1.74	0.40	0.26
Total for Grasses		116	583	575	291	5.75	24.62	14.67
F	Astragalus convallarius	13	9	6	14	.02	.01	.05
F	Astragalus mollissimus	4	-	-	-	-	-	-
F	Astragalus nuttallianus (a)	-	a-	a-	b182	-	-	2.12
F	Astragalus spp.	a-	b48	a-	a-	.12	-	-
F	Cordylanthus spp. (a)	a6	b60	a-	a-	.25	-	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
F	Cryptantha spp.	$_{a}$-	$_{b}$13	$_{a}$-	$_{a}$-	.06	-	-
F	Cymopterus acaulis	-	2	-	-	.00	-	-
F	Descurainia pinnata (a)	-	-	-	5	-	-	.01
F	Eriogonum cernuum (a)	-	-	-	2	-	-	.03
F	Erodium cicutarium (a)	-	$_{a}$7	$_{b}$49	$_{b}$34	.01	.33	.53
F	Euphorbia fendleri	13	-	-	-	-	-	-
F	Gilia spp. (a)	-	4	-	3	.01	-	.00
F	Lappula occidentalis (a)	-	$_{b}$26	$_{a}$-	$_{c}$44	.05	-	.97
F	Navarretia intertexta (a)	-	$_{a}$-	$_{ab}$7	$_{b}$11	-	.01	.02
F	Phlox longifolia	-	2	-	3	.01	-	.00
F	Plantago patagonica (a)	-	7	2	5	.04	.00	.01
F	Sphaeralcea coccinea	$_{ab}$5	$_{b}$17	$_{a}$-	$_{b}$10	.80	-	.10
Total for Annual Forbs		6	104	58	286	0.35	0.35	3.71
Total for Perennial Forbs		35	91	6	27	1.01	0.01	0.17
Total for Forbs		41	195	64	313	1.37	0.37	3.88

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

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

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

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

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

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

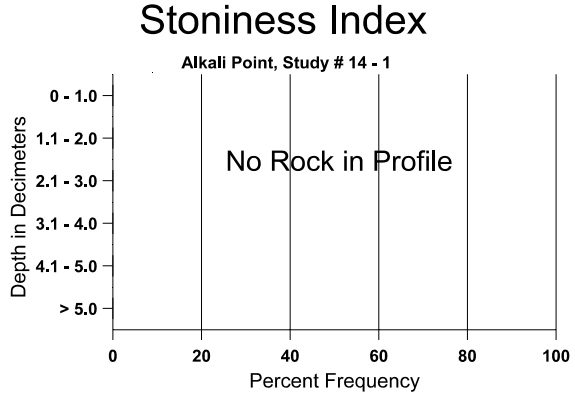
Species	Average leader growth (in)
	'04
Artemisia tridentata wyomingensis	1.3

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.8	67.3 (15.5)	7.4	62.9	14.6	22.6	1.7	5.8	54.4	0.4



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

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

Days use per acre (ha)	
'99	'04
-	-
-	2 (5)
135 (333)	103 (255)
2 (5)	4 (11)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**4399**	-	-	1533	2866	-	12	88	65	6	21	22/23
94	**2680**	120	-	980	1700	860	26	13	63	34	49	23/35
99	**2160**	-	-	440	1720	1300	52	46	80	18	18	26/33
04	**2100**	20	-	200	1900	1380	35	64	90	78	85	23/32
Chrysothamnus nauseosus												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**100**	40	-	80	20	40	0	0	20	-	0	-/-
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Echinocereus spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	8/13
04	**20**	-	-	20	-	-	0	0	-	-	0	6/15
Gutierrezia sarothrae												
86	**5999**	200	266	5733	-	-	1	2	0	-	0	8/9
94	**6840**	2380	1600	5020	220	80	0	0	3	2	2	8/9
99	**4660**	80	640	3920	100	160	7	0	2	.42	.85	9/9
04	**7960**	-	1280	6460	220	520	6	0	3	1	28	6/7
Opuntia spp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**120**	20	20	80	20	-	0	0	17	-	0	2/4
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	4/10

Trend Study 14-2-04

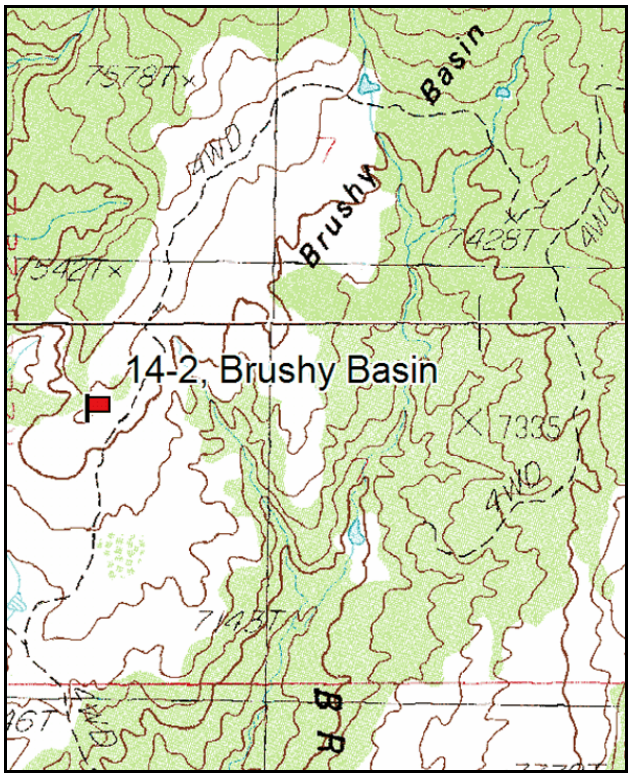
Study site name: Brushy Basin . Vegetation type: Chained, Seeded P-J .

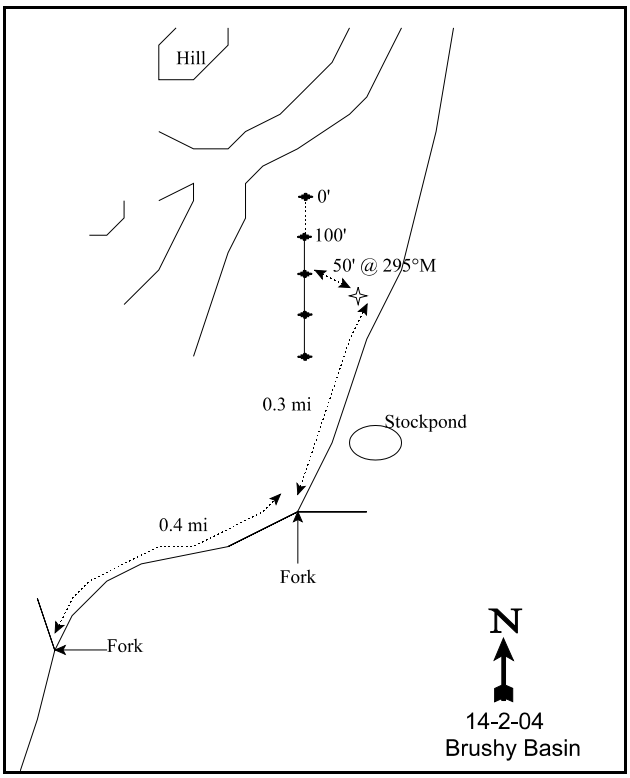
Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Manco Jim Butte

Diagrammatic Sketch

Township 35S , Range 22E , Section 7

GPS: NAD 27, UTM 12S 4178624 N, 627583 E

DISCUSSION

Brushy Basin - Trend Study No. 14-2

Brushy Basin is in the foothills south of the Abajo Mountains at an elevation of 7,400 feet. It has a slope of approximately 10%, with a southeast exposure. Seasonally, the washes in the area drain southward. The area is managed by the U.S. Forest Service and is part of a 1,400 acre chaining and seeding project done in 1971. Water is available in a stock pond about 0.2 miles down the road. The Brushy Basin unit is one of three units on a rest-rotation grazing system on the Camp Jackson Allotment. As of 1999 it was allotted for 300 cattle (1589 AUMs) grazing from June 16 to October 15. The Brushy Basin unit is grazed 2 months for 2 years and rested the third year. This transition zone of Ponderosa pine, oakbrush, serviceberry, sagebrush, pinyon and juniper is generally a spring and fall use area for deer. A pellet group transect on the site estimated 14 deer days use/acre (35 deer days use/ha), 15 elk days use/acre (37 elk days use/ha), and 33 cow use days/acre (82 cow days use/ha) in 1999. In 2004, deer use was estimated at 23 deer days use/acre (58 ddu/ha), elk use at 19 elk days use/acre (8 edu/ha), and cow use at 10 cow days use/acre (25 cdu/ha).

This site has variable soils, generally deep loam surface soils with clay loam subsoil with an estimated effective rooting depth of almost 17 inches. Soil texture is a sandy clay with a neutral pH (6.6). It contains 6% surface rock cover with most of the subsurface rock concentrated near the surface. Litter cover is abundant, with most of the litter as persistent debris left from the chaining. In 1999, there was evidence of sheet erosion and roads and trails in the area showed active soil movement from high intensity summer storm events. Bare ground cover was higher in 2004, but soil erosion was rated as stable.

There is a dominant overstory of Utah serviceberry and pinyon-juniper with mountain big sagebrush and bitterbrush. The key browse species are serviceberry, bitterbrush, and mountain big sagebrush. Utah serviceberry density was estimated at 140 plants/acre in 1994, averaging more than six feet in height and seven feet across. Density increased to 200 plants/acre in 2004 and 20% of the population was classified as young. Use was moderate on available plants, but many are only partly available due to their height. Leader growth was poor in 2004. Mountain big sagebrush is the most abundant shrub on the site and produces the most forage. Density of mountain big sagebrush was 3,333 plants/acre in 1986, 78% of which were young. The population declined slightly by 1994 to 2,320 plants/acre as the stand became more mature. Seedlings were abundant in 1994. Data from 1999 shows a slight increase in sagebrush density to 2,920 plants/acre with 45% of the population classified as young. Density declined by 13% (2,540 plants/acre) in 2004, but recruitment is still good with 24% of the population classified as young. Use was also higher in 2004 with 31% showing moderate use and 11% showing heavy use. Percent decadence has been very low each year. Cover has remained fairly constant at about 7% the last two times it was sampled. Bitterbrush is not abundant, but is scattered throughout the site. It has a prostrate growth form which received very heavy use in 1986. Density increased to 640 plants/acre in 1994 mostly due to the much larger sample now used. Utilization was light in 1994, increasing to moderate and heavy in 1999. Vigor was good with no decadent plants sampled in 1999. Density increased 43% in 2004 to 800 plants/acre. Decadency increased, but was still low at 13%. Eight percent of the population was young in 2004. Use was higher in 2004 with 65% showing heavy use.

Pinyon pine and Utah juniper are present in the chaining. Pinyon had an estimated density of 87 trees/acre in 1994. Junipers were less prevalent at 48 trees/acre. Tree density and size have increased. In 1999 density was estimated at 95 pinyon and 37 juniper trees/acre. Average diameter of pinyon was nearly 4 inches while juniper was nearly 4.5 inches. Twenty percent of the juniper trees sampled were trees which were tipped over by the chaining but still living. In 2004, pinyon density estimated 97 trees/acre with an average diameter of 3.8 inches. Juniper density estimated 50 trees/acre with an average diameter or 4.4 inches.

Herbaceous species are important on deer spring-fall transition range and elk winter range. In 1986, there was a vigorous and diverse stand of native and seeded grasses. Although grazing had been heavy, the grasses

appeared healthy and young plants were evident. Since then the herbaceous understory has declined as shrubs and trees have increased. The most common grasses are intermediate wheatgrass, crested wheatgrass, and mutton bluegrass. Nested frequency for perennial grasses have decreased significantly between 1986 and 1994, while nested frequency for forbs increased substantially. Sum of nested frequency of grasses declined slightly between 1994 and 1999 and again between 1999 and 2004. Cover decreased from 7% to only 3.5% in 2004. Sum of nested frequency declined significantly in 2004. The most abundant forb was mat penstemon, which increased significantly in 2004. The variety of native forbs found on the site provide some spring forage, but none are very numerous.

1986 APPARENT TREND ASSESSMENT

Depending on the management objective for this area, the trend in this community is up. However, woody species are increasing somewhat to the detriment of grasses. Some are undesirable species which include, broom snakeweed, pinyon, and juniper. The sagebrush and serviceberry may also have increasing populations. Yellow sweet clover, alfalfa, and bitterbrush are being heavily utilized. The grasses must be allowed to maintain a competitive ability with the low increaser subshrubs by not overgrazing in the late spring and early summer. With a high percent litter cover, the soil trend appears to be improving.

1994 TREND ASSESSMENT

Nested frequency of herbaceous understory has decreased from 1986 to 1994, mostly due to the loss of grasses, possibly from competition from the larger shrubs and the extended drought, coupled with early summer livestock use. Shrub density for the key species has decreased, but the biotic potential (proportion of seedlings to population) for mountain big sagebrush is very high at 57%. Sagebrush and Utah serviceberry are both only lightly hedged and in good vigor. Bitterbrush has increased contrary to what was predicted in the past trend assessment. Bare ground cover increased from 16% to 20%. Rock and pavement cover are stable at nearly 6%. Litter cover has decreased mostly because of the prolonged drought. The Desirable Components Index (see methods) rated this site as fair to good with score of 64 due to a low amount of palatable browse cover. The herbaceous understory is good.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 64 (fair to good) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soil is stable. Percent cover for bare ground increased slightly while cover for litter increased. However, ground cover is not continuous and there is some erosion occurring. Trend for browse is up for mountain big sagebrush. Density has increased, utilization is light to moderate, vigor improved, and recruitment good due to high numbers of seedlings and young. Serviceberry and bitterbrush are moderate to heavily utilized, but appear to have healthy, stable populations. Trend for the herbaceous understory is down slightly. The increase in the density and size of shrubs and especially trees appears to have negatively effected the understory. Sum of nested frequency of perennial grasses has declined slightly while frequency of perennial forbs has remained similar to 1994 estimates. Composition of grasses is diverse but dominated by seeded grasses (crested and intermediate wheatgrass) which combine to produce 81% of the grass cover. Since 1994, nested frequency of intermediate wheatgrass has declined significantly, while frequency of crested wheatgrass has increased slightly (more drought tolerant). This change would be driven by long term drought which would favor crested wheatgrass. The composition of forbs is also diverse but only a few species are common. The DCI score improved to “good” (70), due to increased cover of palatable browse species with a

good proportion of young plants and low decadence.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 70 (good) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

The soil trend is stable. Bare ground is slightly higher, but the ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground has remained fairly stable. Erosion was rated stable in 2004. The browse trend is stable. Serviceberry has increased slightly in density. Mountain big sagebrush density declined slightly, but cover remained stable. Young plants make up 24% of the population and use has increased slightly. Decadency is very low at 7%. Bitterbrush density increased by 43%, while use has also increased. The herbaceous understory trend is down. Sum of nested frequency is down for both grasses and forbs. The three dominant grass species (crested wheatgrass, intermediate wheatgrass, and mutton bluegrass) all declined significantly. Drought conditions and increased shrub dominance may have led to the decrease in understory species. The DCI score declined to fair condition (54) due to a decline in the herbaceous understory.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down (1)
winter range condition (DC Index) - 54 (fair) Mountain big sagebrush/chaining type

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

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{c}$198	$_{ab}$76	$_{b}$112	$_{a}$66	1.57	2.71	1.67
G	Agropyron intermedium	$_{d}$410	$_{c}$218	$_{b}$152	$_{a}$79	7.75	3.11	1.27
G	Bromus inermis	$_{b}$26	$_{a}$-	$_{a}$-	$_{a}$-	-	-	.00
G	Bromus japonicus (a)	-	1	6	-	.00	.03	-
G	Bromus tectorum (a)	-	-	2	-	-	.00	-
G	Carex spp.	$_{c}$80	$_{b}$43	$_{ab}$22	$_{a}$1	.76	.41	.03
G	Koeleria cristata	-	3	1	-	.03	.00	-
G	Oryzopsis hymenoides	-	1	3	7	.01	.03	.02
G	Poa fendleriana	$_{b}$120	$_{b}$90	$_{b}$87	$_{a}$31	1.19	.85	.54
G	Sitanion hystrix	$_{b}$38	$_{ab}$27	$_{a}$6	$_{a}$-	.24	.02	-
G	Stipa spp.	2	-	-	-	-	-	-
Total for Annual Grasses		0	1	8	0	0.00	0.03	0
Total for Perennial Grasses		874	458	383	184	11.55	7.15	3.54

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
Total for Grasses		874	459	391	184	11.56	7.19	3.54
F	Allium spp.	-	2	3	-	.00	.00	-
F	Arabis spp.	-	1	7	-	.00	.04	-
F	Astragalus miser	5	4	4	12	.21	.21	.38
F	Cirsium spp.	3	6	10	-	.01	.12	-
F	Crepis acuminata	-	2	8	-	.00	.04	-
F	Cymopterus spp.	$_{a}$-	$_{b}$43	$_{b}$41	$_{a}$10	.33	.50	.04
F	Eriogonum elatum	-	3	-	-	.03	-	-
F	Eriogonum racemosum	4	4	10	4	.04	.07	.01
F	Helianthella uniflora	$_{a}$-	$_{ab}$6	$_{b}$13	$_{a}$-	.09	.42	-
F	Hymenoxys acaulis	-	8	6	3	.21	.09	.03
F	Lappula occidentalis (a)	-	3	-	-	.00	-	-
F	Lactuca serriola	-	9	-	-	.02	-	-
F	Lesquerella fendleri	16	25	19	7	.05	.05	.02
F	Lupinus spp.	-	1	7	3	.15	.19	.15
F	Machaeranthera canescens	-	-	-	1	-	-	.00
F	Machaeranthera grindelioides	8	-	5	6	-	.06	.06
F	Melilotus officinalis	$_{a}$-	$_{b}$16	$_{a}$5	$_{a}$3	1.01	.04	.00
F	Medicago sativa	-	-	3	2	.15	.03	.00
F	Penstemon caespitosus	$_{a}$-	$_{b}$47	$_{a}$-	$_{b}$37	1.43	.06	1.48
F	Pedicularis centranthera	$_{a}$-	$_{b}$7	$_{a}$-	$_{a}$-	.31	-	.00
F	Penstemon comarrhenus	-	-	-	7	-	-	.04
F	Penstemon pachyphyllus	8	3	6	2	.03	.06	.03
F	Penstemon thompsoniae	$_{a}$-	$_{a}$-	$_{b}$53	$_{a}$-	-	1.82	-
F	Phlox longifolia	-	6	-	-	.01	-	.00
F	Polygonum douglasii (a)	-	$_{a}$6	$_{b}$22	$_{a}$7	.01	.05	.01
F	Tragopogon dubius	3	8	1	-	.05	.00	-
F	Trifolium gymnocarpon	-	3	3	2	.15	.00	.03
F	Unknown forb-perennial	$_{b}$9	$_{a}$-	$_{a}$-	$_{b}$21	-	-	.44
Total for Annual Forbs		0	9	22	7	0.01	0.05	0.01
Total for Perennial Forbs		56	204	204	120	4.33	3.84	2.77
Total for Forbs		56	213	226	127	4.35	3.89	2.78

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

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

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

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

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	4.00	6.93
Artemisia tridentata vaseyana	-	11.01
Cercocarpus montanus	-	.63
Gutierrezia sarothrae	-	.31
Juniperus osteosperma	1.00	2.21
Pinus edulis	2.20	9.51
Purshia tridentata	-	2.08
Quercus gambelii	-	1.58

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

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

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

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

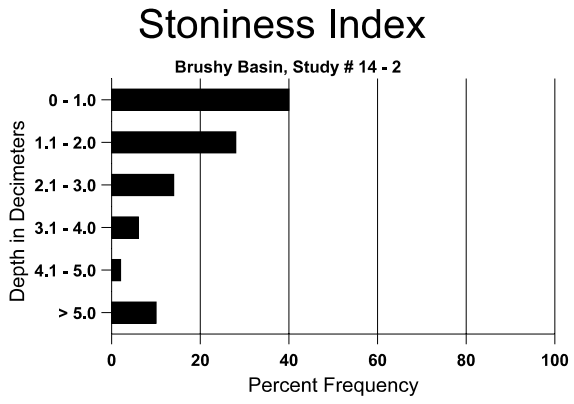
Average diameter (in)		
'94	'99	'04
-	4.5	4.4
-	4.0	3.8

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
16.6	56.0 (11.4)	6.6	46.9	10.6	42.6	2.9	6.8	102.4	0.6



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

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

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

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**140**	40	-	140	-	-	0	0	-	-	0	81/91
99	**100**	40	-	100	-	-	60	0	-	-	0	74/75
04	**200**	20	40	160	-	20	30	0	-	-	0	80/71
Artemisia tridentata vaseyana												
86	**3333**	200	2600	733	-	-	17	1	0	-	13	14/22
94	**2320**	3120	140	2000	180	20	0	.86	8	-	9	25/29
99	**2920**	3780	1320	1420	180	40	10	1	6	-	0	23/38
04	**2540**	480	600	1760	180	80	31	11	7	3	3	18/30
Cercocarpus montanus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	20	0	0	-	-	0	47/45
99	**40**	-	-	40	-	-	0	100	-	-	0	43/43
04	**40**	-	-	40	-	-	50	50	-	-	0	41/46
Chrysothamnus depressus												
86	**6966**	-	166	6800	-	-	0	0	0	-	0	2/11
94	**120**	80	20	100	-	-	0	0	0	-	0	6/15
99	**800**	340	640	120	40	40	8	0	5	5	5	6/15
04	**160**	-	-	160	-	-	25	50	0	-	0	6/15
Chrysothamnus nauseosus hololeucus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	20	-	-	-	0	0	-	-	0	9/3
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	100	-	-	0	9/9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Echinocereus engelmanii												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	4/8
04	**0**	-	-	-	-	-	0	0	-	-	0	4/9
Gutierrezia sarothrae												
86	**7932**	-	833	6966	133	-	0	0	2	-	0	6/6
94	**540**	20	80	460	-	-	0	0	0	-	0	8/9
99	**580**	20	80	460	40	20	0	0	7	7	7	7/10
04	**600**	-	20	580	-	-	0	0	0	-	0	9/10
Juniperus osteosperma												
86	**66**	-	-	-	66	-	0	0	100	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**40**	-	40	-	-	40	0	0	0	-	0	-/-
04	**40**	-	20	20	-	-	0	0	0	-	0	-/-
Opuntia spp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**80**	-	-	60	20	-	0	0	25	25	25	4/9
99	**80**	-	-	60	20	-	0	0	25	-	25	4/13
04	**120**	-	-	100	20	20	0	0	17	17	17	4/12
Pinus edulis												
86	**100**	-	100	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	20	-	20	-	20	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Purshia tridentata												
86	**33**	166	-	33	-	-	0	100	0	-	0	15/35
94	**640**	-	20	560	60	-	3	0	9	-	0	12/34
99	**460**	80	80	380	-	60	30	48	0	-	0	13/38
04	**800**	-	60	640	100	20	13	65	13	13	13	9/26
Quercus gambelii												
86	**300**	-	300	-	-	-	89	11	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**160**	20	60	100	-	-	0	0	-	-	0	50/35
04	**260**	20	220	40	-	-	0	0	-	-	0	47/30

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Sclerocactus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	4/4
Yucca spp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**40**	-	-	40	-	-	0	0	0	-	100	14/29
99	**20**	-	-	-	20	-	0	0	100	100	100	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	5/10

Trend Study 14-3-04

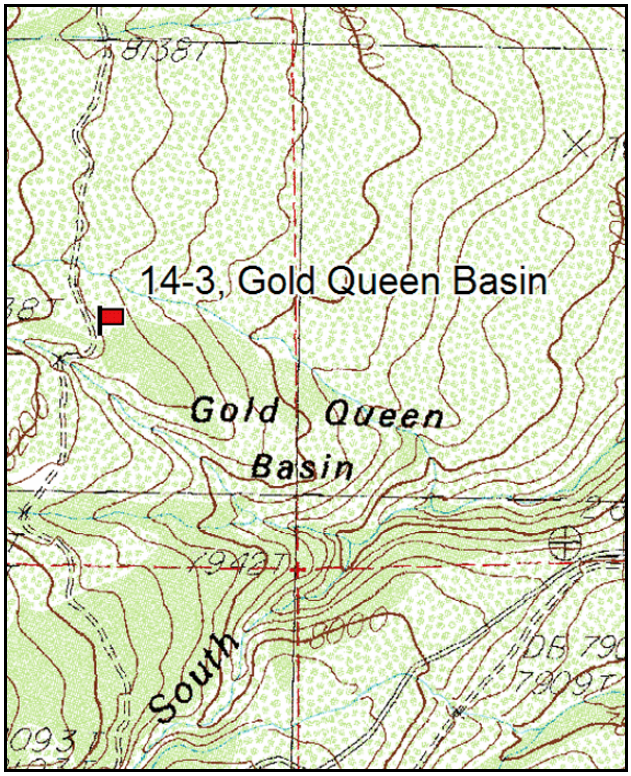
Study site name: Gold Queen Basin . Vegetation type: Gambel Oakbrush .

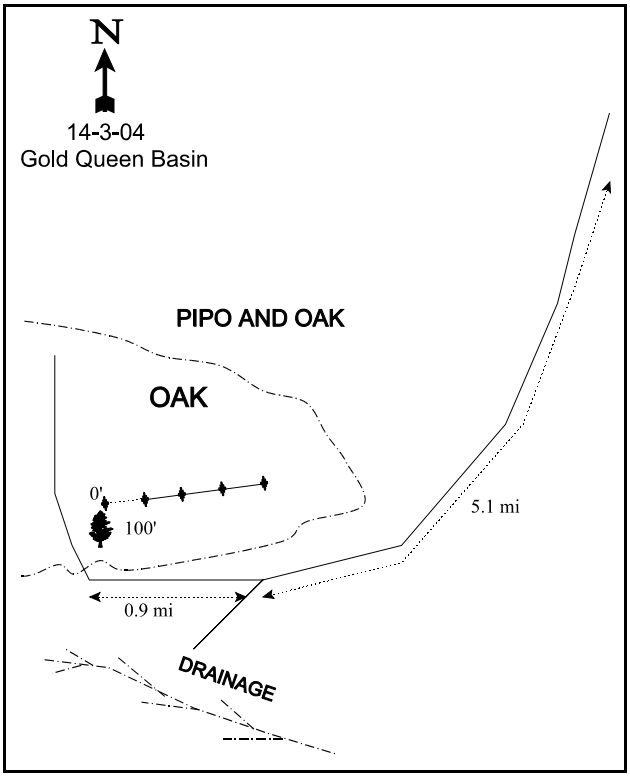
Compass bearing: frequency baseline 69 degrees magnetic.

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

LOCATION DESCRIPTION

From the Forest Service yard on the west side of Monticello, travel southwest on the South Creek Road (Lloyds Lake Road) for 5.1 miles to a fork. Take the right hand fork for 0.9 miles to where the road makes a sharp turn to the north at the top of a steep dugway. Stop here, then walk to the largest ponderosa pine on the east side of the road. The 0 foot stake, a short red fencepost marked with browse tag #7875, is 5 paces north of this tree.





Map Name: Abajo Peak

Diagrammatic Sketch

Township 34S , Range 23E , Section 8

GPS: NAD 27, UTM 12S 4188335 N, 639567 E

DISCUSSION

Gold Queen Basin - Trend Study No. 14-3

The Gold Queen Basin study is located on the east slope of the Abajo Mountains at an elevation of 8,200 feet. Aspect is generally to the northeast on a 10% to 15% slope. The site is an oakbrush-dominated opening surrounded by large ponderosa pines. Point quarter data from 1999 estimated 43 ponderosa pine, 19 pinyon, and 40 maple trees/acre. Average diameter was estimated at 14 inches for ponderosa pine, 2.4 inches for pinyon and only half an inch for maple. Shrub density strip data from 1999 and 2004 estimated 80 to 100 ponderosa pine trees/acre, the majority (75% to 80%) consisting of young trees. Roads in the area are mainly a result of oil and gas leasing and mineral exploration. Now these roads are used for recreational activities.

Deer and elk use this area primarily during the summer. Pellet group transect data from 1999 estimated 19 deer days use/acre (47 deer days use/ha), 10 elk days use/acre (25 elk days use/ha), and 5 cow use days/acre (12 cow days use/ha). Cow pats appeared to be from the previous fall, while the deer pellet groups were from spring use. Turkey scat was also observed on the site. Deer use was much higher in 2004, with use estimated at 42 days use/acre (103 ddu/ha). The site provides excellent escape cover and fawning habitat. A newborn fawn was seen near the site in mid June of 2004. Elk use was similar to 1999, estimated at 7 days use/acre (18 edu/ha). Cattle use was also low at 8 days use/acre (20 cdu/ha).

Soil throughout the site appears to be moderately deep and rocky, especially at the beginning of the baseline. Estimated effective rooting depth is nearly 20 inches. Soil texture is a sandy clay loam with a slightly acid pH of 6.2. Parent material appears to be granite with large rocks present through the profile. Protective ground cover is abundant with high amounts of litter and herbaceous cover which provides excellent soil protection. Even with the moderate slope, there is little evidence of erosion.

There are several shrub species on the site, including large numbers of Oregon grape, Gambel oak and snowberry. Snowberry is the most abundant understory browse species on this site, providing 36% of the total browse cover in 1999 with a cover value of 7.5%. Average cover increased to 10% in 2004 which accounted for 45% of the total browse cover. Gambel oak is also abundant. Plants vary in size from shorter growth forms near the beginning of the baseline to tall individuals further down the line. Line intercept cover data from 2004 estimated total canopy cover of oak at 29% which accounted for 45% of the total browse cover. Most of the oak is unutilized and in good vigor. Mature plants average height has increased since 1999, from just over 2 to 4.5 feet in height. Other browse species, Utah serviceberry, mountain big sagebrush, antelope bitterbrush, and Wood's rose are present but not common.

A variety of grasses occur in the area. Kentucky bluegrass, an increaser, is the most prevalent. It provided 80% of the total grass cover in 1994, 74% in 1999, and 45% in 2004 with cover values of 6%. Western wheatgrass, intermediate wheatgrass, smooth brome, Carex spp., bulbous bluegrass, subalpine needlegrass, and needle-and-thread are also present in low numbers. Forbs are diverse and produced 62% of the herbaceous cover in 1999, down to 45% in 2004. Common species include, Western yarrow, pussytoes, spreading fleabane, littleflower collinsia, silky Lupine, thickleaf peavine, dandelion, and clover. This variety can provide an important component of a deer's summer diet.

1986 APPARENT TREND ASSESSMENT

Data indicates good soil protection with a high percentage of protective litter and vegetative cover. Aerial vegetative cover, in the form of oakbrush appears to be on the increase. The range is currently in good condition and provides a good variety of browse and herbaceous forage for big game and livestock.

1994 TREND ASSESSMENT

Soil trend on this site has improved with percent bare ground down to only 6% at this time. The herbaceous cover is almost equal to the browse cover which is unusual for sites in the mountain brush type. The herbaceous cover protects the soils much better than aerial cover provided by browse species. The trend for browse is stable. The two key browse species are Gambel oak and snowberry. The oak and snowberry make up 91% of the browse cover or 51% of the total vegetative cover. The density estimate for snowberry is down slightly from the last reading, but some of the change could be due to the rhizomatous nature of this species which make it difficult to get consistent counts from year to year. The important point is that none of the plants are classified as decadent and use is only classified as light. The Gambel oak was mistakenly not inventoried in the shrub strip counts during the 1994 reading. Data from point quarter, estimates oak density at approximately 4,732 stems/acre with an average diameter of 0.6 inches. Shrub trend for the site is stable to improving. The trend for the herbaceous understory is up. Both sum of nested frequency values for grasses and forbs have increased, especially for the forbs.

TREND ASSESSMENT
soil - up slightly and in very good condition (4)
browse - stable (3)
herbaceous understory - up (5)

1999 TREND ASSESSMENT

Trend for soil is stable. There is excellent protective ground cover which keeps erosion to a minimum. Trend for browse is stable but most are unutilized. The common shrubs include Oregon grape, Gambel oak, and snowberry. All have increased in density, exhibit good vigor, and have low percent decadence. Grasses and forbs are more important in this area because they are used more on spring and summer range. Trend for the herbaceous understory is stable. The composition of grasses and forbs is very diverse but dominated by increasers which include Kentucky bluegrass, western yarrow, pussy toes, littleflower collinsia, trailing fleabane, and dandelion.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

2004 TREND ASSESSMENT

Trend for soil is stable because percent bare soil protective cover has remained nearly the same through all sampling dates. Trend for browse is stable but canopy cover of Gambel oak is increasing. The most common shrubs, Oregon grape, Gambel oak, and snowberry, are mostly unutilized. This area is a summer range and the most important vegetational aspect is grasses and forbs. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency and cover of perennial forbs. Average cover of perennial forbs has declined 36% since 1999. Sum of nested frequency of perennial forbs also declined slightly. Sum of nested frequency of perennial grasses remained stable but composition has changed slightly. Kentucky bluegrass declined significantly (less drought tolerant), while western wheatgrass and needle-and-thread increased significantly. Kentucky bluegrass currently provides 45% of the total grass cover, down from 74% in 1999.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Management unit 14 , Study no: 3

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Agropyron intermedium	5	19	9	15	.13	.07	.07
G	Agropyron smithii	32	90	67	58	.56	.91	1.03
G	Bromus anomalus	-	-	-	5	-	-	.01
G	Bromus inermis	-	8	20	11	.16	.11	.08
G	Carex spp.	3	6	1	16	.03	.00	.11
G	Koeleria cristata	4	-	-	8	-	-	.09
G	Poa bulbosa	-	2	7	14	.00	.18	.12
G	Poa fendleriana	50	19	39	65	.17	.45	1.79
G	Poa pratensis	284	267	263	171	6.32	6.22	4.71
G	Sitanion hystrix	29	12	-	-	.10	-	-
G	Stipa columbiana	20	32	19	26	.38	.13	.48
G	Stipa comata	-	-	11	33	-	.25	1.86
G	Stipa lettermani	-	3	-	-	.03	-	-
G	Unknown grass - perennial	2	-	-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		429	458	436	422	7.90	8.35	10.37
Total for Grasses		429	458	436	422	7.90	8.35	10.37
F	Achillea millefolium	97	171	153	101	2.74	4.18	1.44
F	Agoseris glauca	-	8	6	3	.04	.18	.00
F	Antennaria neglecta	62	39	38	35	1.40	1.14	1.38
F	Androsace septentrionalis (a)	-	-	2	-	-	.00	-
F	Arabis spp.	-	-	1	1	-	.00	.03
F	Arenaria congesta	6	33	18	32	.60	.58	.61
F	Artemisia michauxiana	16	11	14	15	.07	.47	.46
F	Aster spp.	-	-	3	3	-	.03	.15
F	Calochortus nuttallii	-	4	-	-	.01	-	-
F	Chenopodium spp. (a)	-	-	5	-	-	.01	-
F	Cirsium spp.	2	5	-	3	.03	-	.00
F	Collomia linearis (a)	-	4	20	6	.00	.11	.01
F	Collinsia parviflora (a)	-	78	73	31	.19	.63	.08
F	Conioselinum scopulorum	-	3	14	-	.00	.10	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
F	Cymopterus spp.	-	6	-	-	.04	-	-
F	Delphinium nuttallianum	-	20	19	-	.03	.04	-
F	Descurainia pinnata (a)	-	3	-	-	.01	-	-
F	Erigeron flagellaris	122	83	75	93	.80	1.78	2.26
F	Eriogonum racemosum	16	2	14	-	.01	.07	.03
F	Erigeron speciosus	9	-	-	-	-	-	-
F	Erigeron speciosus	-	15	-	-	.08	-	-
F	Galium spp.	-	-	-	4	-	-	.00
F	Gayophytum ramosissimum(a)	-	23	17	1	.04	.03	.00
F	Lathyrus lanszwertii	27	31	49	25	.18	.69	.36
F	Lappula occidentalis (a)	-	1	-	-	.00	-	-
F	Ligusticum porteri	3	-	-	-	-	-	-
F	Lomatium spp.	3	31	10	17	2.10	.11	.22
F	Lupinus sericeus	3	34	17	7	1.08	.43	.13
F	Lychnis drummondii	7	-	-	-	-	-	-
F	Microsteris gracilis (a)	-	57	7	21	.12	.01	.07
F	Orobanche fasciculata	-	-	6	1	-	.03	.00
F	Osmorhiza occidentalis	-	-	2	8	-	.03	.05
F	Penstemon crandallii	28	19	17	17	.16	.30	.30
F	Pedicularis spp.	-	3	-	-	.00	-	-
F	Penstemon humilis	-	-	-	2	-	-	.00
F	Phlox longifolia	6	16	10	19	.10	.07	.06
F	Phlox spp.	-	22	29	-	.06	.17	-
F	Polygonum douglasii (a)	-	45	21	20	.07	.09	.04
F	Potentilla fruticosa	-	29	-	-	.27	-	-
F	Ranunculus spp.	-	-	11	-	-	.02	-
F	Senecio integerrimus	19	10	19	-	.33	.09	-
F	Sedum lanceolatum	-	3	9	-	.00	.01	-
F	Senecio multilobatus	-	-	-	7	-	-	.01
F	Taraxacum officinale	-	28	34	29	.32	.98	.35
F	Tragopogon dubius	-	1	-	-	.00	-	-
F	Trifolium gymnocarpon	3	30	32	32	.59	.71	.44
F	Unknown forb-perennial	-	14	6	-	.03	.15	-
F	Verbascum thapsus	-	-	2	2	-	.00	.00
F	Vicia americana	-	-	-	3	-	-	.00
F	Wyethia amplexicaulis	-	-	2	-	-	.03	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
Total for Annual Forbs		0	211	145	79	0.45	0.89	0.21
Total for Perennial Forbs		429	671	610	459	11.17	12.47	8.37
Total for Forbs		429	882	755	538	11.62	13.36	8.59

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

BROWSE TRENDS --
Management unit 14 , Study no: 3

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Acer grandidentatum	0	0	0	-	-	.01
B	Amelanchier utahensis	2	2	4	-	-	.00
B	Artemisia tridentata vaseyana	0	0	0	.00	-	-
B	Chrysothamnus depressus	1	4	1	.15	.06	.03
B	Mahonia repens	26	23	30	1.37	1.66	2.85
B	Pinus ponderosa	0	5	4	.63	.56	.18
B	Purshia tridentata	0	0	0	-	-	-
B	Quercus gambelii	0	67	66	14.72	10.97	8.97
B	Rosa woodsii	4	1	1	.06	-	.00
B	Symphoricarpos oreophilus	78	85	76	8.14	7.54	10.02
Total for Browse		111	187	182	25.09	20.80	22.08

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 3

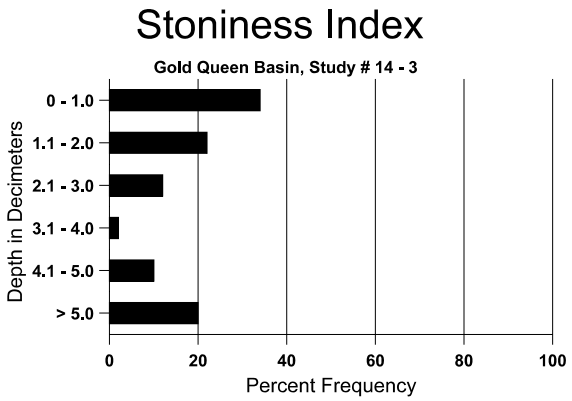
Species	Percent Cover	
	'99	'04
Amelanchier utahensis	-	.08
Chrysothamnus depressus	-	.13
Mahonia repens	-	2.13
Pinus ponderosa	21.20	19.96
Quercus gambelii	22.60	29.36
Rosa woodsii	-	.06
Symphoricarpos oreophilus	-	13.88

BASIC COVER --
Management unit 14 , Study no: 3

Cover Type	Average Cover %			
	'86	'94	'99	'04
Vegetation	9.25	40.06	40.70	39.34
Rock	3.00	2.28	3.86	3.64
Pavement	0	.01	.09	.15
Litter	79.00	62.72	66.68	67.46
Cryptogams	.25	.93	.89	.22
Bare Ground	8.50	5.73	9.93	6.15

SOIL ANALYSIS DATA --
Management unit 14, Study no: 3, Study Name: Gold Queen Basin

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
20.8	59.0 (15.1)	6.2	46.9	30.6	22.6	3.4	19.1	134.4	0.5



PELLET GROUP DATA --
Management unit 14 , Study no: 3

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	1	8	2
Grouse	-	-	1
Elk	-	-	2
Deer	3	7	7
Cattle	1	4	2

Days use per acre (ha)	
'99	'04
-	-
35 (86)	-
10 (25)	7 (18)
19 (47)	42 (103)
5 (12)	8 (20)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Acer grandidentatum												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	20	-	-	-	-	0	0	-	-	0	-/-
04	**0**	80	-	-	-	-	0	0	-	-	0	-/-
Amelanchier utahensis												
86	**0**	66	-	-	-	-	0	0	-	-	0	-/-
94	**60**	-	-	60	-	-	0	0	-	-	0	8/9
99	**40**	-	20	20	-	-	0	0	-	-	0	-/-
04	**240**	20	220	20	-	-	8	33	-	-	0	-/-
Artemisia tridentata vaseyana												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	20	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus depressus												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**40**	-	-	20	20	-	0	0	50	-	0	5/16
99	**160**	40	60	60	40	-	38	38	25	-	0	6/9
04	**100**	-	-	100	-	-	0	0	0	-	0	2/6
Mahonia repens												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**3480**	20	1100	2360	20	-	0	0	1	.57	2	5/7
99	**4300**	40	620	3680	-	-	0	0	0	-	0	4/7
04	**7700**	-	240	7440	20	40	0	0	0	-	.25	5/7
Pinus ponderosa												
86	**66**	-	66	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	-	80	20	-	-	0	0	-	-	0	-/-
04	**80**	-	60	20	-	-	0	0	-	-	0	-/-
Purshia tridentata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	22/20
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	5/22

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Quercus gambelii												
86	**9865**	7733	9133	466	266	-	17	26	3	-	31	127/49
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**11360**	1480	5960	5140	260	820	0	0	2	.52	.52	28/26
04	**9660**	120	5060	4260	340	460	4	0	4	.62	.62	55/38
Rosa woodsii												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**100**	-	40	60	-	-	0	0	-	-	20	6/4
99	**60**	-	-	60	-	-	0	0	-	-	0	4/4
04	**60**	-	60	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
86	**5398**	333	1666	3466	266	-	33	0	5	-	0	19/14
94	**4300**	220	780	3480	40	-	2	0	1	-	.46	16/29
99	**8260**	20	3060	5180	20	100	.96	0	0	-	0	16/23
04	**5760**	-	380	5220	160	20	6	5	3	3	3	15/21

Trend Study 14-5-04

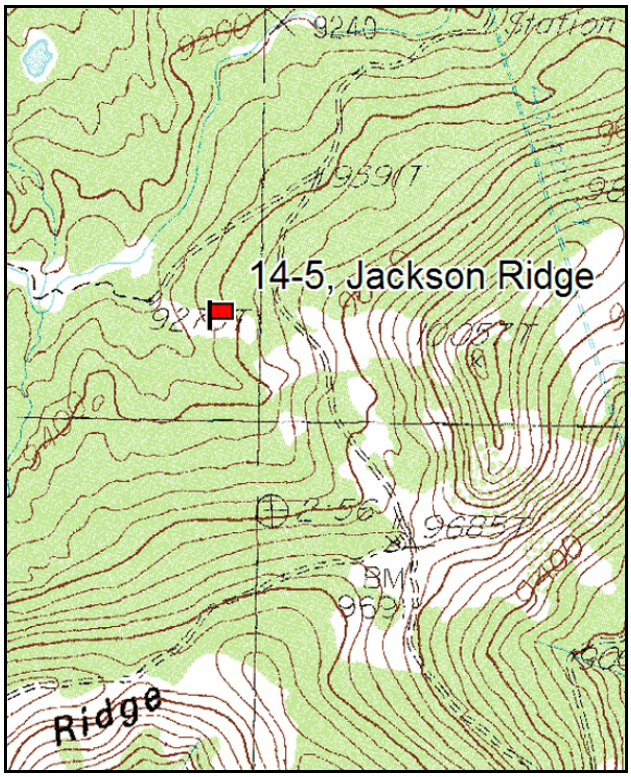
Study site name: Jackson Ridge . Vegetation type: Aspen .

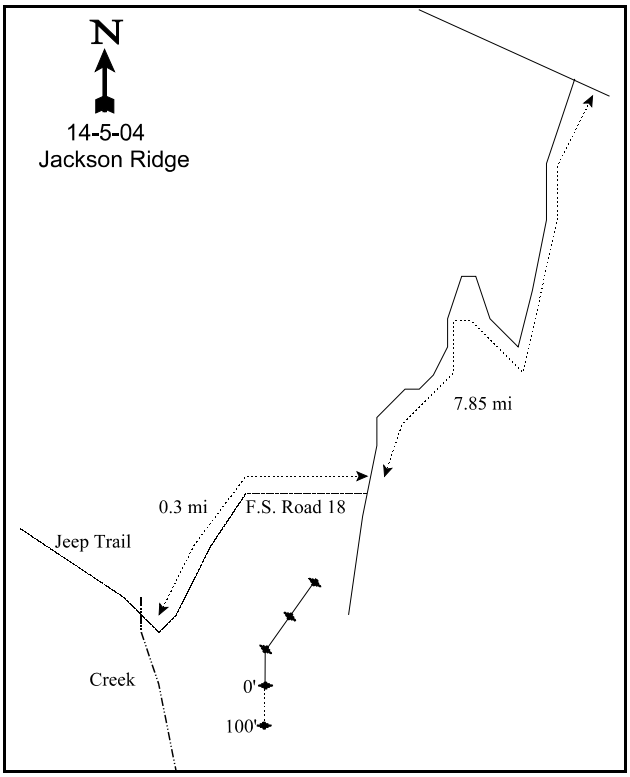
Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Mt. Linnaeus

Diagrammatic Sketch

Township 34S , Range 22E . , Section 9

GPS: NAD 27, UTM 12S 4188193 N, 630892 E

DISCUSSION

Jackson Ridge - Trend Study No. 14-5

The Jackson Ridge Study samples a moderately steep meadow in an aspen-spruce-fir forest on the headwaters of Indian Creek in the southern part of the Abajo Mountains. This is a summer range at an elevation of 9,400 feet. Water is not a limiting factor and the small perennial stream flowing northwest down the slope towards Indian Creek contains water late in the year. Annual precipitation is at least 20 inches per year. The study site has a western exposure with a 35% slope. Because of an underground aqueduct moving water from this drainage, this area is considered part of the Blanding municipal watershed. Consequently, cattle grazing is not permitted on this part of the Manti-LaSal National Forest. However, fences are in poor repair and allow cattle to trespass from the Camp Jackson allotment. Fresh cow sign was abundant on the study site in August 1986, when the site was first established. Pellet group data from 1999 estimated 2 deer days use/acre (5 deer days use/ha) and 12 elk days use/acre (30 elk days use/ha). All of the pellet groups were found further up the slope where it is more open. In 2004, 6 deer days use/acre (15 ddu/ha), 13 elk days use/acre (33 edu/ha), and 1 cow day use/acre (2 cdu/ha) were estimated.

The soil is a moderately deep clay loam with an estimated effective rooting depth of almost 16 inches. The upper soil horizon is a fine textured, heavy soil with a good amount of organic matter. There is quite a bit of large rock in the profile, concentrated in the top 8 inches of soil. In some areas, rock has been exposed by erosion, which occurred in the past and has led to heavy soil loss and the formation of deep gullies. However, now the soil has good vegetative and litter cover which provides excellent soil protection. The gullies are stabilized and recovering and there is only a small amount of rill erosion on the steeper faces. Mounds of bare soil are the result of rodent activity. Bare ground cover increased from only 4-5% in 1994 and 1999 to 18% in 2004. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground decreased from 1:5.8 to 1:3.7 which is still excellent, but trending lower. Litter cover declined from 67 to 39% in 2004.

Surrounding the small meadow is a thick grove of quaking aspen, Engelmann spruce, white fir, and Douglas fir. The forest provides excellent cover for big game. There are young trees on the edge, with aspens being the most aggressive in moving into the meadow. These young trees showed moderate to heavy use on all available portions of the plants in 1986. Many of the young trees were largely unavailable. The smallest ones often had reduced numbers of yellowish leaves, with many being classified in poor vigor in 1986. Browsing may be heavy enough to limit or slow the spread of aspens into the meadow. All mature aspen in the meadow are unavailable due to height. Aspen was mistakenly not included in the shrub density strips in 1994, so no comparisons can be made with 1986 and 1999 data. Density was slightly higher in 1999 (620 to 532 trees/acre) than 1986 estimates, but some of the change is due to the lengthening of the baseline in 1994. Density was stable in 2004 at 600 trees/acre. Overhead canopy cover of aspen was estimated at 21% in 1999 and 31% in 2004. Utilization appeared light. Snowberry occurs infrequently in the meadow with some showing moderate browsing in 2004.

The bulk of available forage production on this study site comes from the herbaceous component which has provided over 93% of the vegetation cover for each reading. There are several native grasses on the site but the most abundant species is Kentucky bluegrass which accounted for 75% of the total grass cover in 1994, 81% in 1999, and 59% in 2004. Other common grasses include slender wheatgrass, orchard grass, and letterman needlegrass. A large species of *Carex* was found in scattered bunches and increased significantly in 2004. The sum of nested frequency for perennial grasses declined 12% in 2004, but it was still quite high. The abundance of forbs on the site is an especially important component of this summer range. In summer, forbs constitute a large portion of the deer diet (up to 50% and more). Many valuable and palatable species are common, including thickleaf peavine, American vetch, mountain dandelion, silvery lupine, sweetroot, and wild strawberry. Forbs made up 66% of total vegetative cover in 1994, 60% in 1999, and 62% in 2004. The sum of nested frequency for perennial forbs declined 34% in 2004, but forb cover was slightly higher.

1986 APPARENT TREND ASSESSMENT

The key species to monitor here are the young increasing aspens and the forbs. The area is healthy, diverse and provides abundant forage. Although cattle grazing is rather concentrated and apparently unregulated, there is plenty of herbaceous forage. The young aspens are heavily utilized where available, but will probably continue to slowly increase. Overall vegetative trend is stable. With increased vegetative and litter cover and organic matter content, the soil is stabilizing and trend is improving.

1994 TREND ASSESSMENT

Soil trend would be considered slightly improving because percent bare ground has gone from 11% down to only 4% and the herbaceous understory makes up 97% of the total vegetative cover. The browse trend is improving with the quaking aspen not showing signs of poor vigor as was the case in 1986. However, browse only contributes to 1% of the total vegetative cover on this site. There was a slight drop in the nested frequency value for the grasses, but this was more than compensated for with significant increases in the forbs which produces almost 70% of the herbaceous understory cover. Trend for the herbaceous understory is slightly up.

TREND ASSESSMENT
soil - slightly up (4)
browse - slightly up (4)
herbaceous understory - slightly up (4)

1999 TREND ASSESSMENT

Trend for soil remains stable with similar ground cover characteristics compared to 1994 estimates. Browse is not very important on this summer range as shrubs and trees are not abundant in this meadow. However, aspen appears to be stable. The increase in density since 1986 is likely due to the much larger sample used in 1994 and 1999. Snowberry also shows a steady increase since 1986 with some moderate use apparent in 1999. However, snowberry provides less than half of 1% cover on the site. Trend for browse is considered stable. Trend for the herbaceous understory is stable with similar sum of nested frequency values for grasses and forbs compared to 1994 estimates. Cover of grasses and forbs are up slightly, but frequency values are basically the same. The increased cover of forbs is likely due to the early reading of the site (6-15) in 1999. Kentucky bluegrass remains the dominant grass by providing 81% of the grass cover. Dominant forbs include: western yarrow, larkspur, thickleaf peavine, lupine, tuber starwort, and dandelion. These six species account for 85% of the forb cover and 53% of the total herbaceous cover. Of these dominant forbs, only larkspur and thickleaf peavine have increased significantly in nested frequency since 1994.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory -stable (3)

2004 TREND ASSESSMENT

The soil trend is slightly down, but is still in good condition. Litter cover is down and bare ground is up, but erosion is not a problem as bare ground is still relatively low. The browse trend is stable, but is not a critical component on this summer range. Aspen density appears stable and a large portion of the population is made up of young sprouting trees (57%). Snowberry is also stable. The herbaceous understory trend is slightly down. The sum of nested frequency for perennial grasses and forbs is down 28% from 1999. Cover has decreased only slightly for grasses and increased slightly for forbs.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - slightly down (2)

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

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Agropyron spicatum	$_{b}$22	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
G	Agropyron trachycaulum	104	68	55	78	.94	.62	1.95
G	Bromus carinatus	$_{b}$48	$_{a}$19	$_{a}$8	$_{b}$31	.27	.21	.53
G	Carex spp.	$_{a}$5	$_{ab}$21	$_{a}$7	$_{b}$30	.43	.07	1.08
G	Dactylis glomerata	$_{a}$3	$_{ab}$9	$_{c}$28	$_{bc}$25	.19	1.12	.73
G	Phleum pratense	1	-	4	-	-	.03	-
G	Poa pratensis	$_{c}$362	$_{b}$341	$_{ab}$357	$_{a}$251	8.45	13.86	8.68
G	Stipa lettermani	$_{ab}$48	$_{a}$45	$_{b}$76	$_{ab}$58	.24	1.25	2.01
G	Trisetum spicatum	4	8	-	-	.66	-	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		597	511	535	473	11.20	17.17	15.00
Total for Grasses		597	511	535	473	11.20	17.17	15.00
F	Achillea millefolium	$_{ab}$280	$_{b}$291	$_{b}$286	$_{a}$250	6.55	9.22	7.01
F	Agoseris glauca	$_{b}$37	$_{ab}$23	$_{a}$13	$_{ab}$22	.10	.05	.10
F	Androsace septentrionalis (a)	-	$_{ab}$36	$_{b}$55	$_{a}$22	.08	.21	.74
F	Arabis spp.	-	1	10	5	.00	.07	.01
F	Castilleja spp.	-	-	-	1	-	-	.03
F	Cerastium arvense	$_{a}$-	$_{b}$10	$_{a}$-	$_{a}$-	.02	-	-
F	Chenopodium album (a)	-	2	-	2	.00	-	.00
F	Cirsium wheeleri	$_{a}$6	$_{ab}$10	$_{b}$24	$_{ab}$18	.02	.49	.52
F	Conioselinum scopulorum	-	11	-	-	1.32	-	-
F	Delphinium nuttallianum	$_{a}$-	$_{b}$78	$_{c}$190	$_{a}$5	.21	2.13	.01
F	Erigeron engelmannii	10	10	-	-	.09	-	-
F	Erigeron flagellaris	$_{b}$102	$_{ab}$96	$_{ab}$52	$_{a}$53	.55	.29	.35
F	Erigeron speciosus	$_{ab}$10	$_{b}$24	$_{a}$2	$_{a}$-	.52	.06	-
F	Fragaria vesca	39	15	18	25	.24	.55	.37
F	Galium bifolium (a)	-	$_{ab}$9	$_{b}$16	$_{a}$-	.01	.21	-
F	Gentiana amarella heterosepala	9	8	-	-	.01	-	-
F	Lathyrus lanszwertii	$_{a}$16	$_{a}$40	$_{b}$92	$_{b}$92	1.56	2.41	5.93
F	Lupinus argenteus	$_{a}$32	$_{b}$92	$_{b}$122	$_{a}$54	1.64	2.38	4.05

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
F	Lupinus spp.	-	-	-	2	-	-	.01
F	Mertensia brevistyla	-	3	-	-	.03	-	-
F	Microsteris gracilis (a)	-	1	-	-	.00	-	-
F	Orthocarpus spp. (a)	-	-	7	-	-	.04	-
F	Osmorhiza occidentalis	37	25	27	19	.53	.28	.45
F	Phacelia hastata	$_{b}$23	$_{a}$4	$_{a}$-	$_{a}$-	.03	-	-
F	Phlox longifolia	3	-	-	-	-	-	-
F	Polygonum douglasii (a)	-	$_{b}$49	$_{a}$15	$_{a}$22	.11	.13	.03
F	Potentilla gracilis	9	10	-	3	.18	-	.00
F	Ranunculus spp.	$_{a}$-	$_{c}$55	$_{c}$47	$_{b}$22	.19	.30	.22
F	Senecio neomexicanus	$_{a}$29	$_{b}$73	$_{b}$95	$_{a}$34	.64	.57	.33
F	Stellaria jamesiana	$_{a}$-	$_{c}$227	$_{c}$204	$_{b}$150	2.57	2.82	2.61
F	Taraxacum officinale	$_{a}$168	$_{b}$215	$_{b}$208	$_{a}$154	3.09	5.08	3.71
F	Thermopsis montana	$_{a}$-	$_{b}$68	$_{a}$-	$_{a}$3	.51	-	.00
F	Thlaspi montanum	$_{a}$22	$_{b}$62	$_{b}$73	$_{a}$21	.18	.35	.11
F	Tragopogon dubius	17	16	7	8	.66	.02	.45
F	Unknown forb-perennial	$_{b}$96	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Valeriana occidentalis	7	5	-	-	.30	-	-
F	Veronica serpyllifolia	1	-	-	-	-	-	-
F	Vicia americana	$_{b}$145	$_{b}$165	$_{a}$98	$_{a}$90	1.82	.64	2.29
F	Viola canadensis	$_{a}$-	$_{ab}$4	$_{ab}$6	$_{b}$8	.04	.01	.13
Total for Annual Forbs		0	97	93	46	0.21	0.59	0.78
Total for Perennial Forbs		1098	1641	1574	1039	23.70	27.76	28.76
Total for Forbs		1098	1738	1667	1085	23.91	28.36	29.54

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

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

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

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

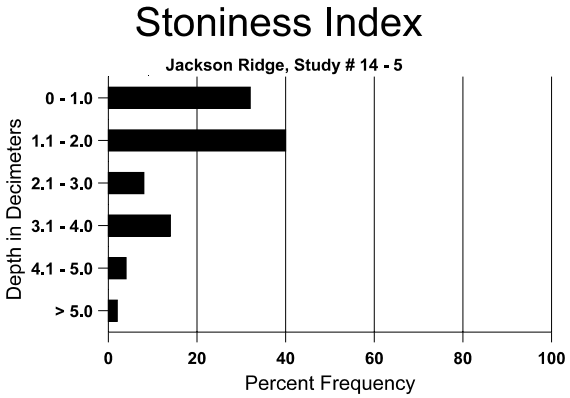
Species	Percent Cover	
	'99	'04
Picea engelmannii	-	3.45
Populus tremuloides	21.20	30.64
Symphoricarpos oreophilus	-	.11

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.5	46.0 (15.9)	6.0	36.9	34.6	28.6	5.3	15.6	390.4	0.3



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

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

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

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Abies concolor												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	40	-	-	-	0	0	-	-	0	-/-
Picea engelmannii												
86	**33**	-	33	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**40**	80	40	-	-	-	0	0	-	-	0	-/-
04	**100**	20	80	20	-	-	0	0	-	-	0	-/-
Populus tremuloides												
86	**532**	333	433	33	66	-	25	25	12	-	44	393/300
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**620**	-	140	480	-	80	0	0	0	-	0	-/-
04	**600**	-	340	260	-	80	0	3	0	-	3	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pseudotsuga menziesii												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	180	-	-	-	-	0	0	-	-	0	-/-
04	**0**	180	-	-	-	-	0	0	-	-	0	-/-
Ribes spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	26/11
Sambucus racemosa												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	13/13
Symphoricarpos oreophilus												
86	**33**	-	-	33	-	-	100	0	0	-	0	24/2
94	**60**	-	-	60	-	-	0	0	0	-	0	23/101
99	**240**	-	40	120	80	-	17	0	33	-	17	18/32
04	**360**	-	180	160	20	20	56	0	6	-	0	13/28

Trend Study 14-6-04

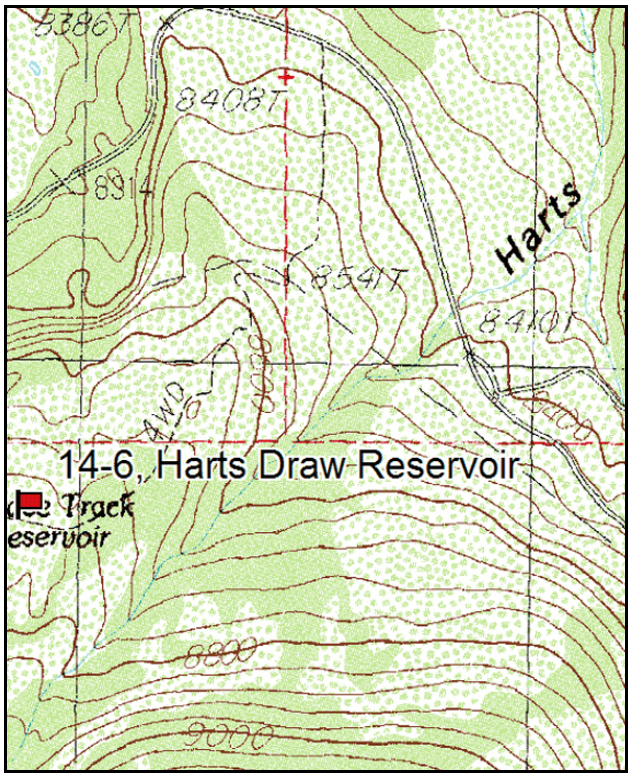
Study site name: Harts Draw Reservoir . Vegetation type: Mixed Oak-Sagebrush .

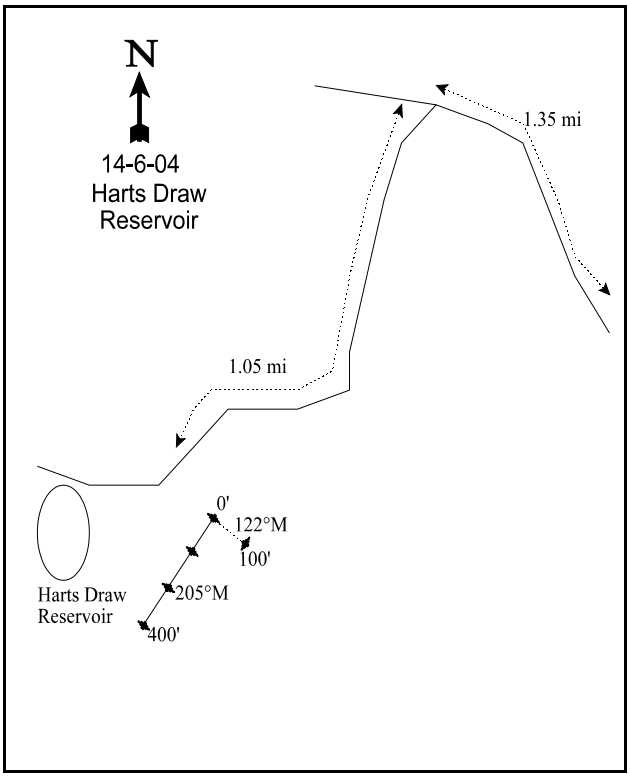
Compass bearing: frequency baseline 122 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Monticello Lake

Diagrammatic Sketch

Township 33S , Range 22E , Section 22

GPS: NAD 27, UTM 12S 4195632 N, 632865 E

DISCUSSION

Harts Draw Reservoir - Trend Study No. 14-6

The Harts Draw Reservoir study is on National Forest land and located on summer range for deer and elk. Aspen groves with oakbrush and sagebrush openings are the predominant vegetation types. This trend study samples one of these sagebrush openings. The elevation is 8,800 feet with a north-northwest aspect and a slope of less than 5%. The area is part of the Harts Draw allotment (the Harts Draw unit is one of three on the allotment). The grazing system is rest-rotation; this unit is grazed for two months of the season for two years and rested the third year. Season of use is June 16 to Sept 15. The current agreement is for 361 head. The area was seeded over twenty years ago with no land treatments planned for the near future.

Considering its proximity to a water source, the area has received only moderate utilization of the grasses by cattle. Water is plentiful and grazing pressure does not appear to be concentrated in the immediate area of the water. Although access is easy, public pressure is low except during the hunting season. Deer pellet groups are frequent and deer have been observed on the site. Escape cover is provided by thick clumps of oak and nearby groves of aspen. Pellet group data from 1999 estimated 18 deer days use/acre (44 ddu/ha), 1 elk days use/acre (3 edu/ha), and 74 cow days use/acre (183 cdu/ha). Nearly all of the cattle pats appeared to be from the previous grazing season. About half of the deer pellet groups were recent with the other half from last year. Pellet group data from 2004 estimated low deer and elk use at 7 and 3 days use/acre respectively (17 ddu/ha and 7 edu/ha). Cattle use was moderate estimated at 41 days use/acre (102 cdu/ha). Cattle pats encountered in 2004 appeared to be from the previous grazing season (2003).

Soil in the area is a moderately deep red-brown loam with an estimated effective rooting depth of nearly 18 inches. It has a slightly acid pH of 6.4. The soil on the site is extremely compacted and difficult to dig in. As a result, stoniness measurements rarely hit rock and are more a measure of soil compaction. As evidenced by the very rocky, rough road leading to the site, the soil is susceptible to erosion. Once started by the removal of vegetation, erosion is rapid and severe. Gullies are found on the steeper slopes that are devoid of vegetation. Most of the study site has a thick protective vegetative and litter cover leaving little unprotected soil.

The sagebrush-grass type, sampled with this trend study, is closely intermingled with oakbrush. It is a productive and highly utilized as summer range. Mountain big sagebrush is the dominant preferred browse species which provided about one-third of the total browse cover in 2004 with a cover value of 5%. Density was estimated at 3,100 plants/acre in 1994. Nearly 80% of the population was classified as decadent but utilization was mostly light. By 2004, the population had declined to 2,320 plants/acre and the number of decadent plants dropped to 30% of the population. Utilization was more moderate with some heavy use on selected plants. Seedlings were abundant and about 10% of the population consisted of young plants.

Oak on the site occur in isolated clones and vary in height from 4 to 10 feet. Density has remained rather constant since 1986 at around 4,000 stems/acre. Oak was mistakenly not included in the shrub density strips in 1994, so there are no density data. Utilization was moderate in 1986, especially on the abundant young sprouts around the edges of the clones. These showed some evidence of poor vigor and insect damage that year. Use has been mostly light, vigor normal, and percent decadence low during all other readings. Total line intercept canopy cover was estimated at just under 14% in 2004.

Two other shrubs, serviceberry and snowberry, are found in scattered populations. Both shrubs were moderately utilized in 1986. The snowberry had already started to loose its leaves in early September of 1986 when the site was first read. Use of snowberry has been mostly light and vigor normal since 1994. Serviceberry is especially vigorous and nearby six-foot tall shrubs provide abundant forage and seed. Serviceberry sampled on the site showed moderate to heavy use in 2004 and vigor was good.

Grasses and forbs are abundant in the understory, however two increaser grasses, smooth brome and Kentucky bluegrass, dominate the herbaceous component. Smooth brome and Kentucky bluegrass each provides a cover value of 20% and account for 100% of the grass cover and 66% of the total herbaceous cover in 1999. Total grass cover declined 34% in 2004 due to drought conditions, but smooth brome and Kentucky bluegrass still account for 93% of the total grass cover. Other grasses are rare. Forbs are diverse but only lupine is abundant. It produced 85% of the total forb cover in 1999 and 79% in 2004. Dusty penstemon was quite common in the past and was heavily grazed, as was redroot eriogonum. Both species have decreased in abundance. Other important forbs are few flower peavine, paintbrush, wooly groundsel, and American vetch.

1986 TREND ASSESSMENT

Looking at data from both the older line intercept studies (LI) and the newer Interagency trend study (IA), these observations seem in order.

1. The oak and aspen-dominated areas are similar on all parameters between years. Diversity in species composition and forage production are high. The overall trend is stable.

2. The sagebrush-grass type, intensively surveyed with both methods, appears to be a more dynamic community. No severe fluctuations in the type were apparent, but there have been some changes.

	1981	1986
Browse production	188 lbs/acre	272 lbs/acre
Browse density	8,400 plants/acre	12,200 plants/acre
% of production from ARTRV	94%	85%
oak density	2500 plants/acre LI - 5600 plants/acre	IA - 5200 plants/acre
grass production	247 lbs/acre	360 lbs/acre

3. The soil is very erodible and where erosion has started, there is serious soil loss. However, most of the area has adequate cover in the form of a dense herbaceous understory and abundant litter. Soil trend is stable.

These data point to a trend of increasing oak, a possible decrease in big sagebrush and possible decrease in grass density. Comparison of photo point photographs also support these conclusions. Oak is vigorously sprouting, while very little recruitment is found for the sagebrush, which also has a fairly high amount of decadence.

This area provides an excellent mosaic of big game habitat types, with cover, water, and forage all available. It is important to maintain the limited sagebrush-grass type for it is highly productive and heavily used by both big game and livestock. The increasing oak threatens the stability of this vegetation type. Therefore, trend is considered stable to declining.

1994 TREND ASSESSMENT

The trend for soil is up, because percent bare ground has decreased substantially and percent litter is still quite high with vegetative cover also being high. The browse trend is slightly down for the key species, which is mountain big sagebrush. The density estimate has gone down somewhat, but that is more reflective of the

much larger sample size. What is of more importance is that the population has a much higher percent decadence (78%) and those showing poor vigor has increased to 43%. The one parameter that can turn this trend around is the large number of seedlings (2,160 seedlings/acre). The herbaceous understory trend is stable.

TREND ASSESSMENT
soil - up (5)
browse - slightly down (2)
herbaceous understory - stable (3)

1999 TREND ASSESSMENT

Trend for soil is stable with excellent protective ground cover. Trend for browse appears to be in a state of decline for mountain big sagebrush. Although vigor has improved and percent decadence has gone down from 78% to 42%, the population density has gone down slightly, recruitment is poor, and the proportion of the population which are dead has doubled since 1994. Currently there are not enough young plants to replace decadent and dying plants. Gambel oak has remained at similar densities since 1986 (4,066 to 3,740 stems/acre) while increasing in size. Serviceberry and snowberry appear to have stable but small populations. Trend for the herbaceous understory is slightly down. Smooth brome and Kentucky bluegrass continue to dominate the herbaceous understory. The increase in Kentucky bluegrass since 1994 may be due to identification problems with mutton bluegrass. The nested frequencies of grasses slightly decreased, while cover of the two dominant grasses doubled since 1994. This would be due to wetter conditions in 1999. Sum of nested frequency for forbs overall declined substantially, but the dominant forb, lupine an increaser, remained stable. Cover of forbs also nearly doubled compared to 1994 estimates.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - slightly down (2)

2004 TREND ASSESSMENT

Trend for soil remains stable with abundant protective ground cover and little exposed bare ground. Trend for the key browse species, mountain big sagebrush, is stable. Density is similar to 1999 estimates while percent decadence has declined from 42% to 30%. Young recruitment is good with 10% of the population consisting of young plants. Seedlings are also abundant. Gambel oak density appears stable and total canopy cover was estimated at 13.5%. Most oak is unutilized. Serviceberry and snowberry have small but stable populations. Trend for the herbaceous understory is stable with similar sum of nested frequency values for perennial grasses and forbs between years. Smooth brome and Kentucky bluegrass still dominate the herbaceous understory by providing 93% of the total grass cover. Perennial grass production is down however due to the dry conditions of the past few years. Average cover of perennial grasses declined 35%. Most of the change is due to a significant decline in cover of Kentucky bluegrass, down nearly three-fold (20% to 8%). Sum of nested frequency for perennial forbs increased slightly in 2004 and average cover remained similar. Silky lupine totally dominates the forb component by providing 79% of the total forb cover. Nested frequency of lupine did declined significantly since 1999 but average cover remained similar (17% vs 15%). Peavine and longleaf phlox increased significantly in frequency. Most other forbs occur rarely.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

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

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	12	2	3	-	.01	.03	-
G	Bromus inermis	$_{a}$301	$_{ab}$323	$_{b}$336	$_{b}$333	8.02	20.12	17.22
G	Carex spp.	$_{c}$54	$_{b}$22	$_{a}$-	$_{c}$52	.43	-	1.17
G	Dactylis glomerata	-	-	2	-	-	.15	-
G	Koeleria cristata	-	-	-	3	-	-	.03
G	Poa fendleriana	$_{c}$130	$_{b}$68	$_{a}$-	$_{b}$46	2.01	-	.61
G	Poa pratensis	$_{a}$143	$_{b}$270	$_{c}$326	$_{b}$270	9.58	20.21	7.82
G	Sitanion hystrix	3	3	-	-	.00	-	-
G	Unknown grass - perennial	4	-	-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		647	688	667	704	20.08	40.52	26.86
Total for Grasses		647	688	667	704	20.08	40.52	26.86
F	Achillea millefolium	-	-	3	-	-	.00	-
F	Agoseris glauca	-	-	-	3	-	-	.00
F	Androsace septentrionalis (a)	-	$_{a}$7	$_{a}$7	$_{b}$28	.63	.04	.07
F	Antennaria spp.	$_{b}$9	$_{ab}$5	$_{a}$1	$_{a}$1	.15	.15	.03
F	Arabis spp.	-	6	-	-	.01	-	-
F	Arenaria spp.	-	-	7	9	-	.30	.30
F	Aster spp.	-	1	-	-	.00	-	-
F	Castilleja linariaefolia	6	8	13	19	.05	.25	.15
F	Calochortus nuttallii	-	-	2	-	-	.00	-
F	Collinsia parviflora (a)	-	$_{b}$19	$_{a}$5	$_{b}$36	.05	.03	.14
F	Crepis acuminata	-	3	-	2	.63	-	.01
F	Erigeron flagellaris	29	25	12	17	.07	.03	.19
F	Eriogonum racemosum	$_{b}$76	$_{ab}$52	$_{a}$27	$_{b}$38	.53	.50	.72
F	Gayophytum ramosissimum(a)	-	$_{b}$25	$_{a}$-	$_{a}$-	.04	-	-
F	Ipomopsis aggregata	$_{b}$17	$_{a}$4	$_{a}$-	$_{a}$1	.63	-	.00
F	Lathyrus pauciflorus	$_{ab}$42	$_{ab}$42	$_{a}$31	$_{b}$56	.79	.37	1.34
F	Lomatium parryi	$_{a}$-	$_{b}$26	$_{a}$-	$_{a}$-	.87	-	-
F	Lupinus holosericeus	$_{a}$178	$_{b}$235	$_{b}$244	$_{a}$197	7.76	17.11	15.04
F	Microsteris gracilis (a)	-	$_{a}$-	$_{c}$51	$_{b}$11	-	.47	.05
F	Penstemon comarrhenus	$_{c}$138	$_{b}$64	$_{a}$7	$_{ab}$33	.29	.07	.27
F	Phlox longifolia	$_{a}$16	$_{b}$68	$_{a}$30	$_{b}$92	.22	.07	.63
F	Polygonum douglasii (a)	-	$_{b}$31	$_{a}$7	$_{ab}$20	.06	.01	.04
F	Senecio neomexicanus	$_{b}$21	$_{a}$7	$_{a}$1	$_{a}$5	.02	.00	.04

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
F	Taraxacum officinale	3	7	9	9	.01	.07	.02
F	Thlaspi spp.	12	-	-	-	-	-	-
F	Vicia americana	$_{a}$-	$_{a}$-	$_{b}$44	$_{a}$6	-	.70	.06
Total for Annual Forbs		0	82	70	95	0.78	0.56	0.31
Total for Perennial Forbs		547	553	431	488	12.09	19.67	18.85
Total for Forbs		547	635	501	583	12.87	20.23	19.15

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

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

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

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

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

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

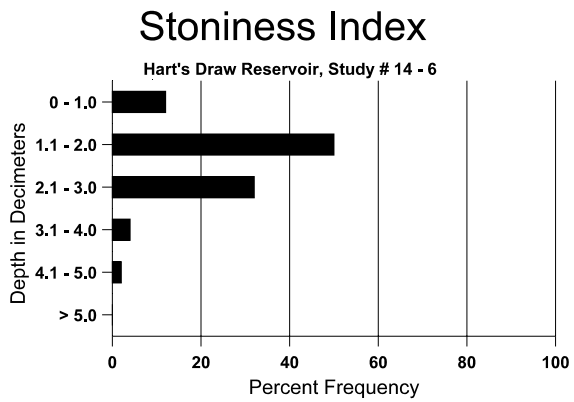
Species	Average leader growth (in)
	'04
Amelanchier utahensis	2.4
Artemisia tridentata vaseyana	1.5

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
17.9	62.7 (11.6)	6.4	44.0	35.4	20.6	3.1	23.2	272.0	0.5



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

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

Days use per acre (ha)	
'99	'04
-	-
1 (3)	3 (7)
18 (44)	7 (17)
74 (183)	41 (102)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
86	**1000**	-	1000	-	-	-	93	7	0	-	0	-/-
94	**360**	60	100	160	100	-	11	0	28	22	22	39/55
99	**380**	-	140	240	-	-	47	0	0	-	0	31/25
04	**320**	-	20	300	-	-	56	38	0	-	0	42/38
Artemisia tridentata vaseyana												
86	**5399**	-	-	2866	2533	-	56	42	47	1	28	18/18
94	**3100**	2160	220	460	2420	800	2	1	78	42	43	19/25
99	**2580**	140	120	1380	1080	1480	12	4	42	12	13	20/23
04	**2320**	5460	240	1380	700	1100	32	10	30	18	18	22/29
Quercus gambelii												
86	**4066**	1133	2400	933	733	-	64	36	18	2	44	41/21
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**3740**	160	1080	2400	260	800	17	0	7	1	1	45/29
04	**4040**	-	800	3200	40	220	6	0	1	-	.49	40/25
Symphoricarpos oreophilus												
86	**599**	-	200	333	66	-	78	11	11	3	78	14/7
94	**600**	-	40	560	-	-	17	0	0	-	10	15/22
99	**460**	-	60	400	-	-	13	0	0	-	0	18/19
04	**500**	20	140	360	-	-	4	0	0	-	0	16/18

Trend Study 14-8-04

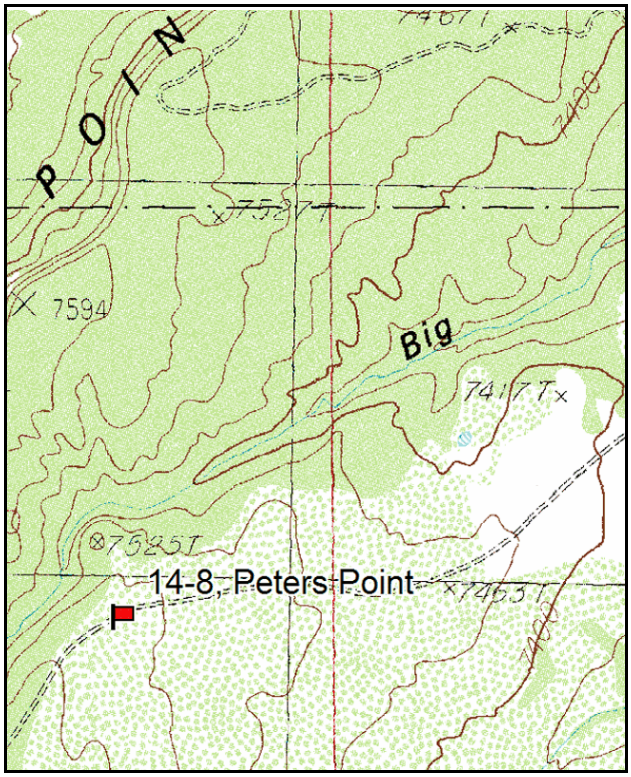
Study site name: Peters Point . Vegetation type: Chained, Seeded P-J .

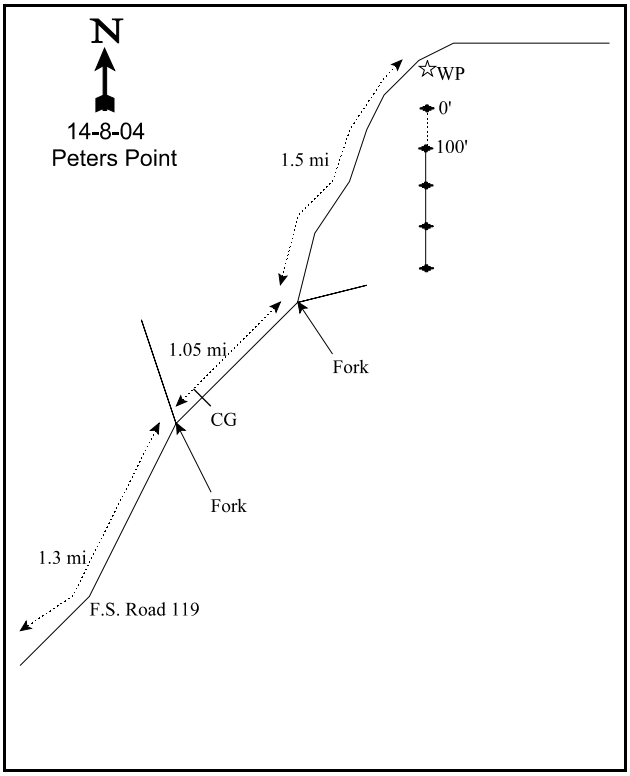
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Monticello Lake

Diagrammatic Sketch

Township 32S , Range 23E , Section 30

GPS: NAD 27, UTM 12S 4202852 N, 637552 E

DISCUSSION

Peter's Point - Trend Study No. 14-8

Fifteen hundred acres of pinyon-juniper woodland on Peters Point Plateau on the northeast side of the Abajo Mountains were chained and seeded in 1962. The Forest Service conducted follow up treatments in 1985 which included burning the perimeter of the old chaining and a Tordon treatment of approximately 200 acres. There are plans to finish burning, chemically treat or roller-chop the chaining in the future. The study site is near the road in the middle of the chaining. Elevation is 7,500 feet with a southeast aspect and on gentle slope. The availability of water is limited, although there are some seasonal sources and small stock ponds. As with the two previous study sites, this area is grazed by cattle in the summer as part of the Harts Draw allotment. It is in the third unit in a rest-rotation grazing system. This area is considered spring-fall range for deer. Peters Point is just above the Harts Draw winter concentration area. This plateau has the potential to become an important elk wintering area. Pellet group data taken on the site in 1999 estimated 13 deer, 1 elk and 7 cow days use/acre (32 ddu/ha, 3 edu/ha, and 17 cdu/ha). Pellet group data from 2004 estimated similar deer use at 15 days use/acre (36 ddu/ha). Elk use was estimated at 11 days use/acre (26 edu/ha) and cattle use estimated at 12 days use/acre (29 cdu/ha). Cattle were in the area when the site was read on June 17, 2004, but use appeared light at that time.

Soil at the site is relatively shallow with an effective rooting depth estimated at just under 12 inches. It is a reddish sandy loam with a neutral pH (7.2). The soil is extremely compacted with a hardpan apparent at about 6 to 7 inches in depth. It appears that this layer is mostly impervious to water. There is little rock on the surface or within the profile. Some pavement is concentrated on the surface in some scattered exposed spots, but this still contributes less than 2% cover. Average cover of bare ground has steadily increased from 19% in 1986 to a relative cover value of 46% in 2004. Much of this increase is due to the inevitable decomposition of chaining litter. However, drought conditions for the past several years have caused a decline in herbaceous cover and an increase in cover of bare ground. Often the bare areas lead into small gullies, where recent soil movement is detectable. Overall the area has good cover, with a high percent of herbaceous cover. There is some erosion occurring but it appears minimal due to the lack of significant slope. A soil erosion condition class assessment rated erosion as slight in 2004.

Encroachment by the juniper into this particular area has been rather slow with point-center quarter data estimated a density of 87 juniper trees/acre in 2004. A few widely spaces pinyon trees are also found on the site at an estimated density of about 22 trees/acre. Average diameter of juniper was estimated at 4.3 inches while that of pinyon averaged 2.4 inches. Approximately one-third of the juniper sampled were in the 8 to 12 foot height range, while another one-third were in the 4 to 8 foot range. Total canopy cover of juniper was estimated at nearly 5% in 2004. Sixteen percent of the juniper sampled were knocked down (tipped over), but still living trees which averaged 7 inches in diameter.

The key browse species on this site is mountain big sagebrush. Although some individuals had different leaf color and growth forms, they were all classified as mountain big sagebrush. Density has remained stable at about 2,700 plants/acre since 1994. Use has been light to moderate with a few individuals displaying heavy hedging. Vigor was rated as poor on 67% of the population in 1994 and 21% of the plants sampled were classified as decadent. Vigor was rated as normal on all but 10% of the population in 2004 with a similar number of decadent plants. Young recruitment has remained good during all readings with 13% of the population consisting of young plants in 1999 and 2004. Seedling sagebrush were abundant in 2004. Total sagebrush canopy cover was estimated at nearly 14% in 2004.

Broom snakeweed is fairly abundant and has increased substantially since 1994. Shrubs not encountered on the density plots include scattered Gambel oak, large and lightly browsed serviceberry, and some true mountain mahogany. The increaser species (broom snakeweed, juniper, pricklypear cactus, and pinyon pine) are not yet numerous enough to really affect production of the more desirable shrub and herbaceous species.

The seeding treatment successfully established a dense stand of crested wheatgrass. The wheatgrass occurs in vigorous, large patches that made up 81% of the total grass cover in 1994, increasing to 95% in 1999 and 2004. This grass, and to a lesser extent the bottlebrush squirreltail and mutton bluegrass, provides abundant spring and fall forage for deer and cattle and it is also valuable to elk in winter.

Forbs are lacking and produced less than 2% cover in 2004. The most numerous species is rock goldenrod. It provided 61% of the forb cover in 1994, increasing to 94% in 1999. Dusty penstemon, a valuable forage species, declined significantly in nested frequency since 1994 and was not sampled in 2004.

1986 APPARENT TREND ASSESSMENT

Currently the old chaining is in good condition. The important forage species, shrubs and grasses, appear vigorous and most appear to be increasing. The age class, form, and vigor of the big sagebrush suggests an improving trend. It appears that the juniper are increasing, which is negative in the long term and management plans already include further treatment to reduce their numbers. A complete elimination of all woody species would be a negative impact to deer habitat needs however. Cover is already limited on the large open chaining. Although there is some gully erosion, the increasing vegetation should improve soil cover and therefore trend. Disturbance of the soil by burning could accelerate erosion temporarily. A roller-chopper treatment would be a much better option to treat the chaining and the litter left in place would protect the soils from high intensity summer storms.

1994 TREND ASSESSMENT

The chaining is still considered in good condition. The soil trend is judged to be slightly down with the large increase in percent bare ground (19% in 1986 to 32% in 1994). Soil trend is considered only slightly down because the herbaceous cover is abundant and makes up 69% of the total vegetative cover. Herbaceous cover is best for protecting the soils from high intensity summer storms. The key browse species, mountain big sagebrush, has shown an increase in it's density, but this is primarily because of the much larger sample size now used. More importantly is the percentage of plants expressing poor vigor which have increased from 5 to 67%. Percent decadence has also increased from 7 to 20%. Young recruitment is good and helps offset some of the downward trends in sagebrush. The browse trend would still be judged slightly down. The herbaceous understory is rated as slightly down because the nested frequency values for both grasses and forbs have decreased slightly and frequency of the most abundant grass, crested wheatgrass, declined since the last reading. The Desirable Components Index (see methods) rated this site as good with score of 72 due to a healthy browse population and abundant perennial grasses and forbs.

TREND ASSESSMENT
soil - slightly down (2)
browse - slightly down (2)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 72 (good) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soil is stable with similar relative percent cover estimates for vegetation, litter, and bare ground. Trend for browse is considered up slightly even though density of the key species, mountain big sagebrush declined slightly. Plants displaying poor vigor declined from 67% of the population to only 6%, while percent decadence declined from 21% to 8%. Seedlings and young are not as abundant, yet adequate to maintain the stand. Trend for the herbaceous understory is considered stable. Nested frequency of crested wheatgrass increased, although sum of nested frequency for all herbaceous species remained at similar levels compared to 1994. The DCI score is rates this site as good. Palatable browse cover has increased and decadence

decreased. Forb cover did decline.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 74 (good) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

Trend for soil is down slightly due to a decline in protective ground cover and a 24% increase in relative bare ground to 39%. Drought conditions have also caused a 40% decline in herbaceous cover. There is some isolated erosion occurring but it is not severe and the erosion condition class was rated as slight. Trend for the key browse species, mountain big sagebrush, is stable. Density has remained similar to 1999, use is light to moderate and vigor normal on most plants. The number of decadent plants increased to 18% but seedlings are abundant and 13% of the population consists of young plants. Mature sagebrush are healthy and producing abundant seed in 2004. The increaser, broom snakeweed, has remained stable since 1999. Trend for the herbaceous understory is slightly down due to a decline in the sum of nested frequency for perennial grasses and forbs. Crested wheatgrass dominates the herbaceous understory by providing 95% of the total grass cover and 79% of the total herbaceous cover. It declined significantly in nested frequency and cover dropped 38%. Rock goldenrod is the only common forb encountered. It also declined significantly in nested frequency and cover. The DCI score declined to fair (58) due to higher decadence and the decline of the herbaceous understory.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 58 (fair) Mountain big sagebrush/chaining type

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

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{b}$324	$_{a}$242	$_{b}$285	$_{a}$216	14.34	14.65	9.14
G	Bromus tectorum (a)	-	8	22	13	.78	.11	.05
G	Koeleria cristata	-	14	3	13	1.54	.00	.08
G	Oryzopsis hymenoides	-	4	5	6	.03	.15	.03
G	Poa fendleriana	$_{a}$3	$_{b}$27	$_{ab}$20	$_{ab}$20	.52	.56	.27
G	Poa pratensis	-	7	-	-	.38	-	-
G	Sitanion hystrix	$_{ab}$9	$_{a}$-	$_{ab}$3	$_{b}$11	.00	.01	.06
Total for Annual Grasses		0	8	22	13	0.78	0.11	0.05
Total for Perennial Grasses		336	294	316	266	16.82	15.38	9.58
Total for Grasses		336	302	338	279	17.60	15.50	9.64
F	Arabis spp.	1	4	1	-	.01	.00	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
F	Artemisia ludoviciana	1	-	-	-	-	-	-
F	Cryptantha humilis	-	4	-	4	.63	-	.03
F	Descurainia pinnata (a)	-	-	-	7	-	-	.01
F	Draba spp. (a)	-	-	2	8	-	.00	.01
F	Eriogonum alatum	1	3	-	3	.00	-	.01
F	Erigeron pumilus	$_{ab}$4	$_{a}$-	$_{b}$12	$_{a}$-	-	.08	.00
F	Heterotheca villosa	-	-	1	-	-	.03	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{a}$3	$_{b}$17	-	.00	.10
F	Lesquerella rectipes	$_{b}$10	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Microsteris gracilis (a)	-	4	3	4	.01	.00	.01
F	Oenothera spp.	-	6	-	-	.02	-	-
F	Pedicularis centranthera	-	-	4	-	-	.06	-
F	Penstemon pachyphyllus	$_{a}$9	$_{b}$20	$_{a}$7	$_{a}$-	1.54	.01	-
F	Petradoria pumila	$_{b}$118	$_{a}$70	$_{ab}$75	$_{a}$48	3.45	3.50	1.68
F	Phlox longifolia	-	-	2	-	-	.01	-
F	Sphaeralcea coccinea	-	2	2	-	.00	.01	-
Total for Annual Forbs		0	4	8	36	0.00	0.01	0.14
Total for Perennial Forbs		144	109	104	55	5.67	3.72	1.73
Total for Forbs		144	113	112	91	5.68	3.73	1.87

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

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

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

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

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

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

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

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

Species	Trees per Acre		
	'94	'99	'04
Juniperus osteosperma	75	68	87
Pinus edulis	19	21	22

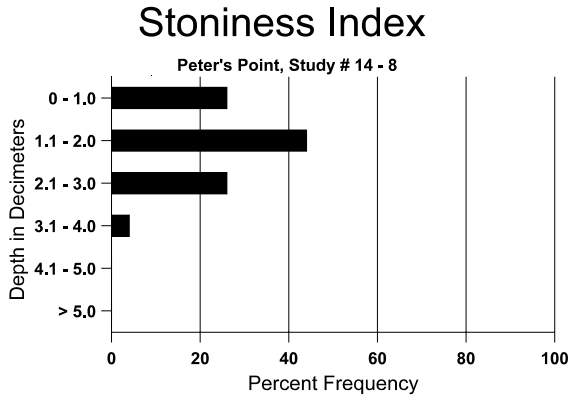
Average diameter (in)		
'94	'99	'04
4.3	4.2	4.4
2.6	2.7	2.4

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

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

SOIL ANALYSIS DATA --
Management unit 14, Study no: 8, Study Name: Peters Point

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
11.8	58.0 (11.0)	7.2	62.9	18.6	18.6	2.3	8.5	86.4	0.6



PELLET GROUP DATA --
Management unit 14 , Study no: 8

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

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

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
86	**100**	-	-	100	-	-	0	0	-	-	0	9/7
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia tridentata vaseyana												
86	**1832**	133	533	1166	133	-	35	13	7	-	5	20/20
94	**2780**	460	640	1560	580	140	17	5	21	4	67	19/33
99	**2300**	60	300	1820	180	240	4	6	8	5	6	19/31
04	**2720**	2200	380	1840	500	180	35	7	18	10	10	18/31
Cercocarpus montanus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	33/31
99	**0**	-	-	-	-	-	0	0	-	-	0	64/55
04	**0**	-	-	-	-	-	0	0	-	-	0	55/44

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus												
86	**1432**	33	1066	200	166	-	53	5	12	-	19	43/52
94	**160**	-	-	-	160	-	50	0	100	88	88	15/14
99	**20**	-	-	20	-	-	100	0	0	-	0	-/-
04	**60**	-	-	-	60	20	0	0	100	100	100	-/-
Chrysothamnus viscidiflorus												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**40**	-	-	20	20	-	0	0	50	50	50	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Gutierrezia sarothrae												
86	**899**	33	133	733	33	-	0	0	4	-	4	6/6
94	**200**	-	-	180	20	40	0	0	10	10	20	6/7
99	**1580**	260	520	1060	-	-	0	0	0	-	0	4/4
04	**1160**	-	-	840	320	40	19	0	28	10	10	8/11
Juniperus osteosperma												
86	**166**	-	133	33	-	-	20	0	-	-	0	88/42
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**140**	-	40	100	-	40	0	0	-	-	0	-/-
04	**120**	-	20	100	-	20	0	0	-	-	0	-/-
Opuntia spp.												
86	**299**	-	66	233	-	-	0	0	-	-	0	3/8
94	**80**	-	40	40	-	-	0	0	-	-	0	5/15
99	**120**	-	-	120	-	-	0	0	-	-	0	3/10
04	**100**	-	20	80	-	-	0	0	-	-	0	4/11
Pinus edulis												
86	**0**	33	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	20	0	0	-	-	0	-/-
Purshia tridentata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	11/21

Trend Study 14-9-04

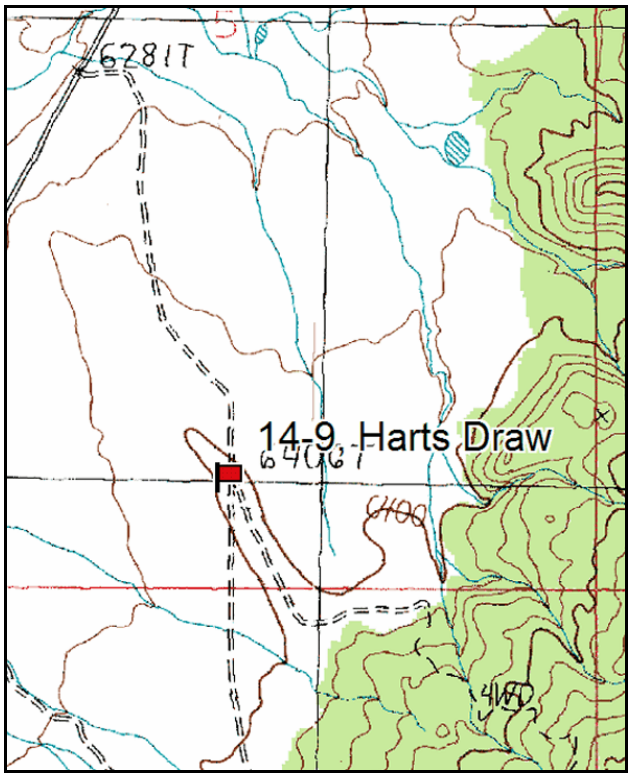
Study site name: Harts Draw . Vegetation type: Wyoming Big Sagebrush .

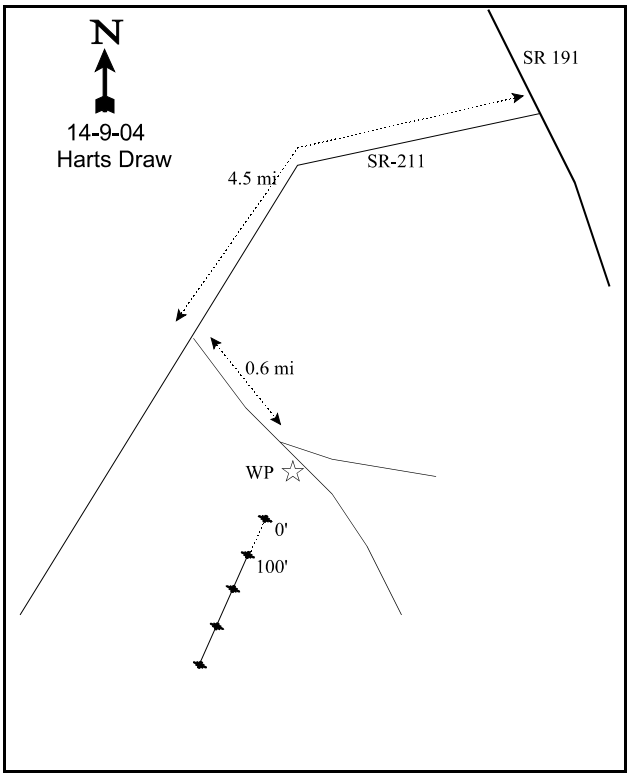
Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Photograph Gap

Diagrammatic Sketch

Township 32S , Range 23E , Section 5

GPS: NAD 27, UTM 12S 4208973 N, 638774 E

DISCUSSION

Harts Draw - Trend Study No. 14-9

The Harts Draw range trend study is located in what is considered an important critical deer wintering area. The range is an extensive Wyoming big sagebrush type below the pinyon-juniper slopes of Peters Point mesa. The elevation is 6,400 feet with a 5% slope and southwest aspect. In the valley below the ridge, sagebrush has been removed and the flat has been planted to crested wheatgrass. Cattle use the flat rather heavily, with sign of grazing less common further up the hill. As of 1999, the BLM allowed 200-300 cattle in fall and spring. Deer pellet groups indicate moderate to heavy use and are especially common along the numerous dirt roads. A pellet group transect located nearby at an elevation of 6,600 feet continually shows the highest use of any transect on the herd unit with a 10 year average ('87-'97) of 91deer days use/acre (225 ddu/ha). Pellet group data from the trend study site in 1999 estimated 85 deer days use/acre (210 ddu/ha) and 7 cow days use/acre (17 cdu/ha). In 2004, deer use increased to an estimated 104 deer days use/acre (256 ddu/ha). Cow use was estimated at 15 cow days use/acre (38 cdu/ha).

Soil on the site is relatively shallow with an effective rooting depth estimated at a little over 13 inches. A compacted layer exists at 13 to 14 inches. Texture of the soil is a sandy loam with a reddish color and a slightly alkaline pH (7.6). There is very little rock or pavement on the surface or within the profile. Much of the sandy soil is exposed on the site. Large unprotected patches have little protection from high intensity summer storms. Grasses provide good protection against erosion where they occur, but as the amount of herbaceous vegetative and litter cover is low and variable, there are microsite problems. There are a few small gullies in the area which appear to be healing. Erosion was rated as stable in 2004 due to the gentle terrain. In 2004, relative bare ground increased from 37 to 46%, while both vegetation and litter declined. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground decreased from 1:2.6 to 1:1.9 which is very poor.

The key browse species is Wyoming big sagebrush. Sagebrush cover was nearly 12% in 1994, but has declined to 9.5% in 1999 and 7% in 2004. Density was stable at about 3,400 plants/acre between 1986 and 1999, but declined by 37% in 2004 to 2,120 plants/acre. Percent decadency has always been relatively high, ranging from 33-55%, but in 2004 it increased to 92%. Decadent plants classified as dying increased to 80% in 2004 from only 14% in 1999. With increased deer use and lower sagebrush cover, plants showing heavy use increased in 2004 to 63%. Recruitment was poor with few seedling and young plants found during any sampling period. Drought and heavy use have been very detrimental to this population. However, drought has had the most effect on the sagebrush populations within the state.

Broom snakeweed occurred frequently in 1986 and appeared to be increasing at the expense of perennial grasses. Density actually declined by 1994, mostly due to drought conditions. It has since increased dramatically from 5,480 plants/acre in 1994 to 19,600 in 1999. In 2004, after drier conditions, it declined to only 2,140 plants/acre.

Blue grama, an increaser under spring cattle grazing because it is a warm season grass, is fairly abundant on the site and forms thick low mats on the side hill. It increased significantly from 1999 to 2004. In 1999, it was found in 29% of the quadrats with 3% cover. Then in 2004 it was found in 55% of the quadrats and cover was up to 13%. Other grasses include bottlebrush squirreltail, needle-and-thread, Indian ricegrass, and galleta. Bottlebrush squireltail declined significantly in 2004. Two annual grass, cheatgrass and sixweeks fescue, are also present. Each declined significantly in abundance in 2004. Cheatgrass was extremely abundant in 1999 when fall and spring precipitation conditions were very wet. Forbs are insignificant with a total cover of only about 1% in each reading.

1986 APPARENT TREND ASSESSMENT

Use on much of the sagebrush in the Harts Draw area is heavy enough to cause reduced vigor. Dry growing season conditions are also responsible for the poor vigor. Decadence, no recruitment, and a decline of sagebrush numbers on this important deer winter range indicate a downward trend. It is an especially serious condition if this trend is occurring over all the Harts Draw winter range. The bare soil, poor litter cover, and slight surface erosion combine to cause a downward soil trend.

1994 TREND ASSESSMENT

Soil trend for this site is stable but very poor condition. Percent bare soil has remained high since 1987, just over 50%. Litter cover is very low, with a cover value of less than 20%. The key browse species is Wyoming big sagebrush, which through the years has been heavily utilized. The slight increase in density is mostly reflective of the much larger sample size taken in 1994, but there are some important improvements in some other critical population parameters. There is a slight increase in the number of plants that are classified as mature healthy plants. Percent ecadency has decreased slightly. There is a slight improvement for Wyoming big sagebrush. Negatively, poor vigor increased from 16% to 32%. The increaser broom snakeweed has a population that has decreased by 57%. Trend for browse would be judged slightly down with the high percentage of the population showing poor vigor. This could turn around with normal weather patterns. The trend for grasses and forbs is difficult to determine. Since 1992, annual species are now inventoried along with the perennial species, therefore when one compares the nested frequency numbers from year to year and group to group (e.g., grass and forbs), comparisons should only include perennial species when comparing with older data sets. With this in mind, the trend would be stable. The forbs are showing a decrease, but the forbs are of little consequence on this site and only provide 4% of the total vegetative cover, while the grass stayed about the same and they contribute 44% of the total vegetative cover. The Desirable Components Index (see methods) rating is fair at 42. There are very few young sagebrush, decadence is high, and forbs are lacking.

TREND ASSESSMENT
soil - stable (3), but very poor conditon
browse - slightly down (2)
herbaceous understory - stable (3)
winter range condition (DC Index) - 42 (fair) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil is up due to an increase in litter cover and a decline in percent bare ground. Sum of nested frequency of grasses also increased dramatically due primarily to cheatgrass. Trend for browse is mixed. Trend for the key browse species is considered up slightly due to a steady population density since 1994, improved vigor, and a decline in percent decadence from 46% to 33%. Reproduction is poor however, with no seedlings and few young sampled. Trend for broom snakeweed, an undesirable increaser, is up due to an explosive increase in density since 1994 (5,480 to 19,600 plants/acre). Taking all of these factors into consideration, trend for browse is considered down slightly. Trend for the herbaceous understory is considered slightly down with cheatgrass increasing from a quadrat frequency of only 9% in 1994 to 97% in 1999. However, the perennial grass component has remained constant, it actually has an improved average nested frequency value of 10%. Cover for cheatgrass (undesirable winter annual) has also increased dramatically. In 1994 it accounted for only 1% of the grass cover with a cover value of less than 1%. This increased to 13% cover (62% of the total grass cover) by 1999. Blue grama, a mat forming warm season perennial and increaser under grazing pressure, decreased significantly in nested frequency since 1994. Bottlebrush squirreltail increased significantly in frequency. Forbs are rare and unimportant on this site. All forbs combined have produced only 1% cove since 1994. The DCI decreased to poor to fair (26) due to a

decline in sagebrush cover and the increase in cheatgrass, which negatively impacts the rating.

TREND ASSESSMENT
soil - up (5)
browse - slightly down (2)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 26 (poor to fair) Wyoming big sagebrush type

2004 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground decreased from 1:2.6 to 1:1.9. Relative bare ground is up to 46%. The decline in cheatgrass is good for other species, but has left more bare ground. The browse trend is also down. Wyoming big sagebrush density declined by 37%. Cover is lower and decadency has increased to 92% (with 80% of these classified as dying), while 82% of the population show signs of poor vigor. With less sagebrush forage and more deer use, more plants are showing signs of heavy use. The combination of drought and heavy use will continue to be very detrimental to this population. Cheatgrass has also been very damaging to sagebrush recruitment, which is currently very low. On a positive note, broom snakeweed declined, which is reflective of precipitation patterns. The trend for the herbaceous understory is slightly down. Sum of nested frequency for perennial grasses declined. This decline is mostly from cool season grasses like bottlebrush squirreltail. The warm season grass blue grama is taking over as cool season grasses are declining. This may be due to spring grazing and summer precipitation patterns that are favorable to blue grama. Cheatgrass declined significantly, but this is due to precipitation. It should return when precipitation is favorable. Forbs continue to be insignificant on this site. The DCI score remained at poor to fair (29). Perennial grass increased and cheatgrass was very low, but sagebrush cover was lower and the extreme high decadence negatively impacted the rating.

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 29 (poor to fair) Wyoming big sagebrush type

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

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	-	6	4	-	.03	.06	-
G	Bouteloua gracilis	$_{b}$165	$_{b}$130	$_{a}$77	$_{b}$166	5.41	2.97	12.73
G	Bromus tectorum (a)	-	$_{a}$16	$_{b}$344	$_{a}$19	.07	12.91	.52
G	Hilaria jamesii	$_{a}$1	$_{a}$5	$_{b}$39	$_{a}$-	.04	1.52	-
G	Oryzopsis hymenoides	$_{a}$-	$_{b}$15	$_{b}$20	$_{b}$9	.39	.27	1.03
G	Sitanion hystrix	$_{a}$25	$_{b}$123	$_{c}$153	$_{a}$46	4.70	2.62	.93
G	Sporobolus cryptandrus	-	-	-	2	-	-	.00
G	Stipa comata	$_{b}$81	$_{a}$-	$_{a}$4	$_{a}$4	-	.04	.03

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Vulpia octoflora (a)	$_{a}$-	$_{d}$240	$_{c}$99	$_{b}$11	.55	.33	.02
Total for Annual Grasses		0	256	443	30	0.62	13.24	0.54
Total for Perennial Grasses		272	279	297	227	10.59	7.50	14.73
Total for Grasses		272	535	740	257	11.21	20.75	15.28
F	Arnica mollis	7	-	-	-	-	-	-
F	Astragalus mollissimus	2	-	5	-	-	.06	-
F	Chenopodium album (a)	-	-	-	3	-	-	.01
F	Chenopodium spp. (a)	-	2	-	-	.00	-	-
F	Cryptantha spp.	$_{a}$-	$_{b}$12	$_{b}$20	$_{a}$-	.03	.23	-
F	Descurainia pinnata (a)	-	$_{b}$38	$_{a}$1	$_{a}$10	.09	.00	.21
F	Eriogonum cernuum (a)	-	1	-	-	.00	-	-
F	Erigeron spp.	9	-	-	-	-	-	-
F	Erigeron pumilus	$_{c}$44	$_{a}$1	$_{b}$17	$_{a}$1	.03	.31	.01
F	Gilia hutchinifolia (a)	-	$_{a}$20	$_{a}$8	$_{b}$34	.05	.02	.30
F	Lappula occidentalis (a)	-	$_{a}$-	$_{a}$1	$_{b}$17	-	.00	.27
F	Leucelene ericoides	-	10	-	7	.33	-	.09
F	Lepidium spp. (a)	-	$_{b}$20	$_{a}$7	$_{a}$3	.42	.23	.07
F	Orobanche fasciculata	-	-	4	-	-	.01	-
F	Phlox longifolia	-	-	-	3	-	-	.00
F	Ranunculus testiculatus (a)	-	-	-	1	-	-	.00
F	Sclerocactus	2	-	-	-	-	-	-
F	Senecio multilobatus	-	-	-	4	-	-	.00
F	Sphaeralcea coccinea	$_{b}$52	$_{a}$14	$_{a}$13	$_{a}$6	.03	.05	.07
F	Unknown forb-perennial	-	-	-	1	-	-	.03
Total for Annual Forbs		0	81	17	68	0.58	0.26	0.87
Total for Perennial Forbs		116	37	59	22	0.42	0.67	0.21
Total for Forbs		116	118	76	90	1.00	0.94	1.09

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

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

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

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

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

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

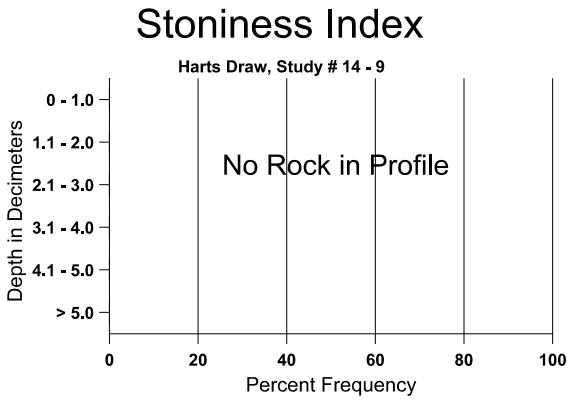
Species	Average leader growth (in)
	'04
Artemisia tridentata wyomingensis	2.4

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
13.4	66.3 (10.5)	7.6	72.9	12.6	14.6	1.3	8.8	51.2	0.4



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

Type	Quadrat Frequency			Days use per acre (ha)	
	'94	'99	'04	'99	'04
Sheep	-	1	-	-	-
Rabbit	14	53	9	-	-
Elk	8	1	-	-	-
Deer	36	40	41	84 (207)	104 (256)
Cattle	-	1	5	7 (17)	15 (38)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**3332**	-	66	1600	1666	-	46	14	50	5	16	20/19
94	**3580**	40	80	1840	1660	780	60	9	46	25	32	20/33
99	**3340**	-	20	2220	1100	1560	53	23	33	14	14	23/31
04	**2120**	40	40	140	1940	1900	32	63	92	80	82	23/34

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus stenophyllus												
86	**199**	-	66	133	-	-	0	0	0	-	33	9/11
94	**480**	-	40	440	-	-	0	0	0	-	0	10/18
99	**300**	20	60	160	80	-	0	0	27	-	0	12/16
04	**400**	-	-	340	60	-	0	0	15	10	10	13/23
Gutierrezia sarothrae												
86	**12866**	3533	3733	8533	600	-	.51	0	5	.15	.51	8/6
94	**5480**	260	580	4800	100	180	1	0	2	2	2	5/6
99	**19600**	80	3260	15980	360	920	0	0	2	2	2	7/8
04	**2140**	-	40	2060	40	80	0	0	2	.93	2	8/11
Opuntia spp.												
86	**133**	-	-	133	-	-	0	0	0	-	50	3/6
94	**500**	160	240	260	-	-	0	0	0	-	0	2/10
99	**240**	120	120	120	-	-	0	0	0	-	17	3/7
04	**100**	40	40	40	20	-	0	0	20	20	20	2/4
Sclerocactus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	3/9
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 14-10-04

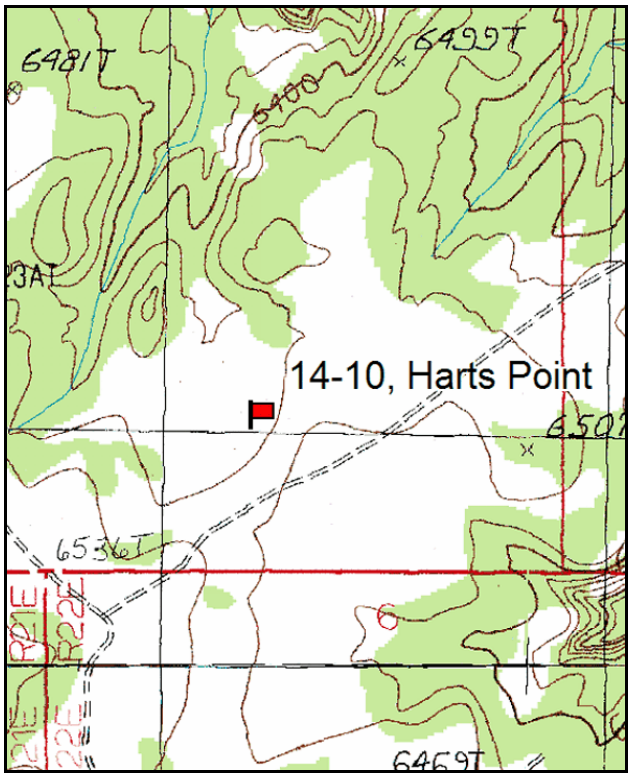
Study site name: Harts Point . Vegetation type: Wyoming Big Sagebrush .

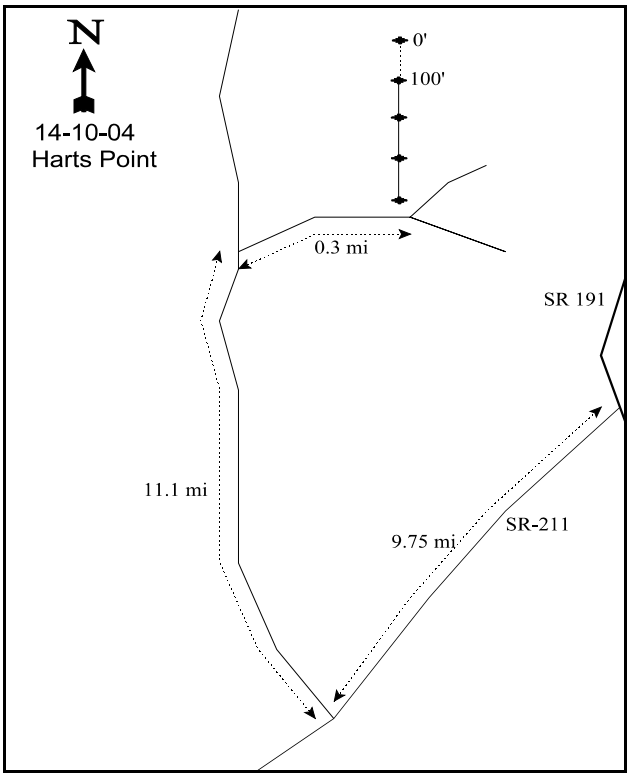
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

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





Map Name: Harts Point North

Diagrammatic Sketch

Township 30S , Range 22E , Section 31

GPS: NAD 27, UTM 12S 4221003 N, 627194 E

DISCUSSION

Harts Point - Trend Study No. 14-10

The Harts Point transect is located on a sagebrush park surrounded by slickrock domes and Juniper-covered hills. It is an arid site with an elevation of 6,500 feet, a slope of 3-5%, and a western aspect. A stock pond has been constructed in the area where a small drainage flows between two sandstone bluffs. The pond collects seasonal water and could provide water when cattle (250 head) are present in March and April. Grazing pressure appears to be fairly heavy on this BLM administered land and is part of the Harts Point allotment. Pellet group data from 1999 estimate 48 deer days use/acre (119 ddu/ha), 1 elk days use/acre (3 edu/ha), and 22 cow days use/acre (54 cdu/ha). In 2004, use was lower, with 32 deer days use/acre (79 ddu/ha) and 7 cows days use/acre (16 cdu/ha). Another principal use for this area is oil and gas exploration and extraction. A new pipeline was constructed across Harts Point in 1986.

Although there are many raised areas of exposed sandstone, the soil appears to be fairly deep with an estimated effective rooting depth of 22 inches. The dry soil is loose with a sandy loam texture and a slightly alkaline pH (7.5). Phosphorus and potassium occur in low amounts at 4.9 ppm and 38.4 ppm respectively. Phosphorus below 10 ppm and potassium below levels 70 ppm may negatively effect normal plant growth and development. There is no rock on the surface or within the soil profile. The surface was marked by rain and small erosion channels in the past, but current erosion appears minimal. There may be some wind erosion occurring and there is some soil pedestalling around the bunch grasses. When cover is used on a relative scale, bare ground has been stable at between 45 and 50%. It was only slightly higher in 2004 than it was in 1999. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) has remained stable at about 1:2.5.

Wyoming big sagebrush is the key species on this winter range. The sagebrush appears to have some of the characteristics of both mountain big sagebrush and Wyoming big sagebrush and is likely a hybrid between the two subspecies. Use varies greatly between individual plants, indicating some plants have more characteristics of the more palatable mountain big sagebrush. The population has remained at a fairly stable density of about 3,500 plants/acre since 1986, the majority of which are mature. Utilization was heavy in 1986, but more moderate ever since. Percent decadence has been low, but increased to 42% in 2004 after only being 11% in 1999. Vigor was poor in 1994 (a dry year), but improved in 1999. Although percent decadency was high in 2004, only 18% of the population showed signs of poor vigor. The number of seedlings encountered was very high in 1986, but has been very low in every subsequent reading. In 1999, 12% of the population was made up of young plants, but in 2004 only 3% were considered young.

Winterfat is scattered throughout the area at relatively low densities (about 200 plants/acre). It appears that these have been heavily hedged. The few juniper in the area do not appear to show any signs of increasing into the sagebrush flat.

Seven perennial grasses have been sampled on this site. Blue grama has declined slowly since 1986, but is still the most prominent perennial grass. Needle-and-thread has increased significantly since 1999, but it still only contributes to about 1% cover in 2004. Sand dropseed, a warm season grass, increased significantly between 1999 and 2004 and had nearly 2% cover in 2004. Cheatgrass abundance has been reflective of precipitation patterns and 1999 was a very wet year and cheatgrass was very abundant. In 1994 and 2004 which were drier, cheatgrass was much lower in abundance each of those years. Forbs are quite sparse on this site with a total cover value of less than one percent in 1994. Forb cover increased to 2% in 1999 due to a significant increase in frequency of lobeleaf groundsel. In 2004, lobeleaf groundsel significantly increased again to nearly 6% cover and made up 96% of the forb cover. There are also numerous annual species, such as gilia and wooly plantain.

1986 APPARENT TREND ASSESSMENT

Vegetative trend, based on form, vigor, and age class structure of the key browse species Wyoming big sagebrush, is basically stable. There is a fair balance between all parameters. Continued heavy grazing could led to an increase in cheatgrass on the site, although the blue grama is certainly healthy and vigorous. Continued heavy hedging could be detrimental to the sagebrush population in conjunction with the extended drought. The soil trend is stable to slightly down because of the moderate but normal erosion. An increase in vegetation and especially in litter cover would be positive.

1994 TREND ASSESSMENT

This site is very similar in most aspects to Harts Draw (14-9); high amounts of bare ground and a significant loss of litter cover, all leading to a slightly downward trend for soil. The Wyoming big sagebrush has shown some improvements in those plants classified as heavily hedged, from 64% down to only 9%. Percent decadence is up slightly and overall vigor of the sagebrush community has declined with 57% now classified as showing poor vigor. Biotic potential has decreased and the percentage of the population that are young have decreased to 6%. This leads to a trend that is slightly downward in association with the continuing drought. The herbaceous understory trend is stable, with the nested frequency value for perennial grasses staying about the same and the nested frequency value for perennial forbs going down, but all the forbs combined make up less than 1% of the vegetative cover. The Desirable Components Index (see methods) rating is good at 49. The amount of young sagebrush plants is low, but decadence is low also. Perennial grasses are abundant, but forbs are lacking.

TREND ASSESSMENT
soil - down slightly (2)
browse - down slightly (2)
herbaceous understory - stable (3)
winter range condition (DC Index) - 49 (good) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil appears stable with relative percent cover of litter and bare ground remaining similar to 1994 estimates. Erosion is not currently a problem on this site. Trend for the key species, Wyoming big sagebrush is considered improved. Density of sagebrush has remained stable, but percent decadence has declined from 26% in 1994 to 11% in 1999. Vigor has also improved dramatically. In 1994, 57% of the sagebrush sampled showed poor vigor. Currently only 4% of the population was classified with poor vigor. Utilization is mostly light to moderate. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses has shown a notable decrease, while frequency of perennial forbs has increased slightly. In addition, cheatgrass has increased significantly in frequency and now provides 33% of the grass cover. Overall, the herbaceous trend is considered slightly down. The DCI score is fair to good at 47, perennial grasses are lower, but forbs increased and decadence and proportion of young shrubs have improved to keep the score about equal to 1994.

TREND ASSESSMENT
soil - stable (3)
browse - up slightly (4)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 47 (fair to good) Wyoming big sagebrush type

2004 TREND ASSESSMENT

The soil trend is stable as relative percent cover for litter and bare ground has changed very little. The trend for browse is slightly down. Wyoming big sagebrush density has remained stable, but decadency and poor

vigor have increased. Sagebrush is in better condition on this site, than on many of the other Wyoming big sagebrush studies within the region that have seen large amounts of die-off. This site receives less use than other sites that are in worse condition. Harts Draw is at a similar but slightly lower elevation, and has much heavier deer use. These two sites had very similar sagebrush densities in 1999, but Harts Draw has decreased by 37%, while Harts Point only had a 4% decrease. The herbaceous understory trend is slightly up. Cheatgrass abundance has declined significantly, while perennial grasses have remained stable. Lobeleaf groundsel is the only significant forb, but has significantly increased in abundance The DCI increased to 50, which is rated as good. Sagebrush decadence and the proportion of young plants worsened, but the herbaceous understory increased.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - up slightly (4)
winter range condition (DC Index) - 50 (good) Wyoming big sagebrush type

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

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Bouteloua gracilis	$_{c}$234	$_{b}$168	$_{ab}$159	$_{a}$127	8.36	4.55	4.97
G	Bromus tectorum (a)	-	$_{b}$75	$_{c}$270	$_{a}$33	2.93	4.39	.09
G	Hilaria jamesii	$_{ab}$31	$_{ab}$45	$_{b}$45	$_{a}$17	.70	.42	.26
G	Oryzopsis hymenoides	$_{a}$7	$_{b}$27	$_{c}$64	$_{a}$9	.09	.53	.18
G	Poa secunda	-	-	1	1	-	.00	.00
G	Sitanion hystrix	$_{b}$27	$_{b}$30	$_{ab}$19	$_{a}$7	.16	.11	.04
G	Sporobolus cryptandrus	$_{a}$-	$_{b}$47	$_{b}$20	$_{c}$91	.78	.15	1.73
G	Stipa comata	$_{c}$110	$_{bc}$88	$_{a}$17	$_{b}$56	1.00	.23	.80
G	Vulpia octoflora (a)	-	$_{b}$307	$_{b}$299	$_{a}$131	.88	3.07	1.07
Total for Annual Grasses		0	382	569	164	3.81	7.46	1.17
Total for Perennial Grasses		409	405	325	308	11.12	6.02	7.99
Total for Grasses		409	787	894	472	14.93	13.48	9.16
F	Calochortus nuttallii	6	-	3	2	-	.00	.00
F	Cryptantha spp.	-	6	-	-	.02	-	-
F	Cymopterus spp.	-	3	-	-	.15	-	-
F	Delphinium nuttallianum	$_{a}$-	$_{a}$-	$_{a}$1	$_{b}$7	-	.00	.02
F	Draba reptans (a)	-	7	3	-	.02	.01	-
F	Erigeron flagellaris	-	1	3	-	.00	.00	-
F	Erigeron pumilus	$_{b}$77	$_{a}$1	$_{a}$3	$_{a}$-	.01	.18	-
F	Gilia hutchinifolia (a)	-	$_{ab}$42	$_{b}$70	$_{a}$17	.09	.87	.06
F	Lappula occidentalis (a)	-	1	2	-	.00	.00	-
F	Machaeranthera canescens	1	-	-	-	-	-	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
F	Oenothera spp.	-	-	-	2	-	-	.00
F	Plantago patagonica (a)	-	$_{b}$147	$_{b}$160	$_{a}$49	.30	1.10	.19
F	Ranunculus testiculatus (a)	-	-	3	-	-	.03	-
F	Senecio multilobatus	$_{a}$9	$_{ab}$42	$_{b}$61	$_{c}$137	.16	2.25	5.80
Total for Annual Forbs		0	197	238	66	0.42	2.02	0.25
Total for Perennial Forbs		93	53	71	148	0.35	2.45	5.82
Total for Forbs		93	250	309	214	0.77	4.47	6.08

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

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

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

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

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

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

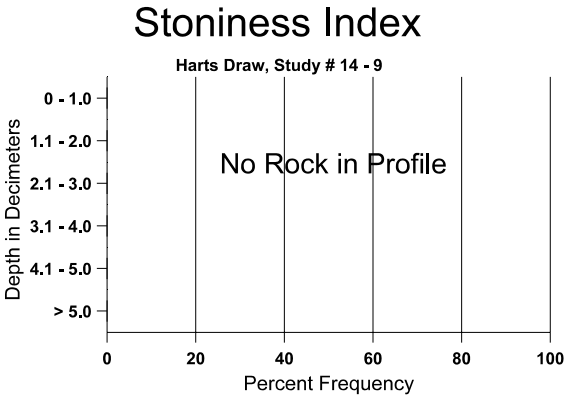
Species	Average leader growth (in) '04
Artemisia tridentata wyomingensis	4.2

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

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

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

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
22.4	61.3 (17.7)	7.5	64.9	18.6	16.6	1.0	4.9	38.4	0.4



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

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

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

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**3732**	1000	733	2133	866	-	18	64	23	2	9	17/22
94	**3560**	20	220	2400	940	400	13	9	26	10	60	37/49
99	**3580**	-	420	2760	400	660	30	11	11	4	4	25/36
04	**3420**	40	100	1900	1420	840	43	0	42	18	18	26/40
Ceratoides lanata												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**220**	-	-	160	60	-	0	0	27	9	9	7/21
99	**180**	-	-	180	-	-	0	11	0	-	0	6/8
04	**100**	-	-	100	-	-	0	100	0	-	0	8/8
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**40**	-	-	40	-	-	0	0	-	-	0	8/10
99	**20**	-	-	20	-	-	0	0	-	-	0	8/8
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Juniperus osteosperma												
86	**66**	-	-	66	-	-	0	0	-	-	0	69/70
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**60**	20	-	40	20	-	0	0	33	33	33	8/9
99	**60**	-	-	60	-	-	0	0	0	-	0	4/9
04	**20**	-	-	20	-	-	0	0	0	-	0	6/9

Trend Study 14-11-04

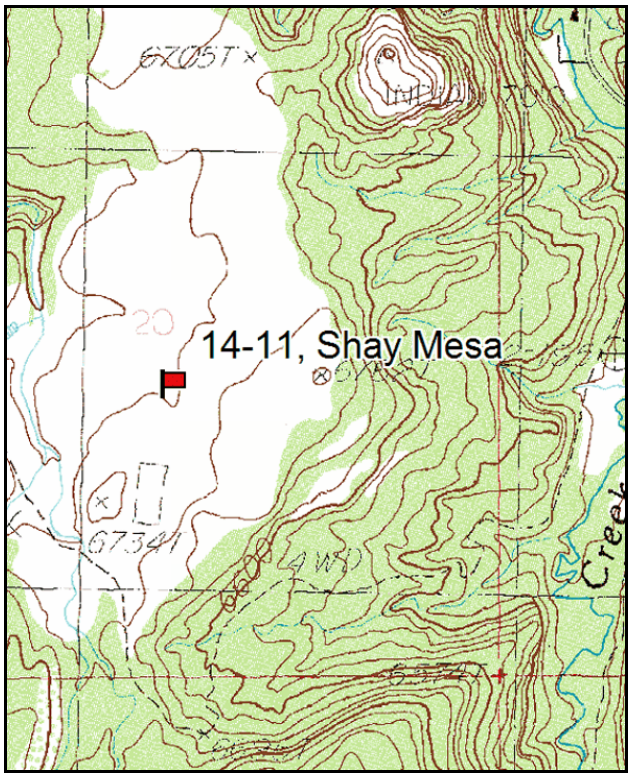
Study site name: Shay Mesa . Vegetation type: Chained, Seeded P-J .

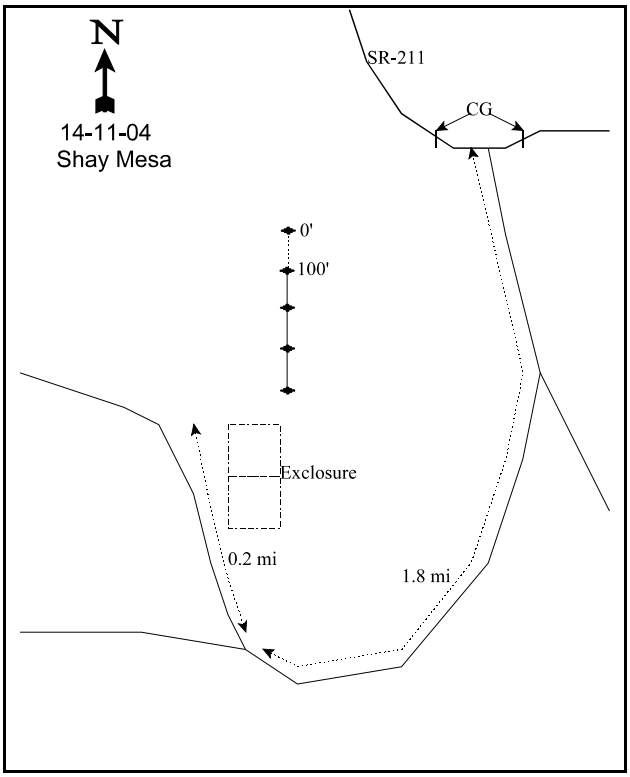
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction of SR-l91 and 211 (about 14 miles north af Monticello), turn west on the road towards Canyonlands National Park and Newspaper Rock. Go approximately 13 miles on this paved road, the last two miles dropping into the canyon of a tributary to Indian Creek. Cross a cattleguard and turn left just before another cattleguard and 0.1 miles east of Newspaper Rock. Turn left on this road, cross Indian Creek and go 1.8 miles up onto the mesa. Look for a faint road going up to the right through an old pinyon-juniper chaining to an exclosure. Follow this road 0.2 miles to the north end of the exclosure. The end of the baseline is located 100 feet north of the northeast corner of the exclosure. The 0 foot end of the baseline is 400 feet north and the stake is tagged #7877.





Map Name: Shay Mountain

Diagrammatic Sketch

Township 32S , Range 22E , Section 20

GPS: NAD 27, UTM 12S 4204431 N, 629186 E

DISCUSSION

Shay Mesa - Trend Study No. 14-11

Located on Shay Mesa, this study samples a mixed pinyon-juniper woodland with openings of sagebrush and grass which is established on an old chaining. This large chaining and seeding project was done in the mid-1960's on the high mesa foothills north of the Abajo Mountains. The seed mixture included crested wheatgrass, pubescent wheatgrass, alfalfa, and a ground application of four-wing saltbush, bitterbrush, and cliffrose at selected locations. There was little evidence of the seeding on this particular study site, as all species encountered during all readings were native. The trend study was placed just outside a 1958 BLM two-way exclosure. The study site has an eastern aspect and an elevation of about 6,700 feet, 700 feet above Indian Creek, which is a perennial stream. Shay Mesa is grazed by 200-300 cattle in fall or spring. Judging by sign and use on grasses in 1986, cattle use was moderate to heavy that year. Pellet group data from mid-June of 1999 estimated 26 cow use days/acre (64 cdu/ha). Nearly all of the pats sampled appeared to be from the last season. Only 1 deer day use/acre (2 ddu/ha) was estimated. Rabbit pellets were very numerous. Pellet group data from 2004 showed light cattle use at 8 days use/acre (20cdu/ha). Only 2 deer days use/acre was estimated but elk had utilized the site during the winter and early spring at an estimated 13 days use/acre (31 edu/ha).

Exposed bare soil is moderately abundant and in places dominated by pinyon, there is much less plant cover and consequently a higher amount of exposed soil. This condition leads to a substantial amount of soil loss from these areas. The light red, fine-textured sandy clay loam soil has an effective rooting depth estimated at about 16 inches. It is quite susceptible to erosion. The soil has a neutral pH (7.3), low organic matter content and phosphorus. There is one large gully about 20 yards northeast of the baseline which was active in 1986, but appeared to be healing as of 1999. There were also many erosion channels and signs of sheet erosion found throughout the pinyon-juniper understory in 1986. There is still some signs of localized erosion, however it is not severe due to the gentle slope (about 2-5%). An erosion condition class assessment rated erosion as slight in 2004.

The dominant overstory is pinyon with a few juniper. Pinyon and juniper provide good cover for wildlife but suppress understory grasses, forbs and shrubs. Point-center quarter data from 2004 estimated 34 juniper and 79 pinyon trees/acre. Average diameter of juniper was estimated at 8.5 inches, while pinyon was estimated at just over 5 inches. About 50% of the juniper and 61% of the pinyon trees were greater than 12 feet in height.

The key browse species is mountain big sagebrush which remained at a stable density between 1986 and 1999 at an estimated population of about 2,200 plants/acre. The stand has become increasingly mature through time. In 1986 only 21% of the population was mature and in 1999, 85% were classified as mature. Few decadent plants were sampled on the site between 1986 and 1999, but in 2004, about a third of the population was classified as decadent. General browsing use on the sagebrush has been moderate with some classified as heavy. Annual leader growth was excellent in 2004, averaging just over 4 inches.

There were some white-stemmed rubber rabbitbrush sampled in 1986, but none were encountered in 1994, 1999, or 2004. These rabbitbrush were apparently highly palatable and were heavily hedged during the 1986 reading. Other palatable browse species in the area include four-wing saltbush (warm season species), slender buckwheat, and winterfat (warm season species). Broom snakeweed, a small increaser subshrub, is also common.

Grasses are fairly abundant although they show the effects of grazing, especially when compared to the wildlife exclosure. Nested frequency for perennial grasses has declined considerable since 1986. Cheatgrass an annual, increased significantly in frequency between 1994 and 1999. It provided 39% of the total grass cover in 1999, but declined considerably in 2004 due to drought conditions. The most abundant perennial grasses include blue grama and needle-and-thread. Several typical pinyon-juniper associated forb species are present, although overall density and usefulness is limited. The cover value for all the forbs combined was only a little over 1% in 1994 and 2004. The most common perennial species is scarlet globemallow.

1986 APPARENT TREND ASSESSMENT

Currently there appears to be a good balance between sagebrush and grass on the majority of the area. It is interesting to note the apparent contrasts presented by the exclosure in terms of plant composition and the effects of grazing and browsing. Sometimes it is difficult to determine a vegetative trend based on only one key species, mountain big sagebrush. There are signs to indicate it was once more abundant, but there are also a good number of young plants. The lack of seedlings could easily be attributed to unfavorable conditions the last few years and with current seed production, it could change anytime. The one definite downward indicator is the increasing number and size of pinyon, although this invasion is occurring slowly. Overall vegetative trend is stable if current management practices are followed and deer numbers don't increase substantially on the winter range. An increase in grazing pressure could be detrimental to the sagebrush, but the fall and/or spring use by livestock can even be more detrimental, especially during a prolonged drought. The soil trend is related directly to the amount of ground cover and trends in that area also appear stable.

1994 TREND ASSESSMENT

The soil trend is down at this time because of the loss of almost half of the litter cover and percent bare ground has risen from 21% to 40%. The browse trend would be considered stable for most measured characteristics. Mountain big sagebrush is stable except for the increase in individuals that are considered to have poor vigor, which has risen to 17%. For the herbaceous understory, the perennial grasses have experienced a sharp decrease in their nested frequency values. Perennial forbs are fairly stable, but even when all are combined, they contribute only about 1½% cover. Trend for the herbaceous understory is down. The Desirable Components Index (see methods) rating is poor at 44 due mostly to a lack of preferred browse cover. Forbs are also lacking.

TREND ASSESSMENT
soil - down (1)
browse - stable (3)
herbaceous understory - down (1)
winter range condition (DC Index) - 44 (poor) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soil appears stable due to similar relative percent ground cover characteristics compared to 1994. Trend for browse appears stable for now, but the lack of reproduction and young recruitment for the key species, mountain big sagebrush, is currently low. Utilization is higher than 1994, however vigor has improved and percent decadency is relatively low. The small scattered population of fourwing saltbush appears to be about gone. It's density has declined from 200 plants/acre in 1986, to 120 in 1994, and only 40 in 1999. Utilization is heavy and vigor poor. Trend for the herbaceous understory is fairly stable for perennial species. However cheatgrass, an annual, has increased significantly in nested frequency since 1994. Cover has also increased five-fold. The DCI score decreased slightly due to a lower proportion of young sagebrush plants and an increase in the amount of cheatgrass. Preferred browse cover was higher.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 41 (poor) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

Trend for soil is down due to a 30% increase in percent cover of bare ground and a 27% decline in litter cover. Vegetation cover also declined 18% and herbaceous cover declined 46% since 1999. These trends have been

caused by the extremely dry conditions of the past few years. Spring precipitation (April - June) was only 14% of normal in 2002 and 30% of normal in 2003. Some erosion is occurring but it is not severe due to the level terrain. Trend for the key browse species, mountain big sagebrush, is down slightly. The population has increased 30% since 1999 and become more mature. However, now 27% of the stand is classified as decadent and about 18% of the population were classified as dying. Utilization is moderate to heavy but average vigor is good and annual leader growth was excellent, averaging over 4 inches. No seedlings were sampled and young plants currently account for 4% of the total population. It appears that the population will decline slightly in the future. A return to normal precipitation patterns will help reverse this trend. Trend for the herbaceous understory is also down slightly due to a decline in the sum of nested frequency of perennial grasses and forbs. The dominant perennial grass, blue grama, declined slightly in nested frequency and remained stable in percent cover. Other common perennial grasses, western wheatgrass and needle-and-thread, declined significantly in nested frequency. Cheatgrass, an annual, had a cover value of over 5% in 1999 and had a quadrat frequency of 71%. Drought conditions for the past few years during the fall and spring periods have caused a dramatic decline. Quadrat frequency of cheatgrass dropped from 71% to 1% and cover fell from over 5% to less than one-tenth of 1%. The decline in cool season annual and perennial grasses combined with the stable trend in the warm season blue grama is consistent with the precipitation trends of dry spring periods with more normal summer precipitation. Forbs remain fairly diverse but are not abundant. The only common perennial species remains scarlet globemallow. The nearby livestock exclosure appears to contain more cheatgrass than outside the exclosure. The sagebrush in the livestock exclosure shows little use. The total exclosure appears to have a higher density and canopy cover of sagebrush. Seedheads are more abundant but annual leader growth is less than outside. The DCI has remained stable. Percent decadence and proportion of young sagebrush in the population worsened, although cheatgrass was not as abundant.

TREND ASSESSMENT
soil - down (1)
browse - down slightly (2)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 40 (poor) Mountain big sagebrush/chaining type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 11

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Agropyron smithii	$_{c}$204	$_{b}$69	$_{b}$72	$_{a}$38	.42	.46	.21
G	Bouteloua gracilis	168	154	163	150	3.05	5.13	5.67
G	Bromus tectorum (a)	-	$_{b}$49	$_{c}$222	$_{a}$2	.18	5.43	.03
G	Oryzopsis hymenoides	-	4	10	3	.03	.02	.03
G	Poa fendleriana	1	1	-	-	.00	-	-
G	Sitanion hystrix	2	12	19	12	.03	.09	.16
G	Sporobolus cryptandrus	$_{b}$53	$_{a}$3	$_{a}$7	$_{a}$9	.00	.01	.07
G	Stipa comata	$_{d}$280	$_{c}$178	$_{b}$117	$_{a}$60	3.65	2.50	1.19
G	Vulpia octoflora (a)	-	$_{b}$121	$_{a}$39	$_{a}$12	.40	.17	.03
Total for Annual Grasses		0	170	261	14	0.58	5.60	0.06
Total for Perennial Grasses		708	421	388	272	7.20	8.24	7.35
Total for Grasses		708	591	649	286	7.79	13.85	7.41

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
F	Astragalus mollissimus	$_{ab}$11	$_{b}$15	$_{a}$1	$_{a}$-	.09	.03	-
F	Calochortus nuttallii	2	-	4	-	-	.03	-
F	Chaenactis douglasii	-	3	-	-	.01	-	-
F	Descurainia pinnata (a)	-	16	16	6	.04	.04	.01
F	Draba spp. (a)	-	$_{b}$65	$_{a}$-	$_{a}$-	.14	-	-
F	Eriogonum cernuum (a)	3	5	4	-	.01	.01	-
F	Erigeron pumilus	$_{b}$44	$_{a}$-	$_{a}$9	$_{a}$-	-	.02	-
F	Gilia spp. (a)	-	4	-	4	.01	-	.01
F	Holosteum umbellatum (a)	-	3	1	-	.01	.00	-
F	Lappula occidentalis (a)	-	$_{b}$18	$_{a}$4	$_{a}$4	.05	.01	.15
F	Penstemon spp.	-	3	3	-	.03	.00	-
F	Phlox hoodii	-	19	22	16	.26	.27	.06
F	Phlox longifolia	-	8	16	10	.02	.06	.09
F	Plantago patagonica (a)	-	$_{ab}$99	$_{a}$74	$_{b}$100	.25	.24	.31
F	Ranunculus testiculatus (a)	-	$_{b}$16	$_{c}$36	$_{a}$-	.03	.14	-
F	Senecio multilobatus	3	-	1	-	-	.03	-
F	Sphaeralcea coccinea	$_{ab}$118	$_{ab}$126	$_{b}$139	$_{a}$98	.60	1.16	.56
F	Tragopogon dubius	-	1	-	-	.00	-	-
Total for Annual Forbs		3	226	135	114	0.56	0.45	0.48
Total for Perennial Forbs		178	175	195	124	1.03	1.62	0.71
Total for Forbs		181	401	330	238	1.59	2.07	1.20

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

BROWSE TRENDS --
Management unit 14 , Study no: 11

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemisia tridentata vaseyana	44	40	56	3.49	5.55	10.04
B	Atriplex canescens	3	2	2	.03	.03	.30
B	Ceratoides lanata	0	1	1	-	-	-
B	Chrysothamnus nauseosus	0	0	4	-	-	-
B	Echinocereus spp.	0	5	2	.00	.01	.01
B	Eriogonum microthecum	14	18	19	.12	.15	.10
B	Gutierrezia sarothrae	18	62	19	.11	1.12	.03
B	Juniperus osteosperma	-	-	-	.76	1.88	-
B	Leptodactylon pungens	0	1	0	-	-	-
B	Opuntia spp.	21	26	30	.16	.55	.41
B	Pediocactus simpsonii	0	0	1	-	-	-
B	Pinus edulis	0	8	3	9.51	9.40	9.44
B	Yucca spp.	-	-	-	-	.03	-
Total for Browse		100	163	137	14.20	18.76	20.34

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 11

Species	Percent Cover	
	'99	'04
Artemisia tridentata vaseyana	-	13.81
Eriogonum microthecum	-	.05
Gutierrezia sarothrae	-	.08
Juniperus osteosperma	3.59	-
Opuntia spp.	-	3.56
Pinus edulis	12.80	12.93

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 11

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

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 11

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	30	34
Pinus edulis	86	79

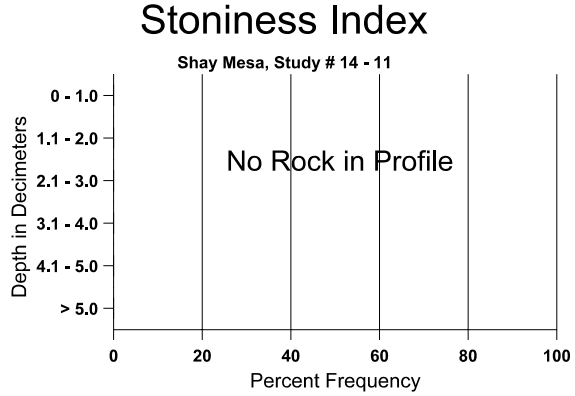
Average diameter (in)	
'99	'04
5.4	8.5
4.8	5.1

BASIC COVER --
Management unit 14 , Study no: 11

Cover Type	Average Cover %			
	'86	'94	'99	'04
Vegetation	14.00	23.29	33.92	27.69
Rock	0	.01	0	0
Pavement	0	.01	.00	.01
Litter	61.25	36.06	40.02	29.13
Cryptogams	4.25	1.69	5.40	3.53
Bare Ground	20.50	39.61	41.13	59.37

SOIL ANALYSIS DATA --
Management unit 14, Study no: 11, Study Name: Shay Mesa

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.8	69.3 (13.5)	7.3	58.9	18.6	22.6	1.5	7.9	83.2	0.6



PELLET GROUP DATA --
Management unit 14 , Study no: 11

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	62	60	56
Elk	-	-	20
Deer	9	3	1
Cattle	3	11	3

Days use per acre (ha)	
'99	'04
-	-
-	13 (31)
1 (2)	2 (5)
26 (64)	8 (20)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 11

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
86	**2265**	-	1733	466	66	-	76	9	3	-	6	23/25
94	**2100**	20	420	1600	80	180	0	0	4	-	18	18/22
99	**2060**	20	160	1780	120	220	49	17	6	-	.97	22/30
04	**2960**	-	120	2040	800	600	52	16	27	18	18	16/25
Atriplex canescens												
86	**200**	-	-	200	-	-	67	33	0	-	0	5/3
94	**120**	20	60	20	40	-	0	0	33	33	33	20/30
99	**40**	-	-	20	20	20	0	50	50	50	50	23/21
04	**40**	-	-	40	-	-	0	0	0	-	0	16/19
Ceratoides lanata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	11/11
99	**20**	-	-	20	-	-	0	100	-	-	0	11/12
04	**20**	-	-	20	-	-	0	100	-	-	0	12/14
Chrysothamnus nauseosus												
86	**3199**	-	733	2466	-	-	4	96	-	-	0	15/16
94	**0**	-	-	-	-	-	0	0	-	-	0	9/39
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**80**	-	-	80	-	-	0	0	-	-	0	-/-
Echinocereus spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	-	60	40	-	-	0	0	-	-	0	3/6
04	**80**	-	80	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	26/28
99	**0**	-	-	-	-	-	0	0	-	-	0	20/30
04	**0**	-	-	-	-	-	0	0	-	-	0	15/24
Eriogonum microthecum												
86	**533**	-	200	333	-	-	0	0	0	-	0	11/6
94	**560**	60	260	240	60	40	0	0	11	-	0	3/4
99	**1020**	40	240	740	40	-	18	51	4	-	0	6/5
04	**620**	-	20	600	-	-	0	0	0	-	0	4/3
Gutierrezia sarothrae												
86	**8266**	-	1400	6600	266	-	0	0	3	-	0	7/5
94	**640**	-	120	460	60	-	0	0	9	-	0	6/6
99	**4120**	60	600	3440	80	80	0	0	2	.97	.97	7/7
04	**700**	40	20	680	-	-	0	0	0	-	0	6/7
Leptodactylon pungens												
86	**999**	-	-	933	66	-	0	0	7	-	0	1/3
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**20**	-	-	20	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Opuntia spp.												
86	**266**	-	66	200	-	-	0	0	0	-	0	3/4
94	**580**	-	60	380	140	-	0	0	24	-	3	3/11
99	**760**	60	140	600	20	60	0	0	3	-	0	6/13
04	**1240**	-	20	1180	40	-	0	0	3	3	3	5/14
Pediocactus simpsonii												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	-	40	-	-	0	0	-	-	0	2/2
Pinus edulis												
86	**199**	-	66	133	-	-	0	0	-	-	0	114/45
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**160**	20	40	120	-	-	0	0	-	-	0	-/-
04	**60**	-	-	60	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus												
86	**200**	-	-	200	-	-	67	33	-	-	33	15/22
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Yucca spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	33/38
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study14-12-04

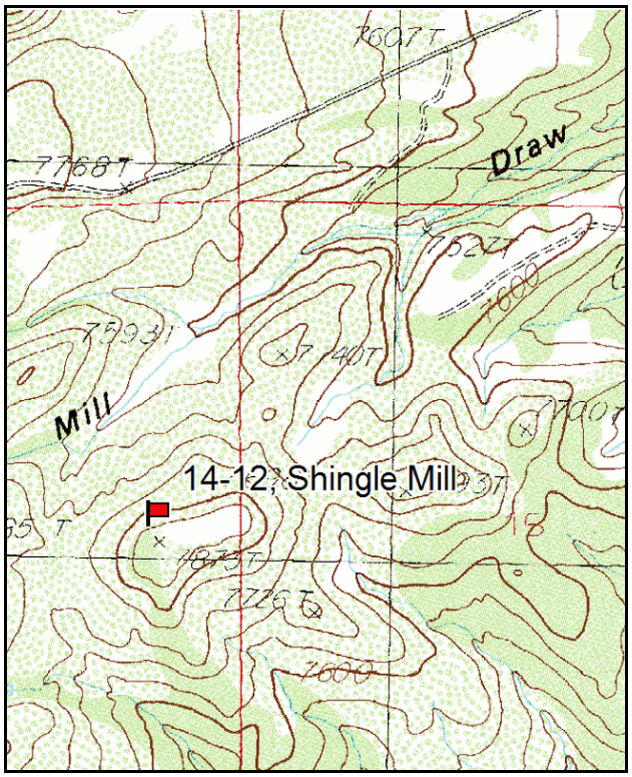
Study site name: Shingle Mill . Vegetation type: Mixed Oak-Mtn Brush .

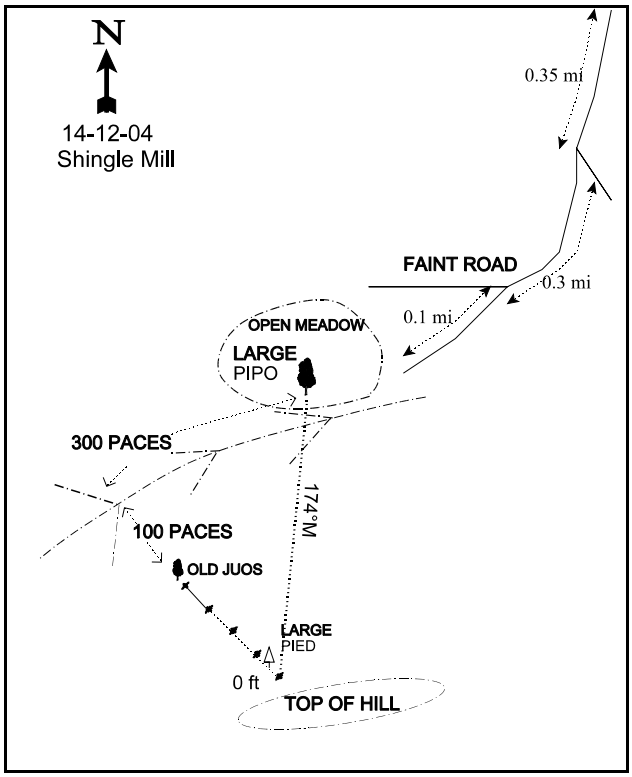
Compass bearing: frequency baseline 278 degrees magnetic.

Frequency belt placement: line 1(11 and 95 ft), line 2(34 ft), line 3(59 ft), line 4(71ft).

LOCATION DESCRIPTION

On Forest Service Road #79 go 3.5 miles from the junction of Blue Mountain and South Creek Roads. Turn left on Forest Service Road #261 and continue 0.35 miles to a fork. Turn right on a faint road and go 0.3 miles to a fork. Bear left for 0.1 miles to a large ponderosa pine in a flat. Park here and take a bearing of 174°M. The site is on a hillside about ½ mile away. The 0 foot stake is uphill, with the baseline running down at 278°M.





Map name: Abajo Peak

Diagrammatic Sketch

Township 34S , Range 23E , Section 16 .

GPS: NAD 27, UTM 12S 4187069 N, 641389 E

DISCUSSION

Shingle Mill - Trend Study No. 14-12

The Shingle Mill trend study was established in 1994. It samples a mixed mountain brush type west of Monticello, considered critical deer winter range by Forest Service personnel. This site is similar to site 14-3 (Gold Queen Basin), but more open with scattered Ponderosa pine and oak with mixed mountain browse on a moderate slope (25-30%) and a south to east aspect. The elevation of the site is 7,500 feet. The area is grazed as part of the Lakes allotment. It is grazed by 241 head of cattle from July 1 to October 15. There was some elk use on the site, but deer use was about three times that of elk. Pellet group data from 1999 estimated 40 deer days use/acre (99 ddu/ha), 7 elk days use/acre (17 edu/ha), and 9 cow use days/acre (22 cdu/ha). Much of the deer and elk sign was recent, while the cow pats appeared to be mostly from the previous grazing season. Pellet group data from 2004 estimated 54 deer and 19 elk days use/acre (134 ddu/ha and 46 edu/ha). A few deer were seen near the site during the 2004 reading and recent pellet groups suggest that the site is used year round until snow depth force deer to lower elevations in the winter.

The soil on the site is deep with an effective rooting depth estimated at nearly 19 inches. There is also a high amount of large rock on the surface and within the top 4 inches of the soil profile. Texture of the soil is a clay with a neutral pH (7.3). Parent material appears to be granite, but there is also some shale present on the site. There has been great deal of erosion in the past as evidenced by the large gullies in the bottom of the drainage. There is some soil pedestaling evident on the site, but overall erosion on the slope appears minimal.

The site supports several useful and preferred browse species including the following: serviceberry, mountain big sagebrush, true mountain mahogany, and squaw-apple. Other species present include black sagebrush, dwarf rabbitbrush, Gambel oak, and snowberry. Mountain big sagebrush, true mountain mahogany, and squaw-apple are the key species on the site. They contribute nearly one-half of the shrub cover and show moderate to heavy use. There is a mix of mountain big sagebrush and black sagebrush on the slope and likely some hybrids. Black sagebrush occurs on the steeper portions of the slope in isolated patches of more shallow soil. Mountain big sagebrush has a stable density of around 2,500 plants/acre. Use was light in 1994 and 1999 and vigor normal on most plants. During the 2004 reading use was more moderate and the number of decadent plants increased to 36%. Approximately 20% of sagebrush was classified as dying. Young recruitment was poor but seedlings were very abundant.

True mountain mahogany had a density of 940 plants/acre in 2004. Use was moderate to heavy in 1994 and 1999 but heavy in 2004. Vigor is generally good and decadence is low. Squaw-apple has a density of about 1,000 plants/acre. Mature plants average only about 2 feet in height with a crown diameter of just under 3 feet. Utilization has been moderate to heavy during all readings, although vigor is normal on most plants. Drought conditions in 2004 have caused the number of decadent squaw-apple to increase to 34%. Young recruitment has steadily declined since 1994 with only one young plant sampled in 2004. Serviceberry numbered about 850 plants/acre in 1994 and 1999. Density declined 52% in 2004 to only 400 plants/acre. Mature plants are small averaging only 15 inches in height with many growing under other shrubs making much of the plant unavailable to browsing. Use on available portions has been moderate to heavy especially in 2004.
Some Gambel oak occurs in isolated clones near the top of the ridge. Some plants are tall and partly unavailable with use concentrated along the edges. Dwarf rabbitbrush and snowberry are abundant and mostly unutilized. They both have low decadence and show normal vigor.

The herbaceous understory is diverse and abundant providing half of the vegetation cover on the site in 1999. Grasses are diverse with 10 species sampled on the site. Mutton bluegrass is most abundant followed by prairie junegrass, subalpine needlegrass, and bottlebrush squirreltail. Mutton bluegrass provided about 43% of the total grass cover in 1994 and 1999 increasing to 72% in 2004. Drought conditions caused several perennial grasses to decline in frequency in 2004. Forbs are also diverse with 20 species encountered in 1999 and 25 in 2004. Most species are uncommon however, with three species, weedy milkvetch, silvery lupine, and mat penstemon,

providing about 92% of the forb cover in 1994 and 1999.

1994 APPARENT TREND ASSESSMENT

The soil appears well protected and erosion is minimal. The preferred browse species, serviceberry, mountain big sagebrush, true mountain mahogany, and squaw-apple, are moderately to heavily utilized, although generally in good vigor with low decadence. The herbaceous understory is abundant and diverse. Mutton bluegrass is most abundant, providing 45% of the grass cover. Carex, prairie junegrass, and subalpine needlegrass are also abundant. The forb composition is poor however, with three species, weedy milkvetch, silvery lupine and mat penstemon, providing 91% of the forb cover. Weedy milkvetch and silvery lupine are poisonous to livestock. Trend indicators in the future will depend on how these species change in frequency. The Desirable Components Index (see methods) rating is fair to good at 67 for a mountain brush community. The amount of perennial grasses is low for a mountain brush type and the proportion of young browse plants was also low.

winter range condition (DC Index) - 67 (fair to good) Mountain brush type

1999 TREND ASSESSMENT

Trend for soil is stable with similar relative percent cover values for bare ground. Litter cover increased slightly, while rock and pavement cover remained similar. There is some evidence of erosion on the site, yet it appears localized. Trend for the key browse species, mountain big sagebrush, true mountain mahogany, and squaw-apple appear stable. Utilization is moderate to heavy but vigor is generally good with percent decadence low. Trend for the herbaceous understory is slightly up with an increase in the sum of nested frequency of grasses and forbs. Composition of forbs is still undesirable however. Nested frequency of slender wheatgrass, prairie Junegrass, Kentucky bluegrass, and subalpine needlegrass increased significantly. Frequency of silvery lupine also increased significantly, although both weedy milkvetch and mat penstemon increased, but not significantly. Cover of both grasses and forbs doubled since 1994. The DCI score improved to 90 as preferred browse, decadence, proportion of young browse, and perennial grass cover all improved.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly up (4)
winter range condition (DC Index) - 90 (good to excellant) Mountain brush type

2004 TREND ASSESSMENT

Trend for soil is stable with similar relative percent cover values for litter and vegetation. Percent cover of bare ground declined slightly. There is some isolated erosion occurring on the slope but it is minimal and localized. The erosion condition class determined soil to be stable. Trend for the key browse species, mountain big sagebrush, true mountain mahogany, and squaw-apple is stable but these species appear to be suffering the effects of drought. Density of mountain big sagebrush declined slightly while true mountain mahogany and squaw-apple increased slightly. The number of mountain big sagebrush displaying poor vigor increased from 2% to 20% and the proportion of the population classified as decadent increased from 12% to 36%. Squaw-apple also displayed an increase in poor vigor and decadence but true mountain mahogany's average vigor and decadence remained similar to 1999 estimates. Utilization was heavier on all key species but annual leader growth was good. Young recruitment was poor for squaw-apple and mountain big sagebrush but remained good for mahogany. Seedlings were very abundant for sagebrush. Trend for the herbaceous understory is down. Sum of nested frequency for perennial grasses declined 42% and frequency of forbs

dropped 32% since 1999. Western wheatgrass, slender wheatgrass, Carex spp., Kentucky bluegrass, and subalpine needlegrass declined significantly in nested frequency. Cover of perennial grasses dropped by nearly 50%. The forb composition is still dominated by weedy milkvetch, silvery lupine, and mat penstemon. All of these species declined in nested frequency and total cover of perennial forbs declined 66%. The DCI score declined to 60 (fair) due to declines in each category. Preferred browse cover is lower, decadence up, proportion of young browse plants declined, and cover of perennial grasses and forbs is also lower.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down (1)
winter range condition (DC Index) - 60 (fair) Mountain brush type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 12

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
G	Agropyron smithii	$_{ab}$5	$_{b}$20	$_{a}$3	.01	.12	.03
G	Agropyron trachycaulum	$_{b}$40	$_{b}$57	$_{a}$16	.82	.75	.36
G	Carex spp.	$_{b}$23	$_{b}$33	$_{a}$3	1.23	.93	.00
G	Koeleria cristata	33	82	56	.51	3.25	.88
G	Oryzopsis hymenoides	13	9	14	.09	.01	.13
G	Poa fendleriana	241	254	204	3.86	6.80	6.36
G	Poa pratensis	$_{a}$7	$_{b}$43	$_{a}$-	.16	1.04	-
G	Sitanion hystrix	$_{b}$91	$_{a}$29	$_{a}$41	.72	.46	.68
G	Stipa columbiana	$_{a}$17	$_{b}$104	$_{a}$25	.52	3.16	.37
G	Stipa comata	-	6	3	-	.06	.01
G	Stipa lettermani	$_{b}$35	$_{a}$-	$_{a}$3	.66	-	.03
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		505	637	368	8.59	16.62	8.88
Total for Grasses		505	637	368	8.59	16.62	8.88
F	Achillea millefolium	$_{b}$24	$_{b}$20	$_{a}$-	.22	.57	-
F	Agoseris glauca	4	-	1	.01	-	.01
F	Agastache urticifolia	-	-	7	-	-	.02
F	Allium spp.	7	-	10	.02	-	.02
F	Arabis spp.	$_{a}$4	$_{a}$-	$_{b}$8	.01	-	.02
F	Arenaria fendleri	-	-	1	-	-	.00
F	Artemisia ludoviciana	10	3	-	.01	.03	-
F	Astragalus miser	$_{b}$154	$_{b}$207	$_{a}$97	5.65	13.08	3.05
F	Castilleja linariaefolia	5	4	-	.03	.03	-
F	Calochortus nuttallii	$_{a}$2	$_{b}$13	$_{a}$3	.00	.31	.01

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
F	Cirsium spp.	4	1	-	.01	.00	-
F	Crepis acuminata	2	13	7	.00	.08	.05
F	Cymopterus spp.	1	3	-	.00	.00	-
F	Erigeron eatonii	-	-	1	-	-	.03
F	Eriogonum elatum	2	-	-	.00	-	-
F	Erigeron flagellaris	4	4	3	.01	.03	.03
F	Hymenoxys acaulis	$_{ab}$9	$_{b}$13	$_{a}$4	.09	.05	.03
F	Lathyrus lanszwertii	4	-	-	.00	-	-
F	Lappula occidentalis (a)	$_{a}$-	$_{a}$-	$_{b}$22	-	-	.93
F	Lactuca serriola	-	-	3	-	-	.03
F	Lomatium dissectum	14	25	18	.17	.21	.13
F	Lupinus argenteus	$_{a}$39	$_{b}$46	$_{a}$42	1.99	3.58	1.02
F	Penstemon caespitosus	$_{b}$144	$_{ab}$165	$_{a}$106	2.26	4.53	1.79
F	Penstemon pachyphyllus	3	-	2	.01	-	.03
F	Petradoria pumila	-	7	2	-	.09	.01
F	Phlox hoodii	-	-	3	-	-	.00
F	Phlox longifolia	$_{a}$72	$_{a}$52	$_{b}$95	.19	.16	.46
F	Polygonum douglasii (a)	-	-	1	-	-	.00
F	Senecio neomexicanus	3	1	-	.00	.00	-
F	Taraxacum officinale	$_{a}$-	$_{b}$28	$_{a}$1	-	.14	.00
F	Tragopogon dubius	3	2	1	.00	.01	.00
F	Trifolium gymnocarpon	1	3	4	.03	.00	.01
F	Zigadenus paniculatus	$_{a}$-	$_{b}$10	$_{a}$3	-	.02	.01
Total for Annual Forbs		0	0	23	0	0	0.94
Total for Perennial Forbs		515	620	422	10.79	22.98	6.84
Total for Forbs		515	620	445	10.79	22.98	7.78

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

BROWSE TRENDS --
Management unit 14 , Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	24	17	17	.72	1.07	.43
B	Artemisia tridentata vaseyana	65	67	69	10.02	12.66	9.03
B	Cercocarpus montanus	27	25	32	2.77	2.91	2.75
B	Chrysothamnus depressus	51	38	57	1.68	2.32	3.73
B	Gutierrezia sarothrae	5	2	5	.01	.03	.18
B	Juniperus osteosperma	0	1	0	-	-	-
B	Opuntia spp.	0	0	4	-	-	.03
B	Peraphyllum ramosissimum	30	24	27	3.87	3.62	3.76
B	Pinus edulis	0	3	5	.42	.69	.81
B	Quercus gambelii	0	24	23	4.10	7.50	4.75
B	Symphoricarpos oreophilus	77	71	69	5.64	9.85	7.94
Total for Browse		279	272	308	29.27	40.67	33.43

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 12

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	-	1.31
Artemisia tridentata vaseyana	-	12.60
Cercocarpus montanus	-	1.89
Chrysothamnus depressus	-	3.70
Gutierrezia sarothrae	-	.20
Peraphyllum ramosissimum	-	4.16
Pinus edulis	2.40	3.63
Quercus gambelii	-	3.08
Symphoricarpos oreophilus	-	12.16

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 12

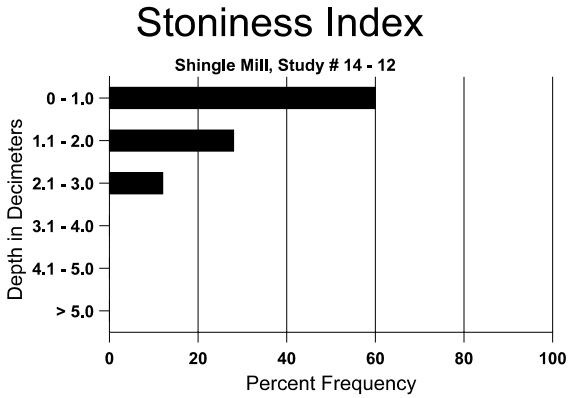
Species	Average leader growth (in)
	'04
Amelanchier utahensis	2.6
Artemisia tridentata vaseyana	1.5
Cercocarpus montanus	2.6
Peraphyllum ramosissimum	2.3

BASIC COVER --
Management unit 14 , Study no: 12

Cover Type	Average Cover %		
	'94	'99	'04
Vegetation	47.95	66.71	49.92
Rock	17.14	17.51	18.15
Pavement	2.46	5.48	6.04
Litter	25.22	40.04	30.17
Cryptogams	.28	.95	.11
Bare Ground	17.34	22.88	13.73

SOIL ANALYSIS DATA --
Management unit 14, Study no: 12, Study Name: Shingle Mill

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
18.7	63.7 (14.2)	7.3	26.9	20.6	52.6	3.4	5.6	86.4	0.4



PELLET GROUP DATA --
Management unit 14 , Study no: 12

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	-	4	11
Elk	5	-	10
Deer	17	27	21
Cattle	-	-	1

Days use per acre (ha)	
'99	'04
-	-
7 (17)	19 (46)
40 (99)	54 (134)
9 (22)	1 (2)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
94	**860**	-	240	520	100	40	2	5	12	-	0	12/15
99	**840**	40	380	420	40	40	17	17	5	5	12	17/20
04	**400**	-	60	320	20	-	10	70	5	5	5	15/21
Artemisia nova												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	15/35
Artemisia tridentata vaseyana												
94	**2420**	740	120	1720	580	180	2	2	24	5	7	18/27
99	**2920**	20	380	2180	360	380	15	0	12	2	2	18/31
04	**2500**	4260	60	1540	900	300	44	9	36	20	20	16/28
Cercocarpus montanus												
94	**1020**	40	120	840	60	-	41	16	6	-	0	20/22
99	**860**	-	200	560	100	40	16	53	12	9	9	27/33
04	**940**	-	200	640	100	-	6	91	11	9	9	20/25
Chrysothamnus depressus												
94	**3600**	20	-	3600	-	-	0	0	-	-	0	5/9
99	**3360**	-	-	3360	-	-	1	0	-	-	0	4/8
04	**6000**	-	60	5940	-	-	24	4	-	-	0	6/10
Gutierrezia sarothrae												
94	**120**	-	-	120	-	-	0	0	-	-	0	8/8
99	**80**	-	-	80	-	-	0	0	-	-	0	6/6
04	**180**	-	-	180	-	-	0	0	-	-	0	7/11
Juniperus osteosperma												
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**20**	-	-	-	20	-	0	0	100	100	100	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Opuntia spp.												
94	**0**	20	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**100**	-	60	40	-	-	0	0	-	-	0	2/3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Peraphyllum ramosissimum												
94	**1520**	-	120	1320	80	20	36	3	5	1	3	18/27
99	**900**	-	60	820	20	20	42	20	2	-	0	18/25
04	**1060**	-	20	680	360	-	8	43	34	13	13	22/31
Pinus edulis												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	60	-	-	-	0	0	-	-	33	-/-
04	**100**	20	100	-	-	-	0	0	-	-	0	-/-
Quercus gambelii												
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**3520**	-	1040	2400	80	360	24	10	2	2	2	25/21
04	**2440**	-	480	1600	360	500	43	7	15	7	7	19/15
Symphoricarpos oreophilus												
94	**6820**	100	900	5880	40	-	1	0	1	-	0	13/21
99	**5780**	80	340	5380	60	20	3	.34	1	.34	.34	14/23
04	**6500**	-	500	5900	100	40	11	12	2	.30	.30	12/20

Trend Study 14-13-04

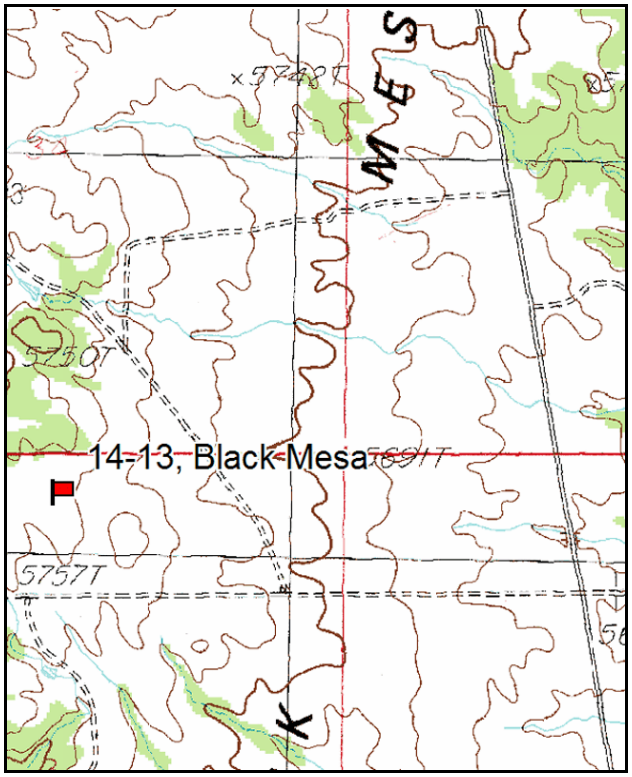
Study site name: Black Mesa . Vegetation type: Wyoming Big Sagebrush .

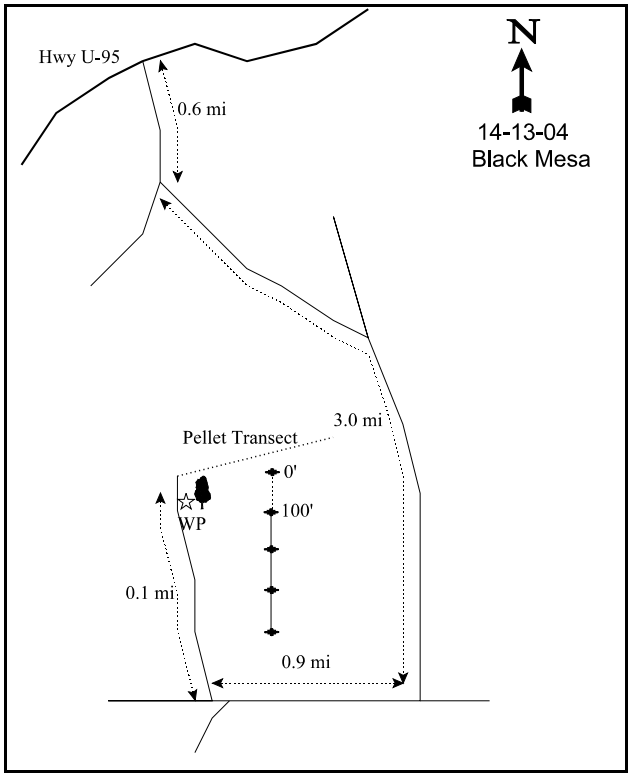
Compass bearing: frequency baseline 163 degrees magnetic.

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

LOCATION DESCRIPTION

From mile marker 114 on Highway U-95 near Cottonwood Canyon east of Comb Ridge, go 0.5 miles east to County Road #233. Go south on #233 0.6 miles to a fork. Stay left and go 3.0 miles to an intersection (Road #280). Turn right and go 0.9 miles beyond a fork to the left, to a very faint road to the right. Turn right on this faint road before two gullies and go 0.1 miles to a fence post which is six feet from the right side of the road. There is a lone juniper just behind the stake. From this witness post, go about 600 feet (95 paces) at 40°M (following the deer pellet group transect) to the first baseline stake which is located 25 feet south of pellet transect stake #8718 (a 6 inch tall yellow rebar). The baseline stake is a three foot tall green fence post tagged #7822. The transect runs south from the 0-foot baseline stake, with 100 feet between all posts.





Map Name: Hotel Rock

Diagrammatic Sketch

Township 38S , Range 21E , Section 3

GPS: NAD 27, UTM 12S 4153113 N, 624402 E

DISCUSSION

Black Mesa - Trend Study No. 14-13

This transect is on top of Black Mesa which is considered an important deer wintering area southeast of Elk Ridge. This is one of the lowest elevation studies (5,700 feet) on the unit, located on a large, flat mesa dominated by open sagebrush parks and pinyon-juniper woodlands. Wyoming big sagebrush dominates the site, which is on a slight southeast facing slope. The area is managed by the BLM, which allows 200 head of cattle to graze from the first of Oct to the end of May. Sign of cattle use has been infrequent and not concentrated on the site during past readings. Pellet group data from the site estimated 44 cow use days/acre (109 cdu/ha) in 1999 and 9 cow use days/acre (21 cdu/ha)in 2004. Black Mesa has shown moderate to heavy use by deer, depending on the winter. A pellet group transect near the site estimated an average of 41 deer days use/acre (101 ddu/ha) between 1993 and 1997. This is an increase from the previous 5 years (1988-92) when 28 ddu/acre (69 ddu/ha) was estimated (Jense et al. 1992). Pellet group data taken on the site in 1999 estimated 58 deer days use/acre (143 ddu/ha) and 1 elk day use/acre (2 edu/ha). In 2004, 37 deer days use/acre (93 ddu/ha) and 1 elk day use/acre (2 edu/ha) were estimated. Human pressure in the area is generally low, however there are several mining claims staked out near the study area.

The soil is a moderately deep, but compacted below the surface. Estimated effective rooting depth is nearly 14 inches. Soil texture is a sandy clay loam with a neutral pH (7.3). There is very little rock on the surface or within the profile. Due to the sandy texture and low elevation, soil temperature is extremely high averaging 76°F in 1999 and 72°F in 2004 at an average depth of just over 12 inches. This condition gives winter annuals like cheatgrass a competitive advantage over cool season perennial grasses and forbs due to early season drying of the soil profile. Phosphorus levels are low and potassium is marginal at only 7.5 ppm and 70.4 ppm respectively. Low amounts of these elements may effect plant growth and development. Vegetation and litter cover are low, although erosion does not appear to be a problem due to the levelness of the terrain, combined with the high infiltration capacity of the soil. An erosion class index rated erosion as stable in 2004.

Wyoming big sagebrush is the key browse species on the site. It formed a moderately dense stand of 3,266 plants/acre in 1986. The old, well-established stand had a fairly good age distribution of 16% young plants, 47% mature, and 37% decadent. Utilization was moderate to heavy with 37% of the plants sampled displaying heavy use. Vigor was considered poor on 20% of the sagebrush sampled in 1986. The population appears to be in a steady state of decline since 1986 with the exception of 1994 when some improvements were seen in lighter use, reduced decadence and improved reproduction with 26% of the population being young plants. This was the highest value for young plants ever recorded. These improvements were short lived. By 1999, use returned to moderate and heavy levels, while vigor was reduced on about 20% of the population. Percent decadence increased from 37% in 1986 to 57% by 1992, to 60% in 1999, and finally to 69% in 2004. Plants showing poor vigor increased to 77% in 2004, while use was mostly moderate. In 2004, there were more dead plants counted than live plants and 51% of the living plants were considered to be dying. Density in 2004 was half of what it was in 1986. Reproduction in 1999 and 2004 were very poor as young and seedling plants were rare in both readings. Many of these problems are the result of the drought, combined with abundance of winter annuals drying the soil profile and continued heavy use.

The scattered juniper in the flat are generally vigorous and could probably be slowly increasing. Point quarter data from 1999 estimated only 10 juniper trees/acre with an average diameter of 6.3 inches. The site also contains a dense population of broom snakeweed. Density has varied with annual precipitation patterns, 1986, 1992, and 1999 were very high, while 1994 and 2004 were lower. Density was 6,040 plants/acre in 2004 with about 6% cover. Young plants have made up at least 18% of the population since 1994.

Five perennial grasses and 2 annual grasses are found on this site. Cheatgrass steadily increased from 1992

(when annuals were first included in the sampling methods) to 1999 when it was most abundant. In 1999, cheatgrass was found in 96% of the quadrats and had 12% cover. This was 75% of the total grass cover in 1999. In 2004, cheatgrass abundance was significantly lower, but still quite high (found in 74% of all quadrats and 10% cover). When cheatgrass is abundant like this it can outcompete sagebrush seedlings and can create fire hazards that can eliminate sagebrush completely. Galleta nested frequency has remained stable since 1992, but was very robust in 2004 with 8% cover. This was much higher than it previously had been. Bottlebrush squirreltail and needle-and-thread were also robust in 2004, although abundance has been stable since 1999. Sum of nested frequency for perennial grasses was highest in 1994 and declined in 1999. It increased slightly in 2004. Forbs are diverse, but none are overly abundant and most are annuals.

1986 APPARENT TREND ASSESSMENT

Vegetative diversity is poor and the key species, Wyoming big sagebrush, is in poor condition on this important winter range. The form and vigor of the sagebrush, in addition to the abundance of the increaser broom snakeweed, would indicate a downward trend is occurring on this already fairly poor site. The presence of healthy young plants is one positive sign. One management option might be to release the young sagebrush plants by treatment with a smooth light-weight anchor chain. A favorable water year would do much to improve the situation. Lack of ground cover leaves the sandy soil susceptible to erosion and there is no indication that the condition is improving. Soil trend is stable to possibly down.

1992 TREND ASSESSMENT

It should be noted that during the 1992 field season, the methodology for determining cover has changed. Soil trend for this site should be considered stable to slightly improving because percent bare ground has declined and there has been a substantial increase in perennial grass and forb frequency. The browse trend would have to be judged slightly down because of a 12% loss in the Wyoming sagebrush density and an increase in percent decadency from 37% to 57%. Nested frequency for both grasses and forbs has increased substantially since 1986 which would indicate a upward trend for the herbaceous understory. The Desirable Components Index (see methods) score is 40 which is rated as fair for a Wyoming big sagebrush site.

TREND ASSESSMENT
soil - slightly up (4)
browse - slightly down (2)
herbaceous understory - up (5)
winter range condition (DC Index) - 40 (fair) Wyoming big sagebrush type

1994 TREND ASSESSMENT

Trend for soil appears stable. Ground cover characteristics are similar to 1992 estimates. Trend for browse has improved in many areas. Density has increased, utilization is light and percent decadence has declined from 57% to 39%. Recruitment is improved with seedlings and young common. However, vigor is still relatively poor on 21% of the plants sampled, and one-half of the 1,420 decadent plants sampled appeared to be dying. Taking all of these factors into consideration, trend for Wyoming big sagebrush is considered up slightly. The population should remain stable with enough young plants to replace decadent and dying plants. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency for perennial grasses. Frequency of perennial forbs declined slightly, but total cover contributed by the forbs is not more than three-tenths of one-percent. The DCI score improved to good (53) as sagebrush cover increased, decadence decreased, and the proportion of young plants improved.

TREND ASSESSMENT
soil - stable (3)
browse - slightly up (4)
herbaceous understory - slightly up (4)
winter range condition (DC Index) - 53 (good) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Tend for soil is slightly up due to a decline in percent bare ground from 46% in 1994 to 38% in 1999. Litter cover also increased slightly. Unfortunately, much of the improvements are due to the dramatic increase in cheatgrass. Trend for browse is down once again after a slightly improving trend in 1994. Use is heavy, vigor poor on 22% of the plants sampled, percent decadence high at 60%, and recruitment poor with low numbers of seedlings and young. To make matters worse, now cheatgrass is abundant in the understory which will further decrease seedling sagebrush establishment. The improvements in sagebrush seen in 1994, must have been due to favorable climatic conditions after the 1992 reading, which enhanced the establishment of seedling sagebrush. Trend for the herbaceous understory is down. Sum of nested frequency of perennial grasses and forbs has declined while the frequency of cheatgrass has increased significantly. Cheatgrass was present on the site in small numbers in 1992, however it was never abundant. Sum of nested frequency did increase significantly with every reading, yet cover was very low. By 1999, sum of nested frequency of cheatgrass increased nearly four-fold and cover rose from 0.5% in 1994 to 12% in 1999. It now accounts for 75% of the grass cover and 74% of the herbaceous cover. Perennial grasses, bottlebrush squirreltail, and sand dropseed declined significantly in frequency. The only common perennial grass left on the site is Galleta, a warm season species. In 1992 it provided 44% of the grass cover, although by 1999, it contributed to only 20%. Forbs continue to be very scarce. The DCI dropped to 7 which is classified as very poor. This drop is due to declines in every category and the high amount of cheatgrass.

TREND ASSESSMENT
soil - slightly up (4)
browse - down (1)
herbaceous understory - down (1)
winter range condition (DC Index) - 7 (very poor) Wyoming big sagebrush type

2004 TREND ASSESSMENT

The trend for soil is slightly down. On a relative scale the amount of bare ground cover increased from 37% in 1999 to 42% in 2004. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground declined from 1:2.5 to 1:2.1. Erosion is not currently a problem. The browse trend is continuing downward. Wyoming big sagebrush density is 21% lower than it was in 1999. Percent decadency has continued to rise since 1994 and vigor is much worse than it was in 1999. There are very few young and seedling plants to replace the dying plants. Drought, heavy use, and winter annuals have been detrimental to this population. The trend for the herbaceous understory is stable. Cheatgrass abundance declined significantly, but is still very high and cover remains very high. Perennial grasses were much more robust in 2004 as cover increased from 4 to 12%, but nested frequency was only slightly up. There is no significant forb component on this site. The DCI score improved to 23 which is poor to fair. This increase was the result of increased perennial grass cover and a slight decrease in cheatgrass cover.

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - stable (3)
winter range condition (DC Index) - 23 (poor to fair) Wyoming big sagebrush type

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

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'94	'99	'04	'92	'94	'99	'04
G	Bromus tectorum (a)	-	a26	b95	d358	c242	.14	.49	12.17	10.00
G	Hilaria jamesii	a40	b66	b75	b72	b82	4.26	4.42	3.22	8.26
G	Oryzopsis hymenoides	a-	b13	b12	ab2	ab4	.05	.08	.03	.21
G	Sitanion hystrix	c142	b55	c131	a15	ab21	1.33	2.24	.21	1.35
G	Sporobolus cryptandrus	a-	b27	ab11	a5	ab10	1.74	.39	.01	.36
G	Stipa comata	a2	b53	c93	b43	b36	2.02	1.75	.33	1.91
G	Vulpia octoflora (a)	-	a17	b50	b59	a23	.04	.12	.19	.05
Total for Annual Grasses		0	43	145	417	265	0.18	0.61	12.36	10.05
Total for Perennial Grasses		184	214	322	137	153	9.42	8.89	3.81	12.11
Total for Grasses		184	257	467	554	418	9.60	9.51	16.18	22.17
F	Astragalus convallarius	-	7	5	3	-	.09	.04	.03	.00
F	Chenopodium album (a)	-	b26	a-	a-	a-	.39	-	-	-
F	Chaenactis stevioides	-	5	-	-	-	.01	-	-	-
F	Comandra pallida	a-	b13	ab9	ab11	ab6	.25	.04	.09	.19
F	Cordylanthus wrightii (a)	-	b58	a-	a-	a3	2.34	-	-	.00
F	Cryptantha spp.	-	-	8	-	-	-	.07	-	-
F	Descurainia pinnata (a)	-	18	13	3	15	.06	.05	.00	.23
F	Draba rectifructa (a)	-	a-	b9	a-	a-	-	.05	-	-
F	Eriogonum cernuum (a)	-	b22	a2	a-	a-	.13	.01	-	-
F	Erodium cicutarium (a)	-	-	-	2	4	-	-	.00	.15
F	Erigeron spp.	2	-	-	-	-	-	-	-	-
F	Euphorbia fendleri	3	-	1	-	1	-	.00	-	.00
F	Gilia hutchinifolia (a)	-	b109	a5	a14	a12	.38	.02	.22	.08
F	Lappula occidentalis (a)	-	b28	b11	a-	b16	.30	.02	-	.18
F	Lactuca serriola	-	-	6	-	-	-	.03	-	-
F	Leucelene ericoides	-	-	-	-	-	-	-	-	.00
F	Lupinus spp.	a-	c92	a-	a-	b29	.68	-	-	.07
F	Lygodesmia spp.	-	-	1	-	-	-	.00	-	-
F	Mentzelia albicaulis (a)	-	b39	a-	a-	a1	.47	-	-	.00
F	Medicago sativa	2	-	-	-	-	-	-	-	-
F	Navarretia intertexta (a)	-	-	3	1	1	-	.00	.00	.00
F	Phlox longifolia	ab26	b41	b52	a7	b42	.11	.10	.02	.17
F	Sphaeralcea coccinea	a1	a-	a1	a3	b15	.00	.00	.00	.31
F	Tragopogon dubius	-	-	-	-	3	-	-	-	.00
F	Unknown forb-annual (a)	-	b34	a-	a-	a-	.33	-	-	-

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'94	'99	'04	'92	'94	'99	'04
F	Unknown forb-perennial	-	-	2	-	-	-	.00	-	-
Total for Annual Forbs		0	334	43	20	52	4.42	0.16	0.23	0.67
Total for Perennial Forbs		34	158	85	24	96	1.16	0.31	0.14	0.77
Total for Forbs		34	492	128	44	148	5.59	0.48	0.38	1.44

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

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

Type	Species	Strip Frequency				Average Cover %			
		'92	'94	'99	'04	'92	'94	'99	'04
B	Artemisia tridentata wyomingensis	57	67	63	47	7.89	12.23	4.72	6.65
B	Ephedra viridis	1	1	1	1	-	-	-	-
B	Gutierrezia sarothrae	51	42	70	72	6.96	.57	2.88	6.17
B	Juniperus osteosperma	-	-	-	-	-	.85	-	-
B	Opuntia spp.	0	1	0	1	-	-	-	-
B	Yucca spp.	1	0	2	1	.63	-	-	.00
Total for Browse		110	111	136	122	15.48	13.66	7.60	12.84

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

Species	Percent Cover '04
Artemisia tridentata wyomingensis	5.03
Gutierrezia sarothrae	7.31

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

Species	Average leader growth (in) '04
Artemisia tridentata wyomingensis	1.4

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

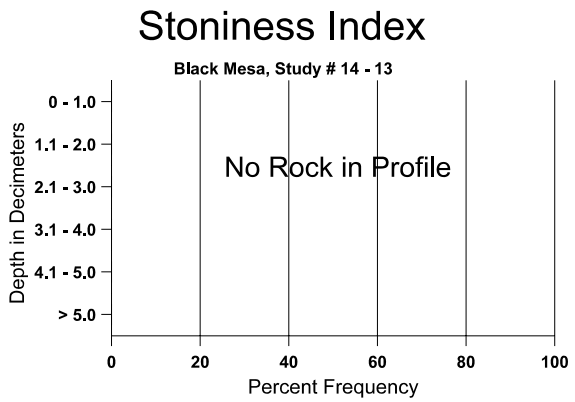
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	10	-	6.3	-

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

Cover Type	Average Cover %				
	'86	'92	'94	'99	'04
Vegetation	3.25	23.40	23.32	25.59	37.04
Rock	0	.45	.10	.06	.02
Pavement	.50	0	.09	.06	.26
Litter	38.50	27.37	29.72	38.25	25.48
Cryptogams	5.75	.91	.31	.08	.22
Bare Ground	52.00	39.81	46.33	38.41	45.67

SOIL ANALYSIS DATA --
Management unit 14, Study no: 13, Study Name: Black Mesa

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
13.7	72.0 (11.9)	7.3	60.9	16.6	22.6	1.3	7.5	70.4	0.5



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

Type	Quadrat Frequency				Days use per acre (ha)	
	'92	'94	'99	'04	'99	'04
Rabbit	52	39	75	39	-	-
Elk	-	1	1	-	1 (2)	1 (2)
Deer	22	17	34	33	58 (143)	38 (93)
Cattle	-	4	10	3	44 (109)	9 (22)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 13

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**3266**	466	533	1533	1200	-	29	37	37	3	20	19/15
92	**2880**	-	560	680	1640	-	50	26	57	7	7	-/-
94	**3660**	5660	960	1280	1420	1200	0	0	39	20	22	25/36
99	**2140**	120	200	660	1280	1460	36	53	60	21	22	23/33
04	**1680**	80	20	500	1160	1900	61	14	69	51	77	18/25
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	-	-	20	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	17/19
99	**20**	-	-	20	-	-	0	0	-	-	0	19/15
04	**20**	-	-	20	-	-	0	0	-	-	0	17/17
Gutierrezia sarothrae												
86	**10132**	66	1266	7400	1466	-	0	0	14	-	0	9/9
92	**8320**	80	140	7340	840	-	0	0	10	-	0	-/-
94	**2940**	3920	800	1720	420	420	0	0	14	10	24	13/13
99	**8900**	40	1580	7120	200	200	0	0	2	.89	1	9/9
04	**6040**	-	1280	4640	120	940	0	0	2	-	8	7/9
Opuntia spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	20	-	-	-	0	0	-	-	0	4/3
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	8/24
Yucca spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	-	-	20	-	-	100	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**40**	-	-	40	-	-	0	0	-	-	0	14/19
04	**40**	-	-	40	-	-	0	0	-	-	0	20/26

Trend Study 14-14-04

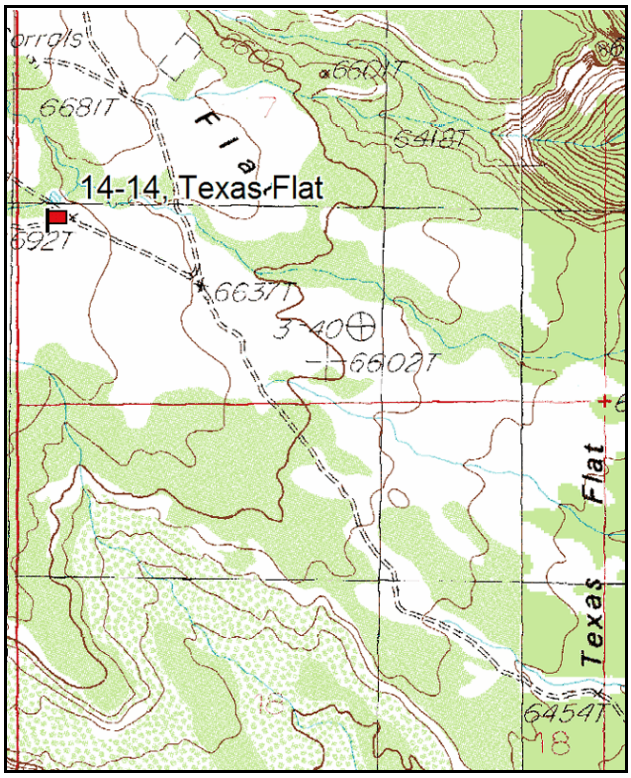
Study site name: Texas Flat . Vegetation type: Basin Big Sagebrush .

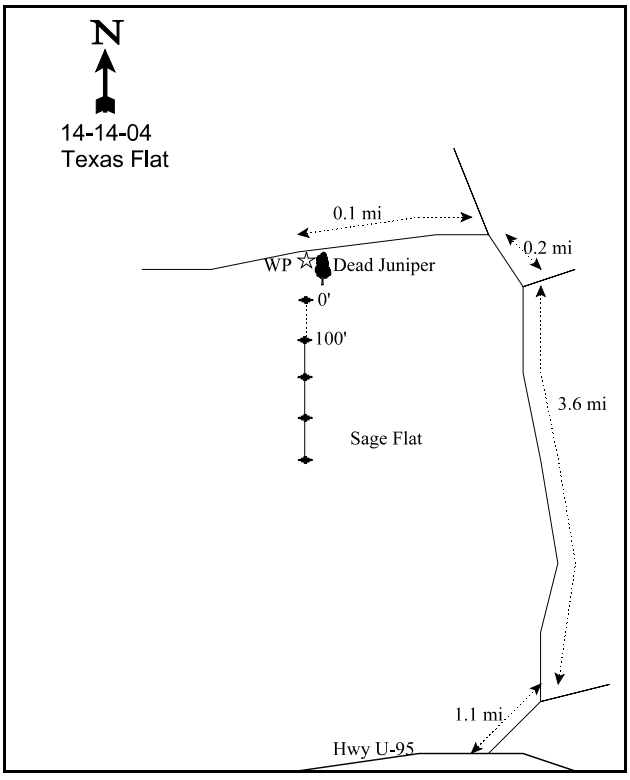
Compass bearing: frequency baseline 164 degrees magnetic.

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

LOCATION DESCRIPTION

Turn north off of Highway U-95 onto San Juan County Road #263 at a point 0.3 miles east of mile marker 102. Proceed north 1.1 miles to a fork. Take the left fork. Go another 3.6 miles and turn left. Go down this road 0.2 miles. Turn left onto a faint two-track road and go 0.1 miles to a witness post located just west of an old dead juniper. The witness post is a 3 1/2 foot tall green fence post on the south (left) side of the road. The 0-foot baseline stake is 100 feet south and is a fence post tagged #7868.





Map Name: Hotel Rock Diagrammatic Sketch

Township 37S , Range 20E , Section 7 GPS: NAD 27, UTM 12S 4159915 N, 609096 E

DISCUSSION

Texas Flat - Trend Study No. 14-14

Texas Flat is a large flat south of Elk Ridge surrounded by deep slickrock canyons. Dense juniper-pinyon stands are intermixed with large sagebrush parks. The area is managed by the BLM. In 1955, the sagebrush was railed and drill-seeded with crested wheatgrass. In October 1986, the area was treated with the herbicide tebuthiuron, a soil activated herbicide that defoliates and eventually kills broad leafed plants. Sagebrush survival on the study site depends on treatment boundaries and application rates. The area is grazed by 300 cattle in the fall or spring. Crested wheatgrass was heavily utilized in 1986. Deer use is light on the site. The Texas Flat pellet group trend transect showed an average of 9 deer days use/acre (22 ddu/ha) from 1982 to 1986 (Jense et al. 1986). The average deer days use/acre declined to 7 (18 ddu/ha) between 1987 to 1992 (Jense et al. 1992). Average deer days use/acre increased to 13 (33 ddu/ha) between 1993 and 1997 (DWR 1998). Pellet group data from the site in 1999 estimated 19 deer days use/acre (47 ddu/ha) and 46 cow days use/acre (114 cdu/ha). In 2004, pellet group data estimated 17 deer days use/acre (41 ddu/ha), 2 elk days use/acre (5 edu/ha), and 30 cow days use/acre (73 cdu/ha).

Soil on the site has a sandy loam texture. The soil on the site should be moderately deep, but it was very compacted which made soil pentrometer measurements difficult. Effective rooting depth was estimated at only about 8 inches, because the soil is very compact. This is probably an underestimation considering that basin big sagebrush, a species which only occurs on deep soils, is present on the site. The parent material is sandstone. There is no rock on the surface or within the profile. Average soil temperature was high at 71°F (12 inches) in 1999 and 75 °F (11 inches) in 2004. Erosion is not a problem due to the high infiltration capacity of the soil and the lack of significant slope. Relative bare soil doubled to almost 50% in 2004 and the ratio bare soil to protective ground cover (vegetation, litter, and cryptogams) declined from 1:2.8 to 1:1.9.

The herbicide treatment was planned to leave edges and drainages for wildlife. The study site is close to the edge of the pinyon-juniper, so it is unknown at this point how much herbicide was actually applied. Since the Basin big sagebrush present is not a preferred subspecies and not fully utilized, the treatment will provide more spring forage as long as the grass is not over grazed by livestock. With the elimination of sagebrush in surrounding areas, the remaining sagebrush along the edges could receive more use. Tebuthiuron is also detrimental to forbs.

Pretreatment density of basin big sagebrush was estimated at 5,466 plants/acre in 1986. Young plants were abundant, accounting for 83% of the population. Utilization was light in 1986, vigor normal and percent decadence low at only 4%. In 1992, after the treatment, density of sagebrush dropped to only 180 plants/acre, which is a 97% decline. Density rose in 1994 to 500 plants/acre and has remained at that level. Density was 540 plants/acre in 2004. Use was light between 1986 and 1999, but increased to moderate in 2004. Vigor has been generally good and decadence low, although decadence did increase to 30% in 2004. Recruitment has been poor since 1986. Young plants have made up 4-7% of the population between 1994 and 2004. Seedlings were very abundant in 2004 with nearly 2000/acre sampled. Hopefully precipitation patterns will be favorable enough to recruit some of these seedlings into the population.

Other browse species sampled include stickyleaf low rabbitbrush, slenderbush eriogonum, and broom snakeweed. Slenderbush eriogonum occurs in low densities and receives moderate to heavy use. Use was very heavy in 2004. Broom snakeweed, an increaser subshrub, is common, but density and cover has declined each reading since 1992.

Grass species present in 1986, prior to the treatment, were mainly crested wheatgrass, sand dropseed, and needle-and-thread grass. Use was very heavy in 1986 on the available grasses, but vigor was still good and the plants appeared to be recovering from the early spring use. After the treatment, nested frequency of crested wheatgrass steadily increased and peaked in 1999. It decreased to its lowest point in 2004. Since 1994 crested

wheatgrass has made up at least 75% of the total grass cover. It had over 15% cover from 1992-1999 and declined to about 9% in 2004. Sand dropseed nested frequency was highest in 1992 and 1994, but declined in 1999 and was stable in 2004. Cheatgrass has never been found in significant numbers on this site. Forbs were scarce before the treatment, however they increased dramatically by 1992. Common species included, low fleabane, thickleaf peavine, prickly lettuce, and scarlet globemallow. Sum of nested frequency for perennial forbs declined dramatically by 1994 and have remained at a low level since.

1986 APPARENT TREND ASSESSMENT

It will be interesting to follow the effects of the treatment on this area. Not knowing the exact treatment of the study site, it is impossible to assign a trend to this disturbed area. Even if not directly impacted by the herbicide, the site will be effected. An increase in spring forage would be beneficial to the deer that winter here, as long as browse forage and cover is left by the treatment. The soil trend will probably remain stable.

1992 TREND ASSESSMENT

Soil trend appears to be stable after the herbicide treatment and great increases in grass and forb frequencies. The browse trend for the key species would be down because the sagebrush population has decreased by 97%, down to only 180 plants/acre. It should also be noted that snakeweed has increased numbers to 3,080 plants/acre, a 20% increase. Pricklypear cactus has noted a 88% decrease in it's population since 1986. The herbaceous understory has seen great changes in the nested frequencies for grasses, especially the forbs. Trend for herbaceous understory is up. The Desirable Components Index (see methods) rating is fair at 40. The shrub component is lacking, but the herbaceous understory is healthy.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - up (5)
winter range condition (DC Index) - 40 (fair) Basin big sagebrush type (Wyoming sagebrush scale)

1994 TREND ASSESSMENT

Trend for soil would be considered stable. Total vegetative cover declined from 53% to 34%, but litter cover increased and percent relative cover of bare ground declined from 26% to 20%. Trend for browse is up slightly. Density has increased from 180 to 500 plants/acre. Use is light and percent decadence low at 8%. Recruitment is currently poor with low numbers of seedlings and young. Another positive aspect of the browse trend is a decline in the density of broom snakeweed from 3,080 to 2,340 plants/acre. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses has increased slightly, while frequency of perennial forbs has declined dramatically. Combined sum of nested frequency of perennial grasses and forbs has declined from 1,194 to 665. Perennial forb cover declined from 28% in 1992 to less than 2% in 1994. Some of this decline is expected after a flush of growth following treatment. With this in mind, trend for the herbaceous understory is considered down, but this decline is expected after a flush of growth following the treatment. The DCI score improved to good as sagebrush cover increased to over 2%.

TREND ASSESSMENT
soil - slightly up (4)
browse - slightly up (4)
herbaceous understory - down (1)
winter range condition (DC Index) - 52 (good) Basin big sagebrush type (Wyoming sagebrush scale)

1999 TREND ASSESSMENT

Trend for soil is stable. Percent cover of vegetation has increased, but this is off set by a decline in percent cover of litter and a slight increase in bare ground. Trend for browse is stable due to a stable population density, light use, good vigor, and low percent decadence for basin big sagebrush. Broom snakeweed has also remained stable. Trend for the herbaceous understory is stable with similar sum of nested frequency values for perennial grasses and forbs compared to 1994. The dominant grass, crested wheatgrass, increased slightly in nested frequency and provides 89% of the grass cover. The DCI rating dropped to fair (41), because sagebrush cover declined to less than 1% cover.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 41 (fair) Wyoming big sagebrush type

2004 TREND ASSESSMENT

The soil trend is down. Relative cover values for bare ground increased from 23% to 48% in 2004. Vegetation cover declined 37% and the ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground declined from 1:2.8 to 1:1.9. The trend for browse is stable. Basin big sagebrush density has remained stable. Recruitment is relatively low with only 7% of this small population being considered young. A very high number of seedlings were sampled in 2004. If precipitation is favorable many of these plants could be recruited into the population. Use increased to a moderate level and percent decadence has increased to 30% from only 12% in 1999. The trend for the herbaceous understory is slightly down. Crested wheatgrass nested frequency is the lowest it has ever been, but it is still abundant and contributes to over 9% cover. Sand dropseed has remained stable. Nested frequency for perennial forbs is stable, while annual forbs have declined. The DCI rating dropped to 32 due to declines in perennial grasses and forbs.

TREND ASSESSMENT
soil - down (1)
browse - stable (3)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 32 (fair) Wyoming big sagebrush type

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

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'94	'99	'04	'92	'94	'99	'04
G	Agropyron cristatum	ab252	a235	bc280	c306	a206	15.33	17.76	15.43	9.51
G	Bromus tectorum (a)	-	-	-	2	-	-	-	.00	-
G	Sporobolus cryptandrus	a30	c241	c206	b124	b142	17.44	4.88	1.80	2.91
G	Stipa comata	b29	a2	a4	ab11	a11	.03	.06	.08	.09
G	Vulpia octoflora (a)	-	-	4	3	-	-	.01	.00	-
Total for Annual Grasses		0	0	4	5	0	0	0.00	0.00	0
Total for Perennial Grasses		311	478	490	441	359	32.81	22.71	17.31	12.52

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'94	'99	'04	'92	'94	'99	'04
Total for Grasses		311	478	494	446	359	32.81	22.72	17.32	12.52
F	Artemisia dracunculus	-	-	-	6	3	-	-	.30	.15
F	Astragalus convallarius	$_{ab}$9	$_{b}$20	$_{ab}$14	$_{b}$31	$_{a}$2	.46	.07	.83	.00
F	Astragalus spp.	$_{b}$13	$_{a}$-	$_{a}$-	$_{ab}$6	$_{b}$14	-	-	.06	.11
F	Calochortus nuttallii	-	1	-	-	-	.00	-	-	-
F	Castilleja spp.	$_{a}$-	$_{a}$-	$_{b}$24	$_{a}$-	$_{a}$-	-	.06	-	-
F	Chenopodium spp. (a)	-	$_{b}$17	$_{a}$-	$_{a}$-	$_{a}$-	.65	-	-	-
F	Conyza canadensis (a)	-	10	-	-	-	.02	-	-	-
F	Comandra pallida	-	-	-	-	2	-	-	-	.01
F	Cordylanthus wrightii (a)	-	$_{b}$10	$_{a}$-	$_{a}$-	$_{b}$25	.52	-	-	.20
F	Descurainia pinnata (a)	-	-	-	4	3	-	-	.01	.00
F	Epilobium spp.	$_{a}$-	$_{b}$13	$_{a}$-	$_{a}$-	$_{a}$-	.15	-	-	-
F	Eriogonum cernuum (a)	-	3	-	-	-	.03	-	-	-
F	Erigeron pumilus	$_{ab}$18	$_{b}$25	$_{b}$27	$_{a}$3	$_{a}$4	1.72	.52	.01	.03
F	Euphorbia glyptosperma (a)	-	$_{b}$19	$_{a}$-	$_{a}$-	$_{a}$-	.04	-	-	-
F	Gayophytum ramosissimum(a)	-	-	3	-	-	-	.03	-	-
F	Gilia spp. (a)	-	-	-	-	7	-	-	-	.01
F	Lathyrus lanszwertii	$_{a}$2	$_{bc}$38	$_{bc}$45	$_{c}$70	$_{ab}$26	1.43	.77	1.85	.12
F	Lappula occidentalis (a)	-	-	-	3	7	-	-	.00	.16
F	Lactuca serriola	$_{a}$-	$_{b}$164	$_{a}$8	$_{a}$3	$_{a}$1	5.43	.02	.00	.00
F	Leucelene ericoides	$_{a}$-	$_{a}$2	$_{a}$-	$_{ab}$20	$_{b}$30	.00	-	1.35	.47
F	Machaeranthera canescens	$_{a}$-	$_{b}$262	$_{a}$-	$_{a}$3	$_{ab}$15	15.27	-	.01	.19
F	Oenothera spp.	-	-	-	-	1	-	-	-	.00
F	Penstemon comarrhenus	5	12	8	6	8	.12	.03	.07	.04
F	Phlox longifolia	6	4	4	4	5	.01	.01	.15	.01
F	Plantago patagonica (a)	-	$_{a}$92	$_{a}$112	$_{b}$209	$_{a}$88	2.24	.64	6.81	.31
F	Polygonum douglasii (a)	-	$_{b}$19	$_{a}$-	$_{a}$-	$_{a}$1	.69	-	-	.00
F	Portulaca oleracea (a)	-	$_{b}$99	$_{a}$-	$_{a}$-	$_{a}$-	1.46	-	-	-
F	Salsola pestifer (a)	-	$_{b}$45	$_{a}$-	$_{a}$-	$_{a}$-	.87	-	-	-
F	Senecio multilobatus	1	-	-	-	-	-	-	-	-
F	Sphaeralcea coccinea	$_{ab}$55	$_{a}$40	$_{a}$38	$_{a}$54	$_{b}$88	1.36	.27	.88	1.83
F	Streptanthus cordatus	-	-	1	-	-	-	.03	-	-
F	Tragopogon dubius	$_{a}$-	$_{b}$17	$_{ab}$6	$_{ab}$4	$_{a}$-	.25	.02	.01	-
F	Unknown forb-annual (a)	-	8	-	-	-	.18	-	-	-
F	Zigadenus paniculatus	-	-	-	3	3	-	-	.00	.00
Total for Annual Forbs		0	322	115	216	131	6.71	0.66	6.82	0.70

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'94	'99	'04	'92	'94	'99	'04
Total for Perennial Forbs		109	598	175	213	202	26.25	1.83	5.55	3.01
Total for Forbs		109	920	290	429	333	32.97	2.50	12.38	3.72

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

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

Type	Species	Strip Frequency				Average Cover %			
		'92	'94	'99	'04	'92	'94	'99	'04
B	Amelanchier utahensis	0	0	1	0	-	-	.53	-
B	Artemisia tridentata tridentata	7	15	17	18	.22	2.38	.48	.90
B	Chrysothamnus nauseosus albicaulis	0	0	0	5	-	.00	-	.00
B	Chrysothamnus viscidiflorus stenophyllus	6	0	6	4	.15	-	.38	.78
B	Eriogonum microthecum	6	0	5	7	.18	-	.03	.06
B	Gutierrezia sarothrae	51	43	28	34	2.94	1.25	.46	.98
B	Juniperus osteosperma	1	0	1	1	2.83	-	2.20	1.70
B	Opuntia fragilis	8	9	25	19	.42	.05	.46	.33
B	Sclerocactus	16	3	0	0	-	.03	-	-
Total for Browse		95	70	83	88	6.76	3.73	4.55	4.76

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

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	-	2.28
Artemisia tridentata tridentata	-	2.81
Eriogonum microthecum	-	.05
Gutierrezia sarothrae	-	1.00
Juniperus osteosperma	4.19	4.00
Opuntia fragilis	-	.16

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

Species	Average leader growth (in)
	'04
Artemisia tridentata tridentata	2.6

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

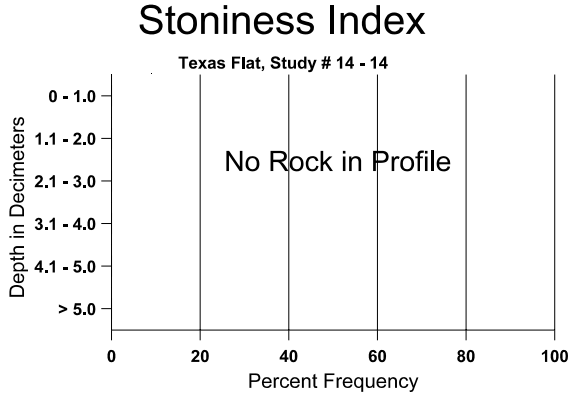
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	10	-	10	-
Pinus edulis	9	-	4.8	-

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

Cover Type	Average Cover %				
	'86	'92	'94	'99	'04
Vegetation	1.25	52.89	33.92	37.51	23.71
Rock	0	0	.03	0	0
Pavement	0	0	.39	0	.03
Litter	58.75	29.62	51.50	44.35	32.81
Cryptogams	0	1.19	.12	.68	.19
Bare Ground	40.00	29.62	22.07	24.50	52.61

SOIL ANALYSIS DATA --
Management unit 14, Study no: 14, Study Name: Texas Flat

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
7.9	75.0 (10.9)	6.9	76.9	8.6	14.6	1.6	12.7	89.6	0.4



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

Type	Quadrat Frequency			
	'92	'94	'99	'04
Rabbit	11	34	48	40
Elk	-	-	-	3
Deer	7	14	8	33
Cattle	6	1	19	18

Days use per acre (ha)	
'99	'04
-	-
-	2 (5)
19 (47)	17 (41)
46 (114)	30 (73)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	123/102
99	**20**	-	-	20	-	-	0	0	-	-	0	129/150
04	**0**	-	-	-	-	-	0	0	-	-	0	119/157
Artemisia tridentata tridentata												
86	**5466**	3133	4533	733	200	-	2	0	4	-	0	25/24
92	**180**	380	40	140	-	-	22	0	0	-	0	-/-
94	**500**	20	20	440	40	1260	0	0	8	-	16	24/23
99	**500**	80	20	420	60	1160	8	0	12	4	4	30/31
04	**540**	1920	40	340	160	740	44	26	30	11	11	28/38
Chrysothamnus nauseosus albicaulis												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	18/21
99	**0**	-	-	-	-	-	0	0	0	-	0	44/32
04	**120**	-	-	80	40	-	0	33	33	-	0	21/28
Chrysothamnus viscidiflorus stenophyllus												
86	**200**	-	200	-	-	-	0	0	0	-	0	-/-
92	**160**	-	40	120	-	-	50	13	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**140**	-	20	120	-	-	0	0	0	-	0	19/27
04	**100**	-	-	80	20	-	20	0	20	20	20	12/17

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Eriogonum microthecum												
86	**800**	66	800	-	-	-	0	0	0	-	0	-/-
92	**480**	-	-	460	20	-	8	0	4	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**160**	-	20	140	-	-	75	13	0	-	0	12/13
04	**440**	-	-	400	40	-	9	91	9	-	0	7/8
Gutierrezia sarothrae												
86	**2465**	66	466	1666	333	-	0	0	14	-	0	9/7
92	**3080**	20	340	2740	-	-	0	0	0	-	0	-/-
94	**2340**	20	160	1860	320	20	0	0	14	3	3	10/12
99	**2020**	80	720	1300	-	20	0	0	0	-	0	8/7
04	**1780**	20	40	1680	60	-	20	1	3	-	0	6/7
Juniperus osteosperma												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	20	-	20	-	-	0	100	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Mahonia repens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	6/24
Opuntia fragilis												
86	**1799**	-	1533	266	-	-	0	0	0	-	0	4/8
92	**220**	-	100	100	20	-	9	0	9	-	9	-/-
94	**340**	-	80	240	20	-	0	0	6	-	12	6/13
99	**680**	60	260	320	100	-	0	0	15	12	26	5/18
04	**540**	20	60	420	60	40	0	0	11	-	11	5/17
Sclerocactus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**720**	-	460	260	-	-	3	0	-	-	0	-/-
94	**60**	-	40	20	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Yucca spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	16/39
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 14-15-04

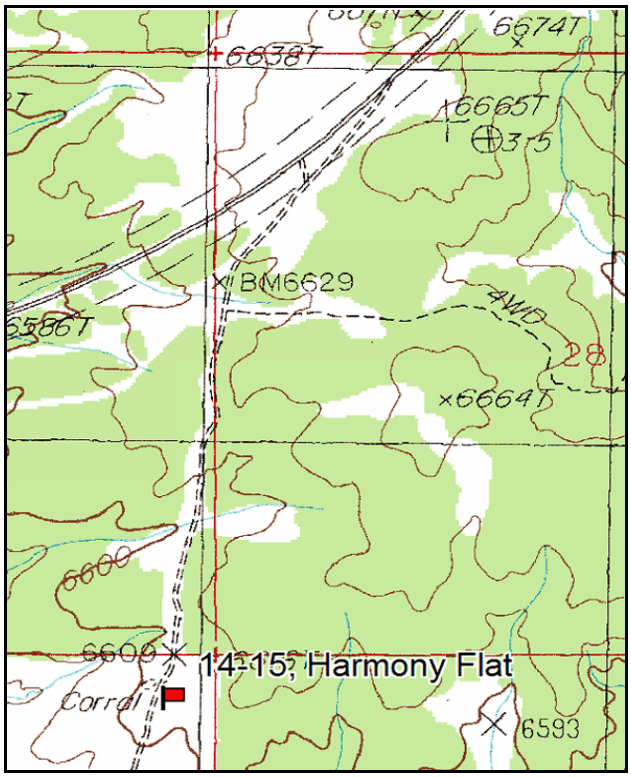
Study site name: Harmony Flat . Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 165 degrees magnetic.

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

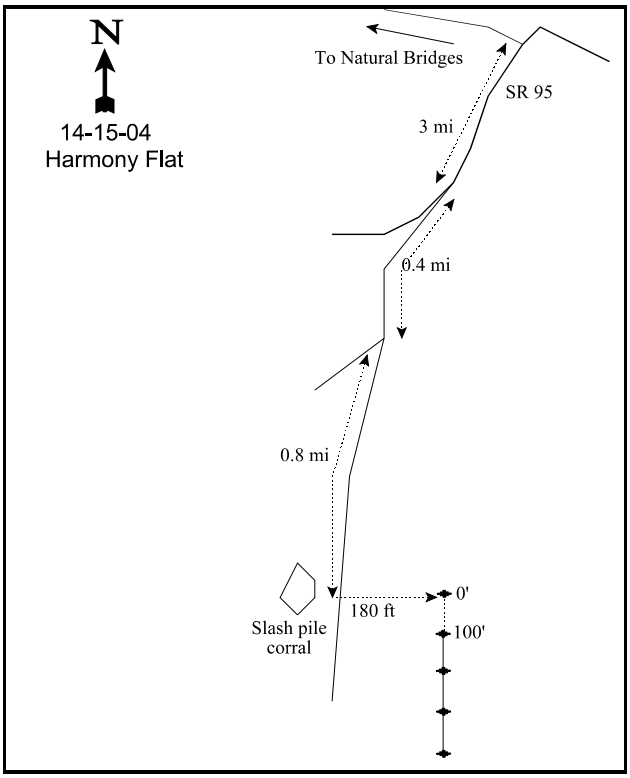
LOCATION DESCRIPTION

From the intersection of SR 95 and the road to Natural Bridges National Monument, go approximately 3 miles southwest on Route 95. At a point 0.4 miles beyond mile marker 89, look for a dirt road going straight off to the left before SR 95 makes a bend to the right. Follow the dirt road (Road #231a) south for 0.2 miles to a gate, staying left and continuing another 0.2 miles to a fork. Stay left and continue 0.8 miles to a corral made out of slash from the chaining. The transect starts on the opposite (left) side of the road. Park by the corral and walk 180 feet east to the starting point of the frequency baseline. The transect stakes are all 3-foot tall green and white fence posts.



Map Name: Kane Gulch

Township 37S , Range 18E , Section 32



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4154274 N, 592911 E

DISCUSSION

Harmony Flat - Trend Study No. 14-15

Harmony Flat is considered an important wintering area for deer coming off the south end of Elk Ridge and the Abajo Mountains. It is a large flat pinyon-Juniper woodlands intermixed with sagebrush parks. Much of the woodland has been chained. The trend study is set up in the old BLM chaining. The site has an aspect which is generally south with a gentle slope of 2% to 8% and drains south into Grand Gulch. Elevation is 6,600 feet. Crested wheatgrass is the principal forage species for cattle. According to the BLM, past use of the area usually consisted of 600 cattle trailing through every spring from about May 5 to June 5. However, cattle were observed trespassing in the area on July 22 when the transect was being set up in 1986. The Harmony Flat pellet group trend transect measures generally light to moderate deer use with an average of 13 deer days use/acre (32 ddu/ha) since 1975 (Jense et al. 1992; DWR 1998). Pellet group data taken along the study site baseline in 1999 estimated 21 deer days use/acre (52 ddu/ha) and 19 cow days use/acre (47 cdu/ha). In 2004, use was lower with an estimated 15 deer days use/acre (36 ddu/ha) and 16 cow days use/acre (39 cdu/ha).

Soil at the site is a deep sandy clay loam with a slightly alkaline pH (7.4). Effective rooting depth is estimated at nearly 15 inches. The soil is very compact, which makes it difficult to accurately measure effective rooting depth. There is virtually no rock on the surface or within the soil profile. There is a slight hardpan at about 12 inches in depth, although it does not appear to be hard or thick enough to be a consistent root barrier. The soil temperature was relatively high at 72°F in both 1999 and 2004 at an average depth between and 12-15 inches. Soil erosion has been a problem on this site. In 1986, heavy rains for two days previous to data collection caused fresh rill and gully erosion. Sheet erosion has also been evident with pedestalling. The fine, sandy loam bare soil occupied 47% of the ground surface in 1986, and remained at that high level in 1999. It increased to 60% in 2004. The lack of consistent cover, cattle trails, and trampling escalates erosion. Large quantities of litter left from the chaining still provides important soil protection and also protects some grasses from excessive grazing. However, litter cover is slowly declining. It was highest in 1986 with 47% cover and has declined to 30% by 2004.

Young juniper and pinyon continue to occupy the site which was treated more than twenty years ago. Average height was 6-8 feet in 2004, which probably represents mostly the small trees that survived the chaining. Point quarter data from 1999 estimate 91 juniper and 47 pinyon trees/acre. Average diameter of juniper is 2.5 inches while that of pinyon is 3 inches. In 2004, juniper density was lower at 70 trees/acre and diameter increased to 4.3 inches. Pinyon density remained stable at 47 trees/acre with an average diameter of 2.9 inches. Pinyon and juniper cover has increased with each reading since 1992. Pinyon and juniper made up 26% of the total browse cover. Pinyon and juniper density doesn't appear to be increasing, but the population is maturing and becoming larger.

The most abundant browse and also key species for the site is Wyoming big sagebrush. It provided 83% of the browse cover in 1992, 81% in 1999, and 74% in 2004. Sagebrush density was highest in 1986 with 5,198 plants/acre. This remained fairly stable in 1992 at 5,060 plants/acre. Density declined 29% in 1999 to 3,600 plants/acre. In 2004 density was again lower at 3,160 plants/acre. Sagebrush density has declined 39% between 1986 and 2004. Percent decadency was 28% and 30% in 1986 and 1999 respectively, but increased to 72% by 2004. Vigor was good each reading until 2004 when those rated as having poor vigor increased to 54%. Young plants made up a large portion of the population in 1986 (28%) and 1992 (37%). This decreased to 9% in 1999 and to 0% in 2004. Seedlings have not been very abundant except in 2004. Utilization was moderate to heavy from 1992 to 1999, but decreased to mostly light use in 2004.

Crested wheatgrass has been the dominant understory species. Nested frequency was stable from 1986-1999, but declined significantly in 2004. Very few live plants were found in 2004 and those that were alive were

found under sagebrush canopies. Grass cover declined from about 10% to less than 1% by 2004. Heavy utilization was noted in 1986. Utilization was evident in 1999, at a level of 30% to 40% on individual plants. Use was inconsistent however. Forbs are uncommon. Alfalfa has not been sampled since 1986.

1986 APPARENT TREND ASSESSMENT

The reestablishment and/or release of pinyon-Juniper in the treatment area, poor sagebrush vigor, lack of vegetative diversity, and heavy grazing by cattle would indicate a downward vegetative trend. The Wyoming big sagebrush should maintain itself within the stand, but production is low and apparently with low palatability. Steps should be taken to restrict season-long grazing in order to maintain vigor on the crested wheatgrass and allow enough forage for wildlife in early spring. The soil trend is also down due to a lack of ground cover and high erodibility.

1992 TREND ASSESSMENT

Soil trend appears to be stable, but poor condition. The browse trend is stable with only a 3% loss in it's population, a decline in percent decadence from 28% to only 2%, and no plants were classified as having poor vigor. The herbaceous understory is stable. The most dominant species, crested wheatgrass, has remained at a similar nested frequency compared to 1986. There are few if any other perennial grasses on the site worthy of note. In 1986, there was only one forb found (alfalfa), which had been seeded with crested wheatgrass. By 1992, the seeded alfalfa could not be found on site, but there were eight forbs of which the majority was made up by the annual, Wright's birdbeak. The site still lacks diversity because the community is basically composed of only two species, Wyoming big sagebrush and crested wheatgrass. The Desirable Components Index (see methods) rating is excellent at 67 for a Wyoming big sagebrush community. Sagebrush is healthy and the grass understory is abundant.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 67 (excelling) Wyoming big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1992. Erosion is still a problem however, and there is a considerable unprotected bare soil. Trend for browse is down slightly. Utilization is similar to 1992, but density has declined, more plants are showing poor vigor, recruitment is down, and percent decadence has increased from 2% to 30%. It does not appear that the population will continue to decline in density however. Trend for the herbaceous understory is stable. Nested frequency of the only common herbaceous species, crested wheatgrass, has remained stable since 1992. Sum of nested frequency for perennial forbs has declined slightly, but forbs are so rare that they account for very little cover. The DCI score declined to fair to good (45) due to increased decadence and a lower proportion of young sagebrush plants.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable (3)
winter range condition (DC Index) - 49 (good) Wyoming big sagebrush/chaining type

2004 TREND ASSESSMENT

The soil trend is down slightly. Relative bare ground has increased to 54%. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) declined from 1:2.0 to 1:1.6, which is very poor. The browse trend is down. Density has decreased 12% since 1999 and percent decadency has increased to 72%. Thirty-four percent of the population was classified as dying. Poor vigor has also increased to 54%. The trend for the herbaceous understory is down. The herbaceous understory makes up only 13% of the total vegetation cover, which is down from contributing 37% of the total vegetation in 1999. Crested wheatgrass has declined significantly and is in very poor condition. A return to more favorable weather patterns may allow crested wheatgrass to return its formally higher numbers. The DCI score dropped again to a poor rating. High decadence and no young sagebrush plants with the decline of the herbaceous understory caused the score to decline to such a low rating.

TREND ASSESSMENT
soil - slightly down (2), very poor condition
browse - down (1)
herbaceous understory - down (1)
winter range condition (DC Index) - 13 (poor) Wyoming big sagebrush/chaining type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 15

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Agropyron cristatum	b235	b227	b228	a37	10.14	8.51	.50
G	Agropyron smithii	3	-	-	-	-	-	-
G	Bromus inermis	4	1	-	-	.00	-	-
G	Sitanion hystrix	3	-	2	-	-	.00	-
G	Vulpia octoflora (a)	-	a-	a-	b19	-	-	.07
Total for Annual Grasses		0	0	0	19	0	0	0.07
Total for Perennial Grasses		245	228	230	37	10.14	8.51	0.50
Total for Grasses		245	228	230	56	10.14	8.51	0.57
F	Astragalus convallarius	-	5	1	-	.09	.00	-
F	Chenopodium album (a)	-	2	-	-	.00	-	-
F	Collinsia parviflora (a)	-	-	1	-	-	.00	-
F	Cordylanthus wrightii (a)	-	c134	a-	b38	5.47	-	.29
F	Descurainia pinnata (a)	-	a-	a-	b41	-	-	1.41
F	Gilia spp. (a)	-	ab4	a-	b9	.01	-	.08
F	Lomatium spp.	-	3	-	4	.01	-	.00
F	Medicago sativa	b14	a-	a-	a-	-	-	-
F	Phlox longifolia	a-	b11	ab8	ab3	.02	.02	.03
F	Senecio multilobatus	-	-	-	-	-	-	.15
F	Streptanthus cordatus	-	2	-	-	.00	-	-
Total for Annual Forbs		0	140	1	88	5.48	0.00	1.80

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
Total for Perennial Forbs		14	21	9	7	0.13	0.02	0.18
Total for Forbs		14	161	10	95	5.62	0.02	1.98

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

BROWSE TRENDS --
Management unit 14 , Study no: 15

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Artemisia tridentata wyomingensis	71	69	65	11.02	11.82	12.32
B	Gutierrezia sarothrae	0	2	0	.03	.00	.00
B	Juniperus osteosperma	6	6	7	2.03	1.43	2.39
B	Opuntia spp.	1	0	0	-	-	-
B	Pinus edulis	2	2	1	.18	1.31	1.85
Total for Browse		80	79	73	13.27	14.57	16.56

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 15

Species	Percent Cover	
	'99	'04
Artemisia tridentata wyomingensis	-	12.88
Juniperus osteosperma	2.00	1.83
Pinus edulis	-	1.53

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 15

Species	Average leader growth (in)
	'04
Artemisia tridentata wyomingensis	1.8

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 15

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	91	70
Pinus edulis	47	47

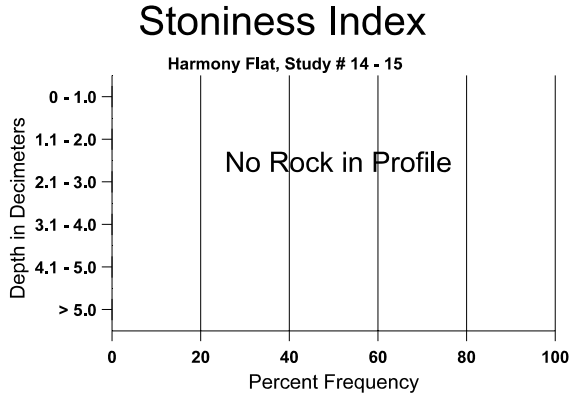
Average diameter (in)	
'99	'04
2.5	4.3
3	2.9

BASIC COVER --
Management unit 14 , Study no: 15

Cover Type	Average Cover %			
	'86	'92	'99	'04
Vegetation	3.00	20.40	21.62	18.27
Rock	0	.38	0	0
Pavement	0	0	.01	.01
Litter	50.00	37.43	34.76	30.44
Cryptogams	0	1.05	1.44	1.71
Bare Ground	47.00	44.36	47.77	60.25

SOIL ANALYSIS DATA --
Management unit 14, Study no: 15, Study Name: Harmony Flat

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
14.9	72.0 (12.1)	7.4	60.9	16.6	22.6	1.5	70.4	35.2	0.4



PELLET GROUP DATA --
Management unit 14 , Study no: 15

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	61	63	25
Deer	23	15	13
Cattle	3	8	6

Days use per acre (ha)	
'99	'04
-	-
21 (52)	15 (36)
19 (47)	16 (39)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**5198**	133	1466	2266	1466	-	13	0	28	1	4	18/17
92	**5060**	100	1860	3080	120	-	56	25	2	-	0	-/-
99	**3600**	60	340	2180	1080	60	57	37	30	3	11	24/31
04	**3160**	2140	-	880	2280	560	31	.63	72	34	54	20/29
Atriplex canescens												
86	**66**	-	-	-	66	-	0	100	100	-	0	-/-
92	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	24/24
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**40**	-	-	40	-	20	0	0	-	-	0	5/6
04	**0**	-	-	-	-	-	0	0	-	-	0	5/7
Juniperus osteosperma												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**120**	40	20	80	20	-	0	0	17	-	0	-/-
99	**140**	-	20	120	-	40	0	0	0	-	0	-/-
04	**140**	-	-	120	20	40	0	0	14	-	0	-/-
Opuntia spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	-	-	20	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	9/21
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**40**	-	40	-	-	-	0	0	-	-	0	-/-
99	**40**	20	-	40	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	20	0	0	-	-	0	-/-

Trend Study 14-16-04

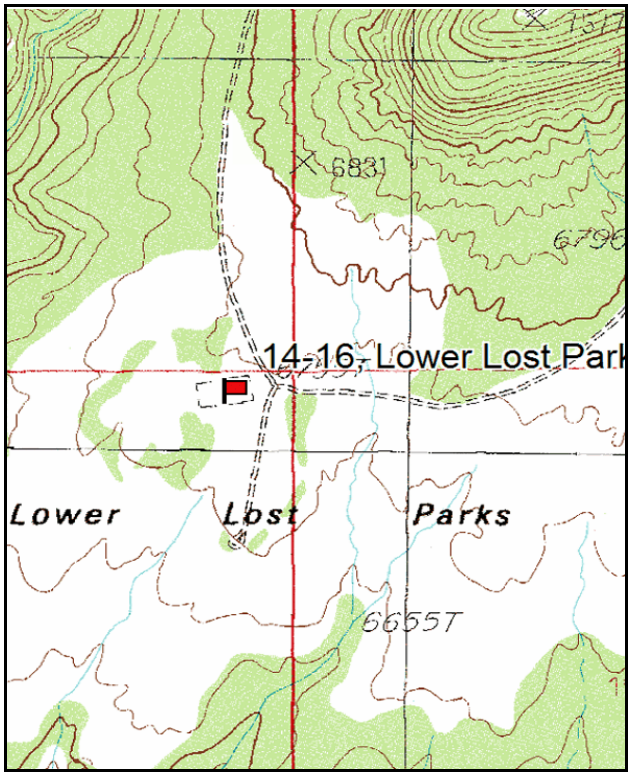
Study site name: Lower Lost Park . Vegetation type: Wyoming Big Sagebrush .

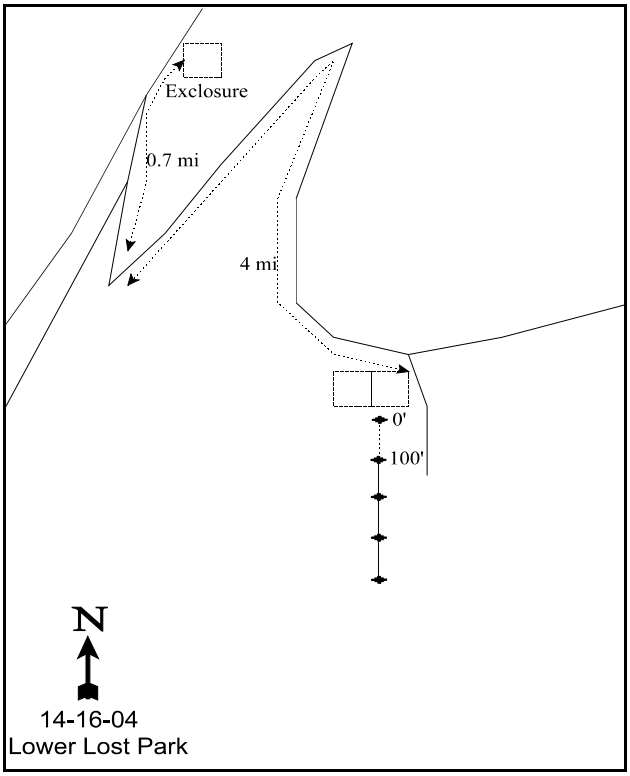
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the turnoff to the Kigalia Guard Station, proceed 2.4 miles southwest towards the Bears Ears. At the intersection, turn right and go west 2.1 miles. Go straight over the cattleguard, past a corral and continue 1.7 miles to a fork. Stay left and continue 1.5 miles to the FS/BLM boundary. Cross the cattleguard and go 2.45 miles to a fork by a stock pond. Stay right and go 0.6 miles. Stay left at this fork and continue 0.6 miles to another fork. Stay left and go 1.85 miles to an exclosure (Deer Flat exclosure and transect). Stay left at the fork by the exclosure and proceed 0.7 miles. Stay left at the forks, then drop off the rim down a tight switchback. Go just under 4 miles to an exclosure. Turn right on the road just east of the exclosure and stop after 100 feet. The transect begins 50 feet south of the center of the exclosure. All transect stakes are green fence posts. The 0-foot baseline post is tagged #7884.





Map Name: Woodenshoe Butte

Diagrammatic Sketch

Township 36S , Range 18E , Section 19

GPS: NAD 27, UTM 12S 4167110 N, 589573 E

DISCUSSION

Lower Lost Park - Trend Study No. 14-16

Lower Lost Park is administered by the BLM. This study site samples deer winter range in a sagebrush and pinyon-juniper flat south of the mouth of Deer Canyon. This area is on the southwest side of Elk Ridge. Topography at the study area is basically level at an elevation of 6,750 feet. The area drains west and south into the deep slickrock of White Canyon. It was originally chained in 1969 and crested wheatgrass and four-wing saltbush were seeded. Livestock is allocated 120 AUMs; 60 cattle from April 1 to May 31. In October 1986, following the establishment of this study, the herbicide tebuthiuron was applied. Edges and drainages were supposedly left untreated for wildlife use. By 1992, it appeared that the herbicide treatment was either ineffective or not done at all, because the sagebrush and juniper showed no effects of being chemically treated. The area does receive a fair amount of deer use during the winter. The pellet group transect on the study site averaged only 11 deer days use/acre (29 ddu/ha) over the 5-year period from 1981-86 (Jense et al. 1986). From 1987-1992, deer days use had risen to 38 ddu/acre (96 ddu/ha) (Jense et al. 1992). Deer use between 1993 and 1997 averaged 44 ddu/acre (109 ddu/ha). Pellet group data taken in 1999 along the trend study site baseline estimated 56 ddu/acre (138 ddu/ha), 1 elk days use/acre (2 edu/ha), and 7 cow days use/acre (17 cdu/ha). In 2004, deer use was lower as 23 ddu/acre (58 ddu/ha) were estimated. Elk use was estimated at 2 edu/acre (5 edu/ha0) and cattle use was 8 cdu/acre (20 cdu/ha).

The study is set up just outside an old (1958) cattle and deer exclosure. Animals have apparently been inside the exclosure and except for greater cryptogam development in the exclosure, there were few observable differences.

The light orange soil is moderately deep and loose on top with a light crust. It is more compacted below the surface layer. Soil texture is a loam with an effective rooting depth estimated at almost 15 inches. Depth is likely deeper since soil compaction makes soil pentrometer depth readings difficult. Phosphorus and potassium are low at just 3.3 ppm and 44.8 ppm respectively. No rocks were encountered on the surface or within the profile. Vegetative cover is scattered, leaving large bare interspaces that are very susceptible to erosion. This erosive disturbance could easily be the limiting factor for the establishment of browse and other herbaceous understory species within the bare interspaces.

When the study was established in August of 1986, a moderately dense and mostly decadent stand of Wyoming big sagebrush dominated the site. These plants displayed moderate to heavy hedging, a clubbed appearance, characterized with low growth and little seed production. Ten-foot tall pinyon pine and juniper were well established and appeared to be gaining dominance on the site. Density of sagebrush increased slightly in 1992, but some of the difference is due to the much larger sample used in 1992. Use was still moderate to heavy, vigor poor, and percent decadence high at 69%. By 1999, density had declined to 4,740 plants/acre. It appears that the population of mature plants has remained relatively constant while many of the decadent plants died. Use was still moderate to heavy and vigor was poor on a third of the plants sampled. Percent decadence declined, but it was still high at 47%. Recruitment in the form of seedlings and young were nearly non existent. In 2004, density declined to 4,560 plants/acre, a 4% decline in the population. Overall, this is a 47% decline since 1992. Percent decadence increased to 80%, while 55% of the population was classified as dying. There were no seedlings or young to replace the decadent and dying plants. Although density has declined since 1992, cover has remained relatively stable only declining from 18% in 1992 to 15% in 2004. There were fewer plants, but, plant size has increased. Average crown width increased from 19 inches in 1992 to 29 inches in 1999 and 28 inches in 2004.

Pinyon and juniper density was estimated in 2004 using the point-quarter method. Pinyon was estimated at 78 trees/acre with an average diameter of 4.4 inches. Utah juniper had a density of 37 trees/acre, with an average diameter of 3.3 inches. With pinyon-juniper cover exceeding 13%, coupled with the drought, this competitive overstory will start to effect the health and vigor of the herbaceous understory (Tausch and West 1994).

The herbicide treatment planned for October 1986 had the objective to kill the Wyoming big sagebrush and pinyon-juniper trees and release the understory grasses. In August 1986, the understory was depleted with grass frequency very low. The planned treatment obviously did not take place. By 1992 and 1999, conditions were similar with perennial grasses providing only about 2% cover. Forbs were also lacking and few species are common. Longleaf phlox was the only common forb. In 2004, the depleted understory had declined even further. Nested frequency for the most common grass, bottlebrush squirreltail, had declined significantly. Cover for perennial grasses was less than 1%. Nested frequency for perennial forbs was also significantly lower.

1986 APPARENT TREND ASSESSMENT

When sampled, the study area appeared to be in poor condition and experiencing a downward trend. The herbicide treatment was planned to benefit livestock, however it had the potential to improve the range condition and trend for big game as well. Management objectives should continue to include wildlife concerns. A grazing deferment for at least one season is necessary to allow grasses to reestablish and avoid causing accelerated soil loss. Cattle grazing after that point could be beneficial to sagebrush reestablishment. If some herbaceous cover and browse forage is maintained as specified in the plan, deer could also take advantage of spring forage on the treated areas. This study will either monitor vegetative changes on a treated area, or if the specific site was not actually treated (unknown at this time), note changes in use on an adjacent area affected by loss of other habitat.

1992 TREND ASSESSMENT

It appears that the treatment was not done or it was totally ineffective on the browse and tree species. The soil trend appears to be stable to slightly improving with increases in litter cover and a slight decrease in percent bare ground. Although, the soil condition is still very poor with a real need for the establishment of more herbaceous understory cover to protect it from high intensity summer storms that will continue to cause severe soil movement and losses. The browse trend is stable, with an increase in density (14%) offset somewhat by an increase in percent decadence, now up to 69%. Seedlings are nearly nonexistent and there are very few plants in the young age class (1%). These sagebrush population parameters should be closely monitored, especially if drought continues. The herbaceous understory trend can be best described as slightly down, with a moderate decrease in nested grass frequency and a slight decline in nested frequency for perennial forbs. Grasses are the most important component of the herbaceous understory and are weighted more heavily in determining trend for this site. The Desirable Components Index (see methods) rating is fair at 34 for a Wyoming big sagebrush community. Decadence and proportion of young plants is poor and perennial grasses are lacking.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 34 (fair) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil appears stable, but in poor condition with abundant bare ground exposed and erosion occurring. Trend for browse is down. Density has declined 45% since 1992, use is moderate to heavy, those classified with poor vigor has increased, and recruitment is poor. Percent decadence has declined, however 33% of the decadent plants sampled appear to be dying. There is currently not enough young plants to maintain the population, so a further decline in density is likely. On the positive side, density of mature plants has remained relatively stable since 1986. Without better recruitment however, the population will continue to decline. Trend for the herbaceous understory is stable for perennial grasses and forbs. However, there has been a significant increase in the nested frequency of cheatgrass which was not present in 1992. It now occurs in 45% of the quadrats. Cover of cheatgrass is still low, but can increase rapidly as it has on other sites within the unit. Sixweeks fescue, another annual, has also increased significantly in nested frequency since 1992. It

now accounts for 32% of the grass cover, up from 11% in 1992. With this in mind, trend for the herbaceous understory is considered down slightly. The DCI score remained stable at 33 (fair). Decadence improved, but cheatgrass was greater which negatively impacts the site.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 33 (fair) Wyoming big sagebrush type

2004 TREND ASSESSMENT

Trend for soil is slightly down. Bare ground has increased as vegetation cover has decreased. The ratio of bare soil to protective ground cover (vegetation, litter, and cryptogams) declined from 1:2.4 to 1:2.1, which is very poor. Erosion is rated as slight, but is susceptible to high intensity events. A better herbaceous component is needed to protect the soil. The browse trend is down. Since 1992 density has declined, but surviving plants have gotten larger so cover has remained fairly stable. Density has only dropped slightly since 1999, but decadence has increased to 80%, while 55% of the population was classified as dying. There are no young or seedling plants to replace the dying and decadent plants. The herbaceous understory trend is also down. Nested frequency for both perennial grasses and forbs has dramatically declined since 1999. The herbaceous understory makes up only 6% of the total vegetation cover. Cheatgrass has declined significantly since 1999, but competition from perennial grasses is needed to keep cheatgrass from becoming a major factor on this site in the future. The DCI score declined to a poor rating at 17. Decadence of sagebrush is very high and there are no young plants. The herbaceous understory is also very poor.

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - down (1)
winter range condition (DC Index) - 17 (poor) Wyoming big sagebrush type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 16

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Agropyron cristatum	11	2	10	1	.01	.10	.00
G	Bouteloua gracilis	$_{a}$-	$_{b}$16	$_{b}$18	$_{ab}$9	.22	.12	.01
G	Bromus tectorum (a)	-	$_{a}$-	$_{c}$116	$_{b}$21	-	.86	.19
G	Oryzopsis hymenoides	$_{ab}$26	$_{b}$41	$_{a}$14	$_{ab}$28	.35	.09	.52
G	Poa fendleriana	$_{b}$47	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
G	Sitanion hystrix	$_{c}$157	$_{b}$72	$_{b}$89	$_{a}$7	.78	1.28	.06
G	Stipa comata	$_{ab}$18	$_{ab}$20	$_{b}$34	$_{a}$8	.26	.22	.04
G	Vulpia octoflora (a)	-	$_{a}$70	$_{b}$135	$_{a}$47	.21	1.26	.61
Total for Annual Grasses		0	70	251	68	0.20	2.13	0.80
Total for Perennial Grasses		259	151	165	53	1.64	1.82	0.64

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
Total for Grasses		259	221	416	121	1.85	3.96	1.44
F	Arabis spp.	-	-	4	-	-	.01	-
F	Astragalus convallarius	95	87	75	60	.96	.79	.39
F	Calochortus nuttallii	-	11	-	-	.02	-	-
F	Cordylanthus wrightii (a)	$_{a}$13	$_{b}$157	$_{a}$1	$_{a}$2	6.91	.00	.01
F	Descurainia pinnata (a)	-	-	2	-	-	.00	-
F	Erigeron pumilus	$_{b}$25	$_{ab}$19	$_{c}$52	$_{a}$5	.16	.77	.04
F	Eriogonum racemosum	-	-	2	-	-	.00	-
F	Lesquerella spp.	-	2	-	-	.00	-	-
F	Machaeranthera canescens	$_{b}$36	$_{a}$6	$_{a}$3	$_{a}$10	.02	.00	.05
F	Madia glomerata (a)	-	-	1	5	-	.00	.04
F	Microsteris gracilis (a)	-	-	-	3	-	-	.03
F	Penstemon comarrhenus	$_{c}$53	$_{bc}$36	$_{ab}$19	$_{a}$4	1.29	.12	.01
F	Phlox longifolia	$_{b}$207	$_{c}$259	$_{c}$253	$_{a}$157	2.03	1.49	.79
F	Sphaeralcea coccinea	33	12	19	22	.11	.08	.13
F	Townsendia spp.	-	4	2	-	.01	.00	-
F	Unknown forb-annual (a)	-	2	-	-	.00	-	-
F	Unknown forb-perennial	2	-	-	-	-	-	-
Total for Annual Forbs		13	159	4	10	6.92	0.01	0.08
Total for Perennial Forbs		451	436	429	258	4.62	3.28	1.41
Total for Forbs		464	595	433	268	11.54	3.30	1.50

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

BROWSE TRENDS --
Management unit 14 , Study no: 16

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Artemisia tridentata wyomingensis	95	93	87	17.77	14.76	15.07
B	Chrysothamnus depressus	11	3	3	.04	.30	-
B	Chrysothamnus viscidiflorus	0	3	0	-	-	-
B	Eriogonum microthecum	4	4	1	.18	.03	.00
B	Gutierrezia sarothrae	0	0	2	-	.00	.03
B	Juniperus osteosperma	4	5	5	.56	.33	.74
B	Opuntia spp.	1	3	1	-	-	.01
B	Pinus edulis	10	6	5	6.81	7.19	5.65
Total for Browse		125	117	104	25.37	22.63	21.52

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 16

Species	Percent Cover	
	'99	'04
Artemisia tridentata wyomingensis	-	10.78
Chrysothamnus depressus	-	.13
Juniperus osteosperma	-	2.86
Opuntia spp.	-	.11
Pinus edulis	6.00	10.16

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 16

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

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 16

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	36	37
Pinus edulis	80	78

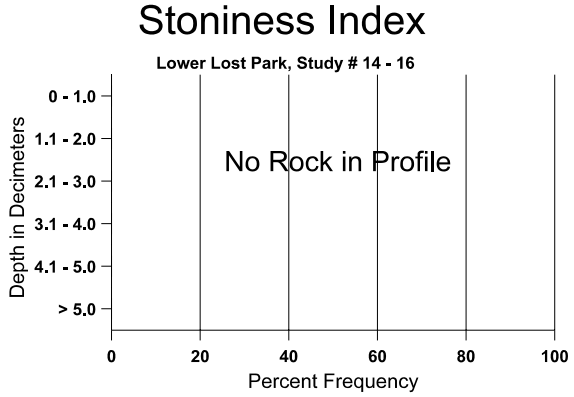
Average diameter (in)	
'99	'04
2.8	3.3
3.0	4.4

BASIC COVER --
Management unit 14 , Study no: 16

Cover Type	Average Cover %			
	'86	'92	'99	'04
Vegetation	3.25	32.20	27.01	22.48
Rock	0	.01	.00	0
Pavement	0	0	0	.01
Litter	28.25	29.35	31.84	31.78
Cryptogams	2.00	2.19	3.28	3.55
Bare Ground	66.50	46.18	48.67	53.32

SOIL ANALYSIS DATA --
Management unit 14, Study no: 16, Study Name: Lower Lost Park

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
14.5	61.7 (12.1)	6.9	44.0	32.2	23.8	1.0	3.3	44.8	0.5



PELLET GROUP DATA --
Management unit 14 , Study no: 16

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	44	60	34
Elk	-	1	-
Deer	49	39	15
Cattle	3	-	-

Days use per acre (ha)	
'99	'04
-	-
1 (2)	2 (5)
56 (138)	23 (58)
7 (17)	8 (20)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 16

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**7399**	-	-	2733	4666	-	35	49	63	6	24	20/19
92	**8600**	20	60	2620	5920	-	42	25	69	13	24	-/-
99	**4740**	-	20	2500	2220	880	38	38	47	16	33	19/29
04	**4560**	-	-	900	3660	1740	57	2	80	55	57	18/28
Chrysothamnus depressus												
86	**266**	-	66	200	-	-	0	0	0	-	0	6/6
92	**260**	-	80	180	-	-	62	8	0	-	0	-/-
99	**80**	-	-	80	-	-	0	50	0	-	0	8/11
04	**60**	-	-	20	40	20	33	33	67	33	33	2/7
Chrysothamnus viscidiflorus												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**60**	-	-	40	20	-	0	0	33	33	33	13/15
04	**0**	-	-	-	-	-	0	0	0	-	0	11/8
Eriogonum microthecum												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**120**	20	80	40	-	-	0	0	-	-	0	-/-
99	**80**	-	-	80	-	-	25	0	-	-	0	3/7
04	**20**	-	-	20	-	-	0	100	-	-	0	2/2
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	40	-	-	-	-	0	0	-	-	0	-/-
04	**80**	-	20	60	-	-	0	0	-	-	0	6/6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus osteosperma												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**80**	-	40	40	-	-	0	0	0	-	0	-/-
99	**100**	-	80	20	-	-	0	0	0	-	0	-/-
04	**100**	-	60	20	20	-	0	0	20	-	0	-/-
Opuntia spp.												
86	**66**	-	-	66	-	-	0	0	-	-	0	8/12
92	**20**	-	-	20	-	-	0	0	-	-	0	-/-
99	**80**	-	20	60	-	-	0	0	-	-	0	9/27
04	**20**	-	-	20	-	-	0	0	-	-	0	7/33
Pinus edulis												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**200**	-	100	80	20	-	0	0	10	-	0	-/-
99	**120**	20	40	80	-	-	0	0	0	-	0	-/-
04	**100**	20	20	80	-	-	0	0	0	-	0	-/-

Trend Study 14-18-04

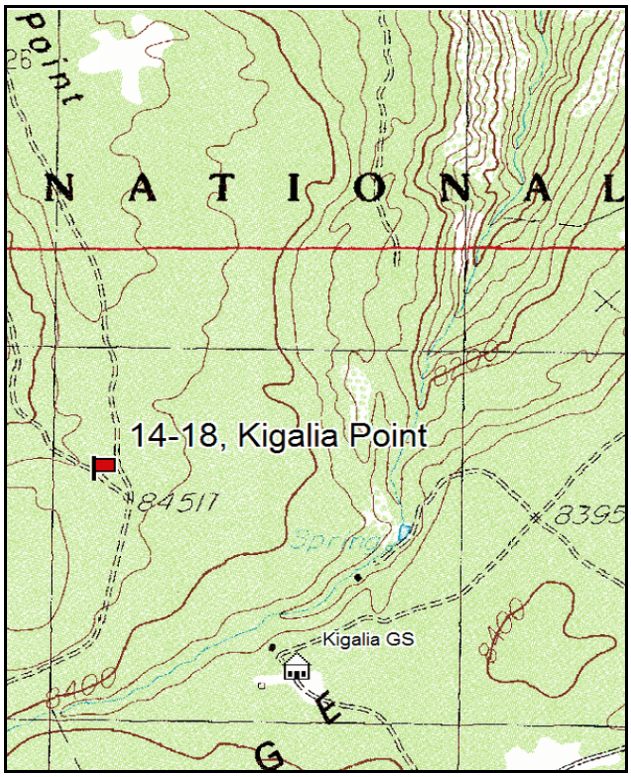
Study site name: Kigalia Point . Vegetation type: Logged Ponderosa Pine .

Compass bearing: frequency baseline 252 degrees magnetic.

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

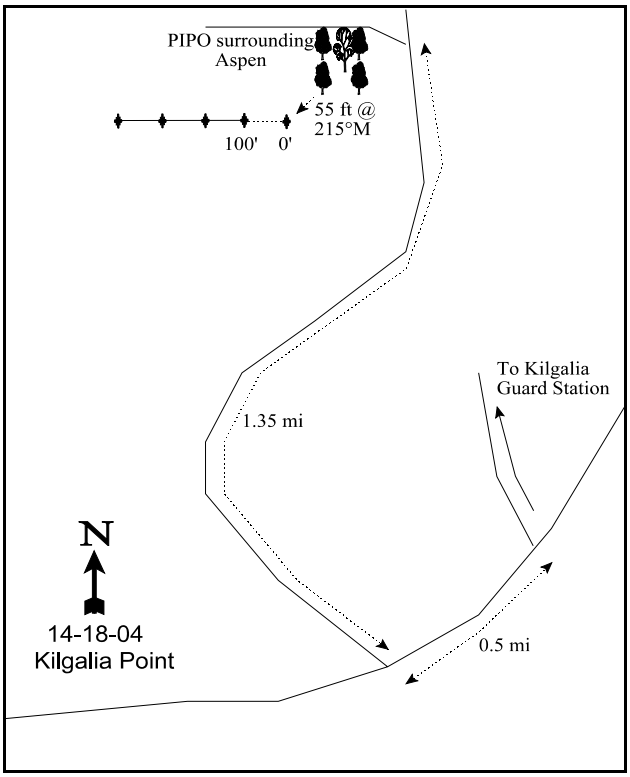
LOCATION DESCRIPTION

From the turnoff to the Kigalia Guard Station on the main Elk Ridge-Bears Ears Road, proceed southwest for 0.50 miles to the Kigalia Point Road. Turn right on this road and travel north for 1.35 miles to a small clearing in the ponderosa pine-aspen forest with a faint road turning off to the left. Park here and walk 0.05 miles down the faint road (just past the west end of the clearing) to where four clustered ponderosa with a large aspen growing in the middle of them are located on the left side of the road. Walk 55 feet southwest (@ 215°M) from these trees to a red painted fence post, 22 inches high. The baseline samples the same area as line 1 of the 1981 line intercept transect. The baseline runs west at 267°M. Two-hundred foot stake is 120 feet due to rocks, so just lay tape straight and string belt.



Map Name: Kigalia Point

Township 36S , Range 19E , Section 4



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4170640 N, 603104 E

DISCUSSION

Kigalia Point - Trend Study No. 14-18

Kigalia Point is a narrow, two mile long ridge, which extends to the north side of southern end of Elk Ridge. The point drops sharply on all sides to the east, west and north. Elevation of the point is about 8,400 feet along the ridge. The level terrain on top of this extension of the plateau is dominated by Ponderosa pine and quaking aspen with a dense understory and is summer range for wildlife and livestock. In the early 1960's, part of this area was logged to harvest old growth timber as part of an accelerated harvest to minimize beetle damage. In 1964, a small part of the section was thinned. The Forest Service has planned for a shelter-wood cut in approximately 15 to 20 years from site establishment in 1986. A ground fire occurred on the site in probably 1998 and did not effect large, mature trees.

Another major use of this area is cattle grazing. As part of the Kigalia Peavine unit on the Twin Springs allotment, the area is grazed on a three pasture rest-rotation system with a June 1 to October 1 season of use. The stocking rate is 500 head of cattle (2,640 AUMs). In 1992, cattle were grazing the allotment and use was moderate, with grass utilization at about 50%. The area sometimes receives heavy summer deer use. Numerous deer, especially does and fawns, were observed along the transect during past readings. Resting cover is good, but the openness of the forest above 3 to 4 feet does not hide a moving animal. There was some elk use near the edges of the ridge, where elk sign was found on the transect in 1986. Bear sign was also noted that same year. Pellet group data taken on the site in 1999, estimate 5 deer days use/acre (12 ddu/ha), 13 elk (32 edu/ha), and 5 cow days use/acre (12 cdu/ha). Over 20 elk, cows and calves, were seen on the site during the 1999 reading. There were also several deer seen in the area. A bear was seen on the point in 1999. In 2004, 14 deer days use/acre (35 ddu/ha), 2 elk (5 edu/ha), and 10 cow days use/acre (25 cdu/ha) were estimated. Other uses of the forest include mining claims, uranium exploration, and recreation. The area has an extensive network of roads allowing easy access to most of the remote areas.

Typical of high elevation conifer-aspen sites with dense understory vegetation, the soil is rarely exposed and has a well developed layer of litter and organic matter. The mineral soil is moderately deep with an estimated effective rooting depth of nearly 21 inches. It has a loam texture with a moderately acidic pH (6.0). Phosphorus is low at 5.1ppm. Bare ground was highest in 1999, while the site was recovering from fire. Due to the thick herbaceous cover, abundant litter, and level terrain, erosion is not a problem unless the soil is significantly disturbed by such activities as logging and road building.

The frequency baselines, established in 1986, were set up on the old Interagency line intercept study base line. The Ponderosa pine and quaking aspen over story shade most of the study site. Density estimates for Ponderosa pine and aspen were estimated at 66 and 466 trees/acre respectively in 1986. A majority of the aspens were tall enough that no leaves or twigs were available for browsing. These estimates have changed somewhat due to the much increased sample size which gives a more accurate estimate. After the fire in 1998, aspen suckers were abundant in 1999 and aspen density was higher. Point quarter data from 1999, estimate 134 aspen and 50 ponderosa trees/acre. Average diameter of aspen is estimated at 10.3 inches and Ponderosa at 14 inches. In 2004, density was lower, but has probably stabilized. Aspen suckers were rare and showed signs of heavy utilization. Young aspens that were stimulated by the fire were probably grazed by elk and cattle and were not able to establish. Aspen density was 60 trees/acre and Ponderosa density was 44 trees/acre. Diameter of aspen was 9.8 inches. Ponderosa diameter was 15.9 inches.

Oak varies from stands of mature and unavailable plants to clumps of young and moderately browsed sprouts. The scattered dense clumps were made up mainly of young plants, most sprouting vigorously, although some insect damage was evident in 1986. The most abundant shrub is mountain snowberry with an estimated density of 19,200 plants/acre in 1986 and 23,880 in 1994. Fifty-seven percent of the snowberry encountered in 1986 were classified as young sprouts, increasing to 63% in 1992. The young, along with the 2.5 foot tall

mature plants, were vigorous and generally only moderately browsed. Ten percent of the snowberry was heavily browsed in 1992 and almost 10% of the plants were also considered in poor vigor. Density of snowberry declined to 6,460 plants/acre in 1999 due to the controlled ground fire which occurred sometime during the fall of 1998. The surviving plants are lightly browsed and in good vigor. Density declined to 5,320 plants/acre in 2004. Vigor was excellent and the population was mostly mature.

The herbaceous understory forms a dense layer under the aspen and snowberry. It is vigorous and diverse, composed of many different perennial grasses and forbs. Fourteen species of grass were sampled on the frequency belts in 1992. The most abundant species are the sod forming, introduced species Kentucky bluegrass and smooth brome. Other prevalent species are timothy, and intermediate wheatgrass. Smooth brome and intermediate wheatgrass increased to their greatest abundance in 2004. No utilization of the grasses was apparent in 1999 or 2004. The more common and preferred species were Kings clover, dandelion, trailing fleabane, and fewflower peavine. Nested frequency and cover of forbs was lower than ever before in 2004. Grass dominance has increased since 1999 as grasses made up 56% of the total herbaceous understory cover compared to 82% in 2004. This is probably due to drought conditions and competition with competitive grasses such as smooth brome.

1986 TREND ASSESSMENT

The lack of significant changes in plant composition and density found by rereading the line intercept transects, plus data from the Interagency study and on-site observations indicate a stable vegetative trend. The possible increases in snowberry and oak density and production are positive changes, as they are the only plants observed to show consistent signs of use. Aspen production is largely unavailable for use. Forbs are abundant and constitute an important part of this summer range. Long term trends indicate a gradual increase in the number and production of woody species, including ponderosa pine, which will eventually cause only minor decreases in the understory herbaceous species because of the structure of ponderosa. Trend will probably remain stable until the area is impacted by future logging operations. The soil is fertile and well protected and also will remain stable until disturbed.

1992 TREND ASSESSMENT

The soil trend is considered stable because percent bare ground is still below 10%. The browse trend for this range is not as critical for it is a summer range. Both Gambel oak and aspen have decreased densities, but this is more reflective of a much larger sampling design than any actual decreases in density. Wood's rose and serviceberry have increased estimated densities, but are still in low numbers. Trend for browse should be considered stable, although it is not critical for this summer range. There are 14 species of grasses which have increased nested frequency values and 18 forb species, which have nested frequency values that have decreased slightly since 1986. The increasing grass component makes up 79% of the herbaceous understory cover. The herbaceous understory is vigorous and productive with a stable to slightly improving trend. The improvements are due mostly to the grasses.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

1999 TREND ASSESSMENT

A prescribed ground fire burned the area sometime during the fall of 1998. The disturbance significantly changed the ground cover characteristics as well as the browse densities. Many ponderosa pine trees are scorched up to a height of 30 to 40 feet but otherwise unharmed by the fire. Ground cover is still abundant but

litter cover did decline from 83% to 69% and percent bare ground increased from 4% to 13%. Erosion is not a problem however. Trend is considered slightly down however, due to the reduction in protective cover. Trend for browse is down due to a decline in density of all shrub species. However, shrubs are not as important on a summer range as the herbaceous understory. The fire did stimulate sprouting of aspen and snowberry which will increase in the future. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency of perennial grasses. Currently only smooth brome and Kentucky bluegrass are abundant. These species provide 43% and 39% of the grass cover respectively. Frequency of perennial forbs remained stable. This is likely only a temporary setback due to the burn. With the reduction of shrubs on the site, grasses and forbs will recover in the future.

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - slightly down (2)

2004 TREND ASSESSMENT

The soil trend is slightly up, as conditions have returned to where they were prior to the fire. Ground cover is very good and there is no threat of erosion. The trend for browse is stable. Aspen density has declined, but this is mostly from the loss of young, sprouting aspens that were not able to become established after the fire. The density has probably stabilized following the fire. The snowberry population has matured and stabilized. This is summer range so the browse component is not as important as the herbaceous understory. The trend for the herbaceous understory is slightly up as perennial grasses have increased and dominate the understory. The dominant species are introduced, sod forming grasses: Kentucky bluegrass and smooth brome. Forbs are declining with the competition from grasses.

TREND ASSESSMENT
soil - slightly up (4)
browse - stable (3)
herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Management unit 14 , Study no: 18

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Agropyron intermedium	$_{a}$14	$_{b}$77	$_{ab}$51	$_{c}$118	1.82	1.68	3.97
G	Agropyron trachycaulum	$_{b}$20	$_{c}$32	$_{b}$11	$_{a}$-	1.02	.05	-
G	Bromus anomalus	$_{a}$-	$_{b}$21	$_{b}$18	$_{a}$-	.77	.28	-
G	Bromus inermis	$_{a}$85	$_{b}$179	$_{ab}$187	$_{c}$223	11.11	7.80	11.89
G	Bromus tectorum (a)	-	-	-	1	-	-	.15
G	Carex spp.	$_{b}$13	$_{ab}$5	$_{a}$-	$_{a}$-	.04	-	.00
G	Dactylis glomerata	16	39	19	34	1.67	.75	.80
G	Festuca thurberi	-	6	-	-	.53	-	-
G	Juncus spp.	-	7	-	-	.04	-	-
G	Oryzopsis hymenoides	3	-	-	-	-	-	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Phleum alpinum	-	-	3	-	-	.03	-
G	Phleum pratense	$_{b}$40	$_{b}$36	$_{ab}$23	$_{a}$2	1.06	.34	.03
G	Poa pratensis	$_{b}$294	$_{a}$216	$_{a}$203	$_{a}$223	16.39	7.03	11.79
G	Sitanion hystrix	$_{b}$30	$_{ab}$24	$_{a}$3	$_{a}$4	1.31	.06	.06
G	Stipa columbiana	$_{a}$-	$_{b}$29	$_{a}$-	$_{a}$-	.35	-	-
G	Stipa comata	-	5	-	-	.41	-	-
Total for Annual Grasses		0	0	0	1	0	0	0.15
Total for Perennial Grasses		515	676	518	604	36.56	18.05	28.56
Total for Grasses		515	676	518	605	36.56	18.05	28.71
F	Achillea millefolium	$_{c}$164	$_{b}$94	$_{ab}$59	$_{a}$41	3.83	1.34	.47
F	Agoseris glauca	-	-	1	-	-	.03	-
F	Antennaria spp.	-	2	-	-	.00	-	-
F	Arenaria congesta	-	3	-	-	.03	-	-
F	Aster spp.	-	-	-	3	-	-	.00
F	Calochortus nuttallii	-	-	-	1	-	-	.00
F	Collomia linearis (a)	-	$_{a}$3	$_{ab}$13	$_{b}$19	.03	.05	.49
F	Comandra pallida	-	-	6	-	-	.01	-
F	Collinsia parviflora (a)	-	$_{a}$-	$_{a}$-	$_{b}$46	-	-	.19
F	Descurainia pinnata (a)	-	-	-	5	-	-	.03
F	Erigeron flagellaris	$_{ab}$19	$_{b}$40	$_{ab}$19	$_{a}$11	2.42	.11	.12
F	Erigeron speciosus	1	4	-	-	.06	-	-
F	Geranium spp.	-	1	4	-	.03	.06	-
F	Lathyrus lanszwertii	$_{a}$8	$_{b}$65	$_{b}$78	$_{b}$85	1.16	4.01	2.25
F	Lomatium spp.	-	8	6	-	.04	.15	-
F	Microsteris gracilis (a)	-	-	-	4	-	-	.01
F	Navarretia intertexta (a)	-	-	-	1	-	-	.00
F	Phacelia spp.	-	-	-	1	-	-	.03
F	Polygonum douglasii (a)	-	$_{b}$21	$_{a}$2	$_{a}$1	.07	.00	.00
F	Senecio canus	2	7	-	-	.01	-	-
F	Senecio multilobatus	-	-	-	1	-	-	.00
F	Stellaria jamesiana	$_{a}$-	$_{b}$24	$_{bc}$38	$_{c}$38	.17	.61	.63
F	Taraxacum officinale	$_{b}$126	$_{b}$113	$_{b}$86	$_{a}$41	.89	1.66	.25
F	Thlaspi fendleri	-	1	-	-	.03	-	-
F	Thermopsis montana	$_{bc}$43	$_{ab}$17	$_{c}$50	$_{a}$3	.26	2.84	.15
F	Trifolium kingii	$_{c}$183	$_{a}$74	$_{b}$104	$_{a}$66	.44	3.07	2.30
F	Unknown forb-perennial	$_{b}$9	$_{a}$1	$_{a}$-	$_{a}$-	.00	-	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
F	Vicia exigua	b16	a-	a-	a-	-	-	-
F	Viola spp.	-	2	-	-	.00	-	-
Total for Annual Forbs		0	24	15	76	0.10	0.05	0.74
Total for Perennial Forbs		571	456	451	291	9.41	13.93	6.25
Total for Forbs		571	480	466	367	9.51	13.98	6.99

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

BROWSE TRENDS --
Management unit 14 , Study no: 18

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Amelanchier alnifolia	1	0	0	-	-	-
B	Pinus ponderosa	8	6	7	17.36	.38	.38
B	Populus tremuloides	5	7	7	7.45	.48	-
B	Quercus gambelii	19	6	12	5.21	.36	.63
B	Rosa woodsii	22	12	4	.36	.10	.03
B	Symphoricarpos oreophilus	91	76	81	22.51	6.27	9.43
Total for Browse		146	107	111	52.91	7.59	10.48

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 18

Species	Percent Cover	
	'99	'04
Pinus ponderosa	22.20	34.00
Populus tremuloides	8.60	6.00
Quercus gambelii	-	4.19
Rosa woodsii	-	.03
Symphoricarpos oreophilus	-	11.69

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 18

Species	Trees per Acre	
	'99	'04
Pinus ponderosa	50	44
Populus tremuloides	134	60

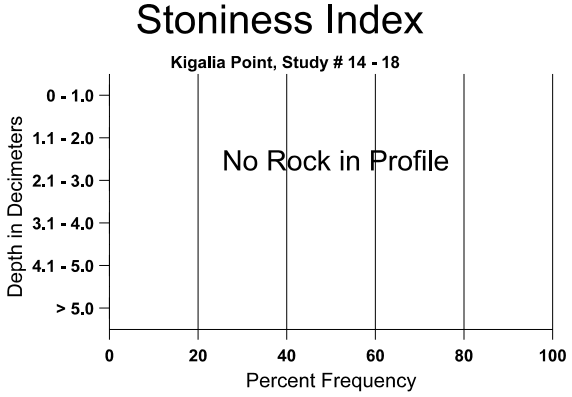
Average diameter (in)	
'99	'04
14.1	15.9
10.3	9.8

BASIC COVER --
Management unit 14 , Study no: 18

Cover Type	Average Cover %			
	'86	'92	'99	'04
Vegetation	13.25	74.02	44.20	49.56
Rock	0	.01	.38	.66
Pavement	0	0	0	.03
Litter	83.00	83.83	69.15	62.50
Cryptogams	0	.00	0	0
Bare Ground	3.75	3.93	12.71	2.23

SOIL ANALYSIS DATA --
Management unit 14, Study no: 18, Study Name: Kigalia Point

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
20.8	44.7 (18.1)	6.0	46.0	36.2	17.8	3.6	5.1	99.2	0.4



PELLET GROUP DATA --
Management unit 14 , Study no: 18

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	3	-	-
Elk	5	5	3
Deer	16	-	1
Cattle	9	-	2

Days use per acre (ha)	
'99	'04
-	-
13 (32)	2 (5)
5 (12)	14 (35)
5 (12)	10 (25)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier alnifolia												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**40**	-	20	-	20	-	50	0	50	50	50	-/-
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Artemisia frigida												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	20	0	0	-	-	0	-/-
Pinus ponderosa												
86	**66**	-	66	-	-	-	0	0	0	-	0	-/-
92	**220**	-	20	180	20	-	0	0	9	-	0	-/-
99	**180**	-	-	180	-	-	0	0	0	-	0	-/-
04	**180**	-	20	60	100	20	0	0	56	-	0	-/-
Populus tremuloides												
86	**466**	66	133	333	-	-	0	0	0	-	0	303/61
92	**100**	80	20	80	-	-	0	0	0	-	0	-/-
99	**300**	180	200	60	40	20	0	0	13	-	0	-/-
04	**160**	-	120	-	40	20	25	38	25	25	25	-/-
Quercus gambelii												
86	**3932**	1666	2866	200	866	-	19	29	22	.50	14	143/39
92	**2320**	660	2020	240	60	-	62	6	3	.86	.86	-/-
99	**440**	-	340	40	60	200	5	0	14	9	9	171/59
04	**600**	-	560	20	20	80	3	0	3	3	3	131/83

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Rosa woodsii												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**1400**	380	1280	40	80	-	9	4	6	1	1	-/-
99	**460**	20	460	-	-	40	0	0	0	-	0	-/-
04	**100**	-	60	20	20	-	0	0	20	-	0	12/3
Symphoricarpos oreophilus												
86	**19200**	8400	11000	7600	600	-	45	7	3	-	.69	28/20
92	**23880**	3800	14960	8900	20	-	42	10	0	-	9	-/-
99	**6460**	640	4580	1060	820	920	11	0	13	.61	.61	18/24
04	**5320**	-	900	4400	20	-	2	0	0	.37	.37	16/21

Trend Study 14-19-04

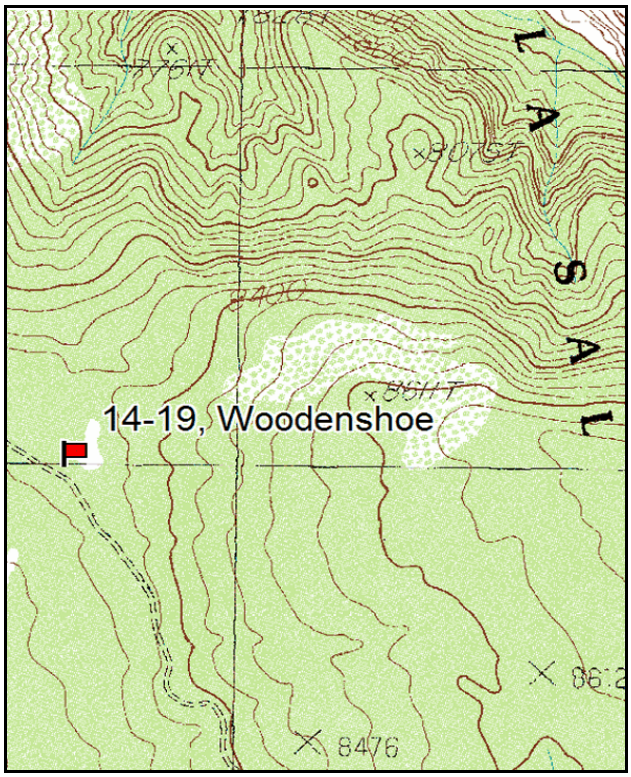
Study site name: Woodenshoe . Vegetation type: Logged Ponderosa Pine .

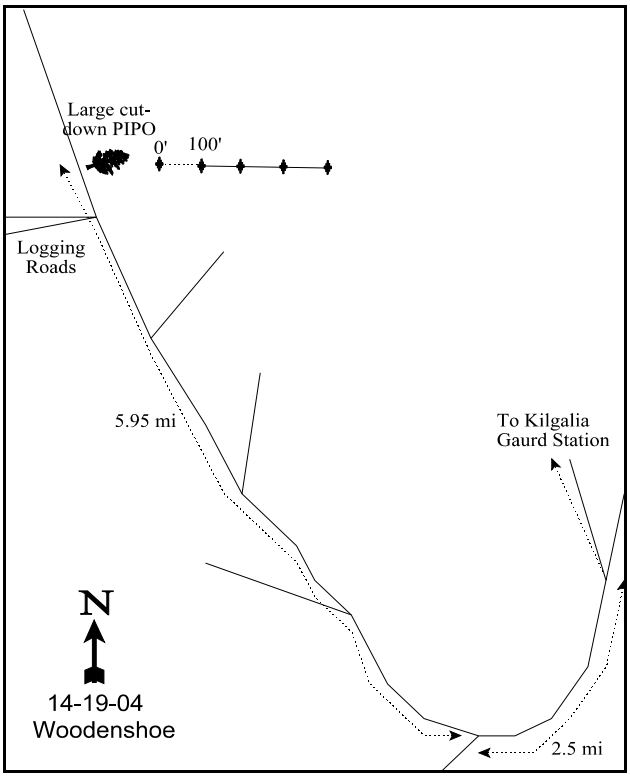
Compass bearing: frequency baseline 64 degrees magnetic.

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

LOCATION DESCRIPTION

From the Kigalia Guard Station turnoff, go 2.5 miles southwest towards the Bears Ears. Turn right at the fork and proceed 2.05 miles to fork located just west of a cattleguard and opposite a corral. Turn right, and go north 1.05 mile to another fork (County Road #271a). Turn left toward Woodenshoe Point and go 1.35 miles to a fork. Stay left and continue 1.45 miles. At this point there are two overgrown, impassable logging roads taking off to the left. Go 0.05 miles (about 210 feet) past the logging roads to a moderately large, cut-down ponderosa on the right and a small clump of tall oak on the left. The transect starting point is about 10 feet east of the pine. The baseline is marked by the 1981 line-intercept red and green steel fence posts 16 inches tall. The 0-foot stake has browse tag #482 attached.





Map Name: Woodenshoe Butte

Diagrammatic Sketch

Township 35S , Range 18E , Section 34

GPS: NAD 27, UTM 12S 4171977 N, 595609 E

DISCUSSION

Woodenshoe - Trend Study No. 14-19

The Woodenshoe summer range study is located on a plateau on the southwest portion of Elk Ridge. The study elevation is 8,400 feet, located in the middle of the gently sloping, southwest-facing plateau. The plateau drains west into the steep slickrock of Woodenshoe Canyon. This area was burned in the summer of 2003 by a wildfire caused by a campfire. Prior to burning the vegetation was dense and dominated mainly by Ponderosa pine, Gambel oak, snowberry, sagebrush, and various perennial grasses. The area appears to be drier than the other summer range studies, which explains the lack of aspen. The trend study was established in 1986, at the same location as an old line intercept study. The 1986 trend study baseline sampled only a 100 ft baseline, mainly under Ponderosa pine. In 1992, the baseline was lengthened to better sample the area. The longer baseline samples some open meadow areas along with the Ponderosa pine forest. There has been selective removal of ponderosa pines, but no large scale logging has taken place on the site.

Like Kigalia Point, this study is on the Twin Springs allotment and is managed for summer grazing under a rest-rotation system by the Manti-LaSal National Forest. The numerous roads traversing the plateau facilitate logging, grazing management, and easy access to mining claims. There has been geophysical exploration, heavy uranium drilling, and oil-gas leasing in the general area. In addition to these uses, the area receives moderate summer deer use and also some elk use in late fall and early winter. Pellet group data from 1999 estimated 7 deer days use/acre (17 ddu/ha), 3 elk days use/acre (7 edu/ha), and 26 cow days use/acre (64 cdu/ha). Cows and deer were observed near the site in 1999. In 2004, 12 deer days use/acre (31 ddu/ha), 7 elk days use/acre (17 edu/ha), and 26 cow days use/acre (64 cdu/ha) were estimated. Most cow pats sampled were older, but there was evidence of cow use during the summer of 2004.

The soil is moderately deep but rocky. Effective rooting depth is estimated at nearly 19 inches. Texture is a loam with a slightly acid pH (6.5). Phosphorus is low at just 7.6 ppm. Values below 10 ppm may effect plant growth and development. Parent material of the soil is granite, with bedrock near the surface in some places. Stoniness measurements show that the majority of the rock occurs in the top 8 inches of soil profile. There is little rock or pavement on the surface due to the high amounts of vegetation and litter cover. Erosion on the site is minimal and localized. After the fire bare ground was higher, but ground cover was still good and the site was rated as stable for erosion.

The fire burned mostly as an understory fire, although a few Ponderosa pines did completely burn. Ponderosa pine was the dominant tree species. Many trees are large (75-100 ft.) and they visually dominate the area. Overhead ponderosa cover was estimated at 21% in 1999. This was reduced to 6% in 2004. Gambel oak density was reduced from 3,580 plants/acre in 1999 to 1,460 plants/acre in 2004. Cover decreased from 6 to 2% after the fire. Mountain big sagebrush density was reduced by 64% by the fire down to 540 plants/acre. However, 48% of the population was young. Prior to the fire, density was relatively stable. Decadence was high in 1986, but has declined with each reading. Use has been light to moderate on all readings. Other palatable shrubs are less common, but includes some chokecherry, bitterbrush, and ceanothus. Observed use is generally light except for bitterbrush which has displayed moderate to heavy use since 1986. Bitterbrush density was reduced by 80% to only 40 plants/acre after the fire.

Although overall density is rather low and restricted by the tree and shrub overstory, the herbaceous understory has been rather diverse. The small openings in the overstory support a good, dry meadow-like stand of grasses. Common species are mutton bluegrass, Kentucky bluegrass, bottlebrush squirreltail, Letterman needlegrass, and sedge. Kentucky bluegrass was more common in the openings, but declined significantly in 2004 as it is not as drought tolerant as the other species. In 1999, it made up 70% of the total grass cover, but was down to only 20% in 2004. Several species of productive, palatable forbs are also found. Utilization of forbs is light. More notable species include trailing fleabane, thickleaf peavine, Rocky

Mountain penstemon, redroot eriogonum, and silky lupine. Nested frequency of grasses and forbs was lower in 2004, probably due to the fire. It is expected that grasses and forbs should flourish with the reduced competition from woody species, after they have recovered from the fire.

1986 TREND ASSESSMENT

No significant changes or trends were demonstrated by data from either the old line intercept transect data or observations from the frequency-density study. The parameters studied show consistency between years especially in terms of species composition and age structure of the population. Most data indicate an increase in the density and production of the major browse species. There also is evidence of an increase in total production, but this parameter is related more to seasonal precipitation and sampling techniques than actual trends. Overall, the vegetative community appears to be in a stable and healthy condition, supporting a variety of plants and wildlife species. The soil trend is also stable to possibly even improving with continued addition of litter forming a deep organic matter layer.

1992 TREND ASSESSMENT

With the examination of photographs and basic cover data, soil trend would be considered stable at this time for this site. But, there have been some obvious problems in the past from grazing and/or logging, for there is a large active gully near the last 100 foot frequency belt line of the vegetative transect. Even though litter cover decreased and relative percent cover of bare ground increased, all this would be expected with the drought since 1985. These parameters should improve with better seasonal precipitation patterns of which 1992 had been the best since 1985. The browse trend would involve condition and trend for the most abundant and preferred species which would include: mountain big sagebrush, bitterbrush, Gambel's oak, and snowberry. Bitterbrush and Gambel's oak were the only species that exhibited increases in their densities. It should be noted again that the sampling design is much larger now and species that occur clumped and/or aggregated would be sampled more accurately with better estimates of their respective densities. Snowberry's population decreased by 71%, but the proportion of the population that were classified as having poor vigor have declined from 28% in 1986 to only 3% in 1992. This is indicative of drought which has had a thinning effect on this rhizomatous population. Mountain big sagebrush population is now estimated to be 1,660 plants/acre in 1992. Percent decadence has improved from a high of 63% in 1986 down to 30% in 1992, indicating improvements in it's population. Browse trend for Wooden Shoe area is considered stable for this high elevation site. Trend is up for the herbaceous understory. Both the grasses and forbs have increased nested frequency values and the number of species has also increased for grasses and forbs from 5 to 12 and 14 to 26 respectively. The increase in moisture in 1992 probably had much to do with this improvement in nested frequency values and improved species diversity.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - up (5)

1999 TREND ASSESSMENT

Trend for soil is considered stable. Relative percent cover of litter and bare ground have remained similar since 1992. Trend for browse is stable for the key species, mountain big sagebrush, Gambel oak, and snowberry. Density of sagebrush has declined slightly due to a loss of decadent plants. There is now more mature plants and percent decadence has declined from 30% to 8%. Densities of Gambel oak and snowberry have declined slightly, but some of the difference is due to the change in sample size combined with the difficulty in counting these rhizomatous shrubs. Cover values for these two species are similar to 1992 estimates. Trend for the herbaceous understory is down slightly. Most perennial grass species declined in

nested frequency except Kentucky bluegrass which increased significantly and currently provides 70% of the grass cover. Sum of nested frequency for grasses declined overall. Total grass cover also declined from nearly 15% in 1992 to 10% in 1999. Sum of nested frequency and cover of perennial forbs remained similar to 1992 estimates.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly down (2)

2004 TREND ASSESSMENT

The trend for soil is down due to fire. The ratio of bare soil to protective ground cover (vegetation, litter, and cryptogams) declined from 1:5.2 to 1:3.0. Relative bare ground cover increased from 10% to 21%, but erosion is not considered a problem at this time. As understory species recover from the fire soil conditions should improve. The browse trend is down as all species have declined in density and cover. Sprouting species like Gambel oak and snowberry should recover quickly. Sagebrush and bitterbrush will take longer to become reestablished from seed, but many young and seedling sagebrush were sampled in 2004. The reduction of Ponderosa pine cover should be beneficial to understory and lower shrub species. The herbaceous understory trend is down. The sum of nested frequency for both grasses and forbs is a one-third lower than it was in 1999. Cover is down 40% for grasses. The fire should benefit the herbaceous understory once it has recovered from the initial disturbance.

TREND ASSESSMENT
soil - down (1)
browse - down (1)
herbaceous understory - down (1)

HERBACEOUS TRENDS --
Management unit 14 , Study no: 19

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Agropyron trachycaulum	$_{a}$-	$_{b}$29	$_{b}$43	$_{a}$-	.41	.55	-
G	Bouteloua gracilis	-	7	-	-	.06	-	-
G	Bromus anomalus	5	12	16	11	.29	.13	.34
G	Carex spp.	44	32	23	38	2.24	.93	2.08
G	Koeleria cristata	-	2	-	-	.03	-	-
G	Muhlenbergia montana	-	8	7	6	.45	.06	.03
G	Poa fendleriana	$_{bc}$54	$_{c}$99	$_{ab}$36	$_{a}$7	1.75	.70	.05
G	Poa pratensis	$_{a}$-	$_{b}$82	$_{c}$126	$_{b}$58	3.87	7.08	1.25
G	Sitanion hystrix	$_{bc}$63	$_{c}$92	$_{a}$10	$_{ab}$30	3.43	.18	1.17
G	Stipa columbiana	$_{a}$-	$_{b}$22	$_{ab}$9	$_{ab}$6	.73	.12	.10
G	Stipa comata	$_{b}$30	$_{ab}$12	$_{a}$8	$_{a}$1	.39	.07	.03
G	Stipa lettermani	$_{a}$-	$_{c}$40	$_{b}$8	$_{c}$33	1.21	.27	1.03

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		196	437	286	190	14.90	10.13	6.11
Total for Grasses		196	437	286	190	14.90	10.13	6.11
F	Achillea millefolium	26	32	40	23	.89	1.39	.81
F	Agoseris glauca	$_{a}$-	$_{a}$-	$_{ab}$6	$_{b}$11	-	.02	.08
F	Arenaria congesta	1	3	6	3	.03	.12	.15
F	Artemisia ludoviciana	8	-	-	-	-	-	-
F	Aster chilensis	$_{a}$-	$_{ab}$5	$_{b}$14	$_{ab}$3	.06	.06	.03
F	Astragalus spp.	-	-	-	4	-	-	.03
F	Castilleja linariaefolia	$_{b}$25	$_{a}$2	$_{a}$-	$_{a}$-	.00	-	-
F	Calochortus nuttallii	-	-	3	-	-	.00	-
F	Chenopodium spp. (a)	-	5	-	2	.01	-	.00
F	Collomia linearis (a)	-	-	-	2	-	-	.01
F	Comandra pallida	2	-	1	-	-	.00	-
F	Collinsia parviflora (a)	-	-	3	130	-	.01	2.06
F	Crepis acuminata	-	-	-	4	-	-	.03
F	Delphinium nuttallianum	-	-	-	3	-	-	.00
F	Epilobium brachycarpum (a)	-	8	-	-	.04	-	-
F	Erigeron divergens	$_{a}$10	$_{b}$23	$_{a}$1	$_{a}$-	.30	.00	-
F	Erigeron eatonii	-	3	-	3	.03	-	.03
F	Erigeron flagellaris	$_{ab}$57	$_{b}$92	$_{b}$94	$_{a}$52	2.71	2.15	1.78
F	Eriogonum racemosum	$_{b}$21	$_{a}$5	$_{ab}$14	$_{a}$6	.05	.08	.07
F	Gayophytum ramosissimum(a)	-	$_{a}$-	$_{a}$-	$_{b}$12	-	-	.45
F	Heterotheca villosa	-	3	-	-	.63	-	-
F	Ipomopsis aggregata	-	4	4	3	.03	.04	.00
F	Lathyrus lanszwertii	$_{b}$77	$_{b}$49	$_{b}$58	$_{a}$18	.93	1.61	.38
F	Lappula occidentalis (a)	-	-	-	2	-	-	.03
F	Lupinus sericeus	28	13	31	17	.14	.91	2.14
F	Lychnis drummondii	-	-	-	-	-	-	.00
F	Microsteris gracilis (a)	-	$_{a}$3	$_{b}$35	$_{b}$30	.00	.18	.36
F	Navarretia intertexta (a)	-	$_{a}$-	$_{a}$-	$_{b}$14	-	-	.09
F	Oenothera spp.	-	2	-	-	.03	-	-
F	Penstemon strictus	$_{b}$35	$_{a}$16	$_{a}$5	$_{a}$6	.10	.07	.07
F	Phacelia spp.	-	4	-	-	.01	.03	-
F	Phlox longifolia	41	60	46	61	.43	.11	1.00
F	Polygonum douglasii (a)	-	$_{b}$74	$_{a}$18	$_{a}$37	.42	.04	.33

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
F	Senecio canus	$_{b}$28	$_{a}$4	$_{a}$7	$_{a}$9	.01	.01	.09
F	Senecio multilobatus	-	-	2	3	.00	.00	.00
F	Stellaria jamesiana	-	1	4	1	.03	.03	.03
F	Taraxacum officinale	$_{a}$-	$_{b}$26	$_{b}$27	$_{a}$-	.49	.29	-
F	Tragopogon dubius	-	8	3	4	.20	.03	.03
F	Unknown forb-annual (a)	-	8	-	-	.07	-	-
F	Unknown forb-perennial	$_{ab}$2	$_{b}$12	$_{a}$-	$_{a}$-	.02	-	-
Total for Annual Forbs		0	98	56	229	0.55	0.23	3.36
Total for Perennial Forbs		361	367	366	234	7.18	7.00	6.79
Total for Forbs		361	465	422	463	7.73	7.24	10.15

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

BROWSE TRENDS --
Management unit 14 , Study no: 19

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Artemisia tridentata vaseyana	44	41	11	3.44	2.59	.71
B	Chrysothamnus depressus	1	1	0	-	-	-
B	Mahonia repens	30	29	27	.71	1.04	1.23
B	Pinus ponderosa	8	8	7	19.45	1.32	1.48
B	Prunus virginiana	1	0	1	-	-	-
B	Purshia tridentata	8	9	2	.97	.21	.06
B	Quercus gambelii	36	37	26	5.79	6.10	1.96
B	Rosa woodsii	2	1	0	.00	-	-
B	Symphoricarpos oreophilus	58	53	38	12.09	11.84	4.14
Total for Browse		188	179	112	42.47	23.13	9.60

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 19

Species	Percent Cover	
	'99	'04
Artemisia tridentata vaseyana	-	1.48
Mahonia repens	-	.60
Pinus ponderosa	21.39	5.84
Purshia tridentata	-	.06
Quercus gambelii	3.00	1.04
Symphoricarpos oreophilus	-	5.46

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 19

Species	Average leader growth (in)
	'04
Artemisia tridentata vaseyana	2.7
Purshia tridentata	3.3

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 19

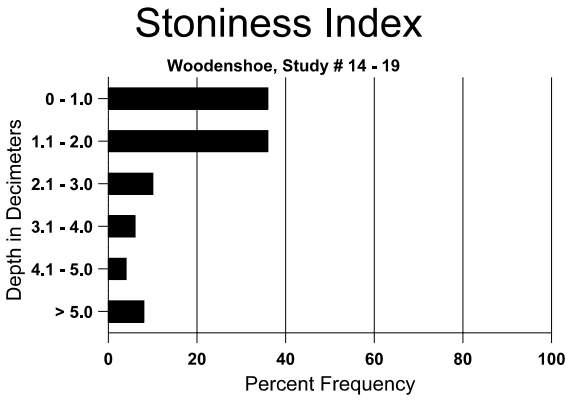
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Pinus ponderosa	52	-	12.8	-
Quercus gambelii	100	-	2.7	-

BASIC COVER --
Management unit 14 , Study no: 19

Cover Type	Average Cover %			
	'86	'92	'99	'04
Vegetation	8.75	54.92	40.18	27.22
Rock	3.50	2.12	1.31	2.61
Pavement	0	0	.16	.18
Litter	79.25	61.79	62.31	54.27
Cryptogams	0	.92	.07	1.48
Bare Ground	8.50	14.34	11.56	23.31

SOIL ANALYSIS DATA --
Management unit 14, Study no: 19, Study Name: Woodenshoe

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
18.9	50.3 (15.7)	6.5	48.4	31.1	20.6	3.8	7.6	204.8	0.4



PELLET GROUP DATA --
Management unit 14 , Study no: 19

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	11	3	2
Grouse	4	-	-
Elk	4	1	-
Deer	11	8	4
Cattle	4	8	3

Days use per acre (ha)	
'99	'04
-	-
-	-
3 (7)	7 (17)
7 (17)	13 (31)
26 (65)	26 (65)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 19

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
86	**1998**	266	66	666	1266	-	33	7	63	5	20	26/18
92	**1660**	460	640	520	500	-	17	2	30	1	7	-/-
99	**1500**	80	460	920	120	240	15	3	8	1	1	25/35
04	**540**	60	260	260	20	140	41	0	4	4	4	16/23

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Ceanothus fendleri												
86	**132**	-	66	66	-	-	0	0	-	-	0	7/20
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus depressus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	-	-	20	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	100	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Mahonia repens												
86	**4599**	266	133	4466	-	-	0	0	-	-	0	6/6
92	**4600**	120	2560	2040	-	-	2	0	-	-	0	-/-
99	**3640**	80	1120	2520	-	-	0	0	-	-	0	4/8
04	**2380**	-	680	1700	-	-	0	0	-	-	0	4/6
Pinus edulis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	20	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus ponderosa												
86	**133**	-	133	-	-	-	0	0	0	-	0	-/-
92	**180**	60	40	140	-	-	0	0	0	-	0	-/-
99	**160**	-	20	140	-	-	0	0	0	-	0	-/-
04	**160**	-	-	120	40	-	0	0	25	-	13	-/-
Populus tremuloides												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	20	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Prunus virginiana												
86	**200**	-	200	-	-	-	0	0	-	-	0	-/-
92	**40**	-	-	40	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	20	20	-	-	0	0	-	-	0	25/13

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
86	**66**	-	-	66	-	-	100	0	0	-	0	19/13
92	**200**	-	120	60	20	-	50	30	10	-	0	-/-
99	**200**	-	20	140	40	-	70	20	20	10	10	11/23
04	**40**	-	20	20	-	-	0	50	0	-	0	6/13
Quercus gambelii												
86	**2666**	2733	2000	666	-	-	3	0	0	-	0	77/44
92	**4000**	9420	3060	840	100	-	22	.50	3	-	.50	-/-
99	**3580**	1220	2600	900	80	160	.55	0	2	1	1	49/44
04	**1460**	20	1160	300	-	-	3	0	0	-	0	20/14
Rosa woodsii												
86	**533**	-	333	200	-	-	0	0	-	-	13	24/17
92	**80**	-	80	-	-	-	0	0	-	-	0	-/-
99	**40**	-	-	40	-	-	0	0	-	-	0	11/15
04	**0**	-	-	-	-	-	0	0	-	-	0	13/7
Symphoricarpos oreophilus												
86	**15066**	2400	6000	9066	-	-	4	0	0	-	29	26/16
92	**4320**	460	1360	2860	100	-	13	2	2	-	3	-/-
99	**3280**	240	1180	2100	-	40	0	0	0	-	0	31/50
04	**2400**	-	840	1560	-	-	3	7	0	-	0	16/30

Trend Study 14-20-04

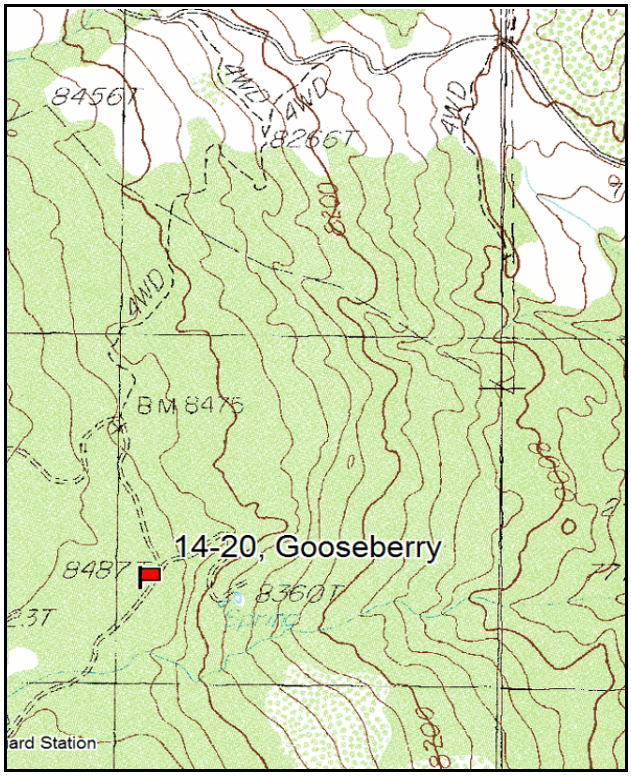
Study site name: Gooseberry . Vegetation type: Logged Ponderosa Pine .

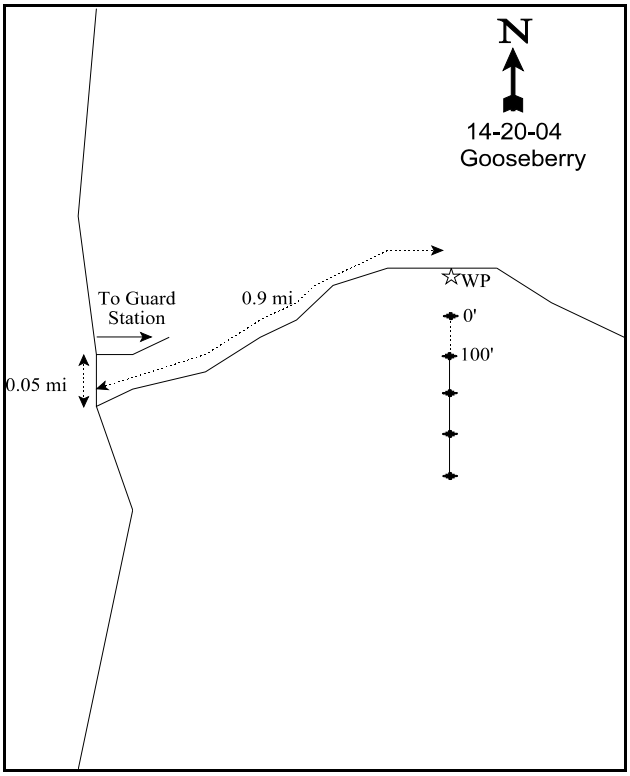
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

Drive 0.05 miles south past the turnoff to the Gooseberry Guard Station on Elk Ridge to a road turning off to the left (east). Proceed down this road past the guard station, corral and water troughs for 0.9 miles and stop at a witness post on the right side of the road. (If you go to far, the road starts to drop down 150 feet past this point). The 0-foot baseline stake is 100 feet south, and is marked by a green full-high fence post tagged with browse tag #7878. Fence posts were used to mark all the transect plots.





Map Name: Poison Canyon

Diagrammatic Sketch

Township 34S , Range 20E , Section 18

GPS: NAD 27, UTM 12S 4187266 N, 609057 E

DISCUSSION

Gooseberry - Trend Study No. 14-20

The Gooseberry Interagency trend study samples mixed ponderosa pine-aspen summer range on northern end of Elk Ridge. The study is found at an elevation of 8,500 feet on the western rim of Elk Ridge. Thick aspen groves dominate below the rim, but on top aspen clumps are scattered through the predominately ponderosa pine forest. Old growth pines were removed with a selective over story harvest in 1963. The area was scheduled for a shelter-wood cut in 1993 or 1994. Some logging activities were evident during the 1999 reading. Slash was common on the site and logs were piled up on the nearby road. Several small aspen along with study site fence posts were bent over by logging equipment.

The Forest Service manages grazing on the area, which is in the Gooseberry allotment. The grazing system involves rotation grazing with three pastures in the allotment. These units are never rested for an entire season, which is June 1 to October 15. The stocking rate is 200 head of cattle. Water is available in nearby Duck Lake where deer, elk, and cattle are frequently seen. Otherwise, water is limited on top of the plateau. Several deer were seen near the study site in 1999. Pellet group data from the site in 1999 estimated 11 deer days use/acre (27 ddu/ha), 11 elk days use/acre (27 edu/ha), and 26 cow days use/acre (64 cdu/ha). In 2004, pellet group data estimated 3 deer days use/acre (7 ddu/ha), 14 elk days use/acre (35 edu/ha), and 22 cow days use/acre (5 cdu/ha). A large herd of elk was seen in the meadow near the guard station.

Soil depth is highly variable with some areas of exposed bedrock. Effective rooting depth estimates vary from 13 to 28 inches. Soil texture is a loam with a slightly acid pH (6.1). Soil phosphorus is low at just 4 ppm. The extensive rock layer underneath can be seen in the nearby exposed cliffs and a deep (15 foot) narrow crack in the rock, almost like a slot canyon, east of the baseline. There are some bare soils in the open, but overall there is excellent litter cover. Litter cover is very high for each reading. Due to the level terrain, there is little hazard of erosion. Some trampled and disturbed places display soil movement, but it is not severe.

The transect runs through the edge of an aspen grove, but aspen is less prevalent in surrounding areas where more Ponderosa pine predominate. Point quarter data from 1999 estimated 48 aspen/acre. Average stem diameter was 5.0 inches. In 2004, density increased slightly to 53 trees/acre, with an average diameter of 3.9 inches. Prior to 2004 aspen were mainly mature trees (25-30 feet tall), so most forage production is unavailable for animal use. Small young trees and suckers are available and were moderate to heavily utilized in 1992. In 2004 there were many young suckers. Ninety percent of the aspen counted in the density strips were young. Point quarter data in 1999 estimated 157 Ponderosa pine trees/acre with an average diameter of 5.7 inches. Density increased to 166 trees/acre in 2004, with an average diameter of 4.3 inches. Many young ponderosa pines were noted in 2004.

The most abundant and available browse is mountain snowberry. It contributes to most of the available browse. More than 50% of the snowberry population were young plants in 1986 and 1992. The population has matured in 1999 and 2004. Use was light to moderate in 1986 and 1992, and very light in 1999 and 2004. Density was highest in 1992. Over 50% of the population was classified as young. Density estimates for 1999 were similar to 1986 estimates at about 7,800 plants/acre. In 2004, density declined to 6,300 plants/acre. The decline can be attributed to a loss of young plants. Percent decadence did not increase and mature plants have remained stable. A variety of other palatable browse species also occur including, low-growing myrtle pachystima, serviceberry, and scattered oak. Oregon grape is also numerous.

The herbaceous understory is diverse and moderately abundant considering the amount of litter cover and shade from tree canopy. Identifying grasses was difficult because of heavy livestock use in 1986. In 1992, overall utilization was moderate and many grasses produced seed. Common grasses include, Kentucky bluegrass (increaser with moderate grazing), sedge, bottlebrush squirreltail, nodding brome, Columbian

needlegrass, and slender wheatgrass. Only light use was noted on the grasses in 1999. Diversity of forbs is also high. The most conspicuous species was thickleaf peavine, which showed light use. Low growing forbs like yarrow, spreading fleabane, starwort, and longleaf phlox are abundant. Sum of nested frequency for perennial grasses and forbs have declined steadily since 1992.

1986 APPARENT TREND ASSESSMENT

A variety of browse and herbaceous forage is available on this site. The aspen appears to be preferred and heavy use may affect regeneration and future availability. Other browse plants are vigorous and produce abundant forage. Herbaceous vegetation, especially grasses, are utilized heavily by cattle. Cattle appear to be responsible for the excessive utilization of young aspen. Vegetative trend is probably stable overall, although the trend will certainly be affected by future logging programs and continued cattle use. The soil trend is stable. It is difficult to assign a trend without a clear management objective which identifies the importance of key species for providing adequate forage for big game animals.

1992 TREND ASSESSMENT

Soil trend is stable with percent bare ground down to only 2%. Protective ground cover is abundant and erosion minimal. Of the key or most preferred browse species, only serviceberry experienced a downward trend. Density is still moderately low at 680 plants/acre, which is an 11% decrease in density. It also shows an increase (from 4% to 41%) in the proportion of the population that is now heavily browsed. However, this should not be used as the principal criteria for the management of wildlife species in this area because serviceberry only makes about 1% of the total browse cover. The other preferred species, which make up the other 99% of the browse cover have shown increases in their populations indicating an upward trend for browse. The grasses make up 76% of the herbaceous understory cover, with Kentucky bluegrass providing 31% of that cover. Kentucky bluegrass is an increaser with moderate livestock use. Trend for the herbaceous understory is stable. The proportion of the herbaceous understory that is composed of Kentucky bluegrass should be monitored to determine additional changes in compositional trend.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - stable (3)

1999 TREND ASSESSMENT

Trend for soil remains stable with abundant vegetation and especially litter cover. Unprotected bare ground is rare and erosion is not a problem on the site. Trend for browse is considered down slightly. Use is mostly light and vigor is generally normal, but population densities of all species declined since 1992. Cover of shrubs declined substantially for most shrubs, while strip frequency of understory shrubs is also lower. Some of these changes may be due to the canopy cover and increased shading of Ponderosa pine and aspen. Average overhead canopy cover of Ponderosa pine is estimated at 35%, while aspen averages 13%. No canopy cover estimates are available from 1992 to compare with. Trend for the herbaceous understory is stable with similar sum of nested frequencies of perennial grasses and forbs. While nested frequency of perennial grasses remained similar compared to 1992, cover declined nearly 4 fold. Cover of forbs increased from nearly 8% cover to 12%. Some of these cover differences are likely due to time the study was read and the timing of precipitation. This study was read in late August of 1992 and in late June of 1999 (6/23).

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable (3)

2004 TREND ASSESSMENT

The soil trend is stable. Vegetation and litter are very abundant and protect the soil surface. The browse trend is stable. Density and cover for most browse species has remained stable. Utah serviceberry density was higher and many young plants were sampled. Use has been light. Snowberry density has declined but, cover has remained stable. Density of aspen and Ponderosa pine increased and many young aspens were sampled. Cover was down for aspen since 1999 (line intercept method). The herbaceous understory is overall stable. Sum of nested frequency of perennial grasses has not changed since 1999, while cover was up to 10% from 7% in 1999. Kentucky bluegrass is the most abundant species and nested frequency has remained stable since 1986. Forb abundance and cover has slightly declined since 1999, but is still abundant. Cover declined from 12 to 8%.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Management unit 14 , Study no: 20

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Agropyron intermedium	$_{ab}$13	$_{a}$-	$_{a}$3	$_{b}$17	-	.03	.11
G	Agropyron scribneri	$_{a}$-	$_{b}$22	$_{a}$-	$_{a}$-	1.42	-	-
G	Agropyron spicatum	3	-	-	-	-	-	-
G	Agropyron trachycaulum	$_{a}$-	$_{b}$44	$_{c}$101	$_{b}$32	1.59	.96	.63
G	Bromus anomalus	$_{b}$50	$_{b}$68	$_{a}$19	$_{a}$19	5.02	.11	.36
G	Bromus inermis	18	25	25	24	.31	.52	.43
G	Carex spp.	$_{a}$-	$_{c}$64	$_{bc}$47	$_{b}$41	1.70	.91	.89
G	Dactylis glomerata	$_{ab}$10	$_{a}$-	$_{a}$1	$_{b}$18	-	.00	.26
G	Festuca ovina	$_{a}$-	$_{b}$10	$_{ab}$4	$_{a}$-	.33	.31	-
G	Festuca thurberi	-	-	-	-	-	-	.00
G	Koeleria cristata	$_{b}$12	$_{b}$14	$_{a}$-	$_{ab}$3	.08	-	.01
G	Muhlenbergia montana	$_{b}$46	$_{a}$5	$_{a}$4	$_{a}$-	.06	.03	-
G	Phleum pratense	$_{b}$19	$_{b}$16	$_{a}$-	$_{b}$21	.45	-	.24
G	Poa fendleriana	16	17	5	17	.09	.01	.17
G	Poa pratensis	182	161	194	158	7.88	3.19	4.44
G	Sitanion hystrix	$_{b}$69	$_{c}$105	$_{a}$14	$_{bc}$75	3.54	.10	1.06
G	Stipa columbiana	$_{b}$83	$_{a}$39	$_{a}$31	$_{a}$22	1.07	.53	.97

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		521	590	448	447	23.59	6.74	9.61
Total for Grasses		521	590	448	447	23.59	6.74	9.61
F	Achillea millefolium	$_{c}$171	$_{b}$111	$_{a}$76	$_{ab}$90	1.43	.99	.53
F	Antennaria rosea	$_{a}$-	$_{b}$11	$_{ab}$10	$_{b}$10	.63	.36	.48
F	Arenaria congesta	-	3	3	-	.00	.03	-
F	Aster chilensis	6	6	2	-	.15	.06	-
F	Astragalus consobrinus	-	-	-	4	-	-	.06
F	Calochortus nuttallii	-	2	4	-	.01	.01	-
F	Collinsia parviflora (a)	-	$_{a}$-	$_{b}$21	$_{ab}$9	-	.04	.02
F	Crepis acuminata	-	-	3	-	-	.00	-
F	Delphinium nuttallianum	$_{a}$-	$_{a}$-	$_{b}$26	$_{a}$-	-	.06	-
F	Erigeron flagellaris	$_{b}$37	$_{ab}$26	$_{a}$17	$_{a}$13	.61	.13	.10
F	Geranium spp.	2	-	-	-	-	-	-
F	Lathyrus lanszwertii	132	106	138	102	2.11	4.80	2.76
F	Lomatium spp.	-	4	5	-	.03	.04	-
F	Lychnis drummondii	4	-	-	-	-	-	-
F	Microsteris gracilis (a)	-	$_{a}$-	$_{a}$5	$_{b}$21	-	.03	.04
F	Osmorhiza occidentalis	-	-	-	6	-	-	.06
F	Penstemon spp.	-	4	1	-	.02	.00	-
F	Phlox longifolia	$_{c}$97	$_{b}$36	$_{ab}$17	$_{a}$10	.76	.06	.02
F	Polygonum douglasii (a)	-	$_{a}$2	$_{ab}$13	$_{b}$16	.01	.05	.04
F	Pterospora andromedea	-	-	3	-	-	.04	-
F	Senecio integerrimus	$_{b}$61	$_{a}$12	$_{a}$9	$_{a}$14	.17	.05	.04
F	Sisymbrium altissimum (a)	-	-	2	-	-	.00	-
F	Smilacina stellata	1	-	-	-	-	-	-
F	Stellaria jamesiana	$_{a}$2	$_{b}$81	$_{c}$168	$_{c}$145	.55	3.21	2.85
F	Taraxacum officinale	$_{b}$59	$_{b}$64	$_{b}$56	$_{a}$25	.57	.96	.16
F	Thalictrum fendleri	-	-	4	-	-	.03	-
F	Thlaspi spp.	$_{a}$-	$_{b}$11	$_{ab}$10	$_{b}$14	.03	.02	.02
F	Trifolium repens	49	42	45	41	.42	1.30	.71
F	Unknown forb-perennial	1	-	-	-	-	-	-
Total for Annual Forbs		0	2	41	46	0.00	0.13	0.09
Total for Perennial Forbs		622	519	597	474	7.55	12.21	7.82
Total for Forbs		622	521	638	520	7.56	12.35	7.92

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

BROWSE TRENDS --
Management unit 14 , Study no: 20

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Amelanchier utahensis	13	9	13	.13	.07	.09
B	Mahonia repens	68	62	63	3.37	1.80	3.06
B	Pachistima myrsinites	19	4	4	.50	.06	.03
B	Pinus ponderosa	13	16	14	30.55	.98	1.06
B	Populus tremuloides	13	5	14	10.94	.03	.13
B	Purshia tridentata	-	-	-	.03	-	-
B	Quercus gambelii	5	3	3	1.37	.06	.15
B	Rosa woodsii	22	7	8	.05	.03	-
B	Symphoricarpos oreophilus	90	89	85	20.68	15.04	14.82
Total for Browse		243	195	204	67.66	18.07	19.37

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 20

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	-	.11
Mahonia repens	-	2.03
Pachistima myrsinites	-	.23
Pinus ponderosa	34.79	32.23
Populus tremuloides	13.19	7.44
Quercus gambelii	-	.08
Rosa woodsii	-	.08
Symphoricarpos oreophilus	-	23.46

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 20

Species	Trees per Acre	
	'99	'04
Pinus ponderosa	48	166
Populus tremuloides	157	53
Quercus gambelii	25	-

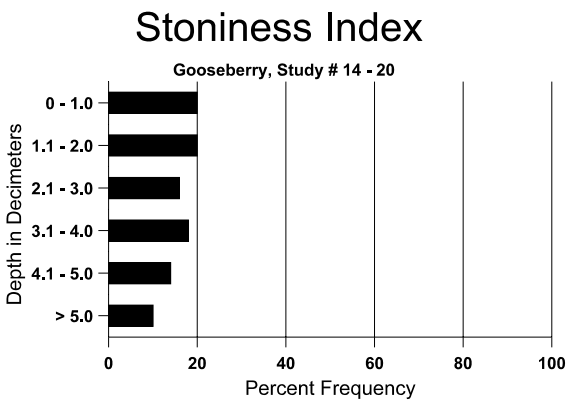
Average diameter (in)	
'99	'04
5.1	4.3
5.7	3.9
2.8	-

BASIC COVER --
Management unit 14 , Study no: 20

Cover Type	Average Cover %			
	'86	'92	'99	'04
Vegetation	9.25	64.87	37.21	38.58
Rock	0	.37	.09	.73
Pavement	0	0	.01	.01
Litter	81.25	84.88	93.13	74.26
Cryptogams	.50	.76	.12	.39
Bare Ground	9.00	1.52	1.28	2.42

SOIL ANALYSIS DATA --
Management unit 14, Study no: 20, Study Name: Gooseberry

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
20.8	45.7 (15.2)	6.1	45.4	34.0	20.6	3.0	4.0	89.6	0.4



PELLET GROUP DATA --
Management unit 14 , Study no: 20

Type	Quadrat Frequency			Days use per acre (ha)	
	'92	'99	'04	'99	'04
Rabbit	4	1	-	-	-
Elk	6	2	3	11 (27)	14 (35)
Deer	8	-	3	11 (27)	3 (7)
Cattle	3	1	-	26 (64)	2 (5)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 20

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
86	**766**	233	433	333	-	-	13	4	0	-	0	11/5
92	**680**	20	620	-	60	-	59	41	9	-	0	-/-
99	**220**	200	220	-	-	-	0	0	0	-	0	-/-
04	**460**	-	380	80	-	-	17	9	0	-	0	7/9
Mahonia repens												
86	**4199**	700	1366	2433	400	-	0	0	10	-	10	6/6
92	**15300**	1080	7800	7400	100	-	1	0	1	-	6	-/-
99	**6060**	-	700	5320	40	-	0	0	1	-	.66	4/7
04	**4820**	-	360	4380	80	-	2	0	2	-	.82	4/6
Pachistima myrsinites												
86	**1132**	1200	466	666	-	-	0	6	-	-	0	5/6
92	**2380**	240	1860	520	-	-	61	0	-	-	0	-/-
99	**180**	20	100	80	-	-	0	0	-	-	0	5/18
04	**280**	-	-	280	-	-	0	0	-	-	0	4/5
Pinus ponderosa												
86	**166**	-	166	-	-	-	0	0	0	-	0	-/-
92	**280**	380	140	140	-	-	0	0	0	-	0	-/-
99	**340**	60	200	120	20	20	0	6	6	6	6	-/-
04	**300**	20	200	100	-	20	0	0	0	-	7	-/-
Populus tremuloides												
86	**33**	33	33	-	-	-	0	0	0	-	0	-/-
92	**400**	560	200	100	100	-	35	20	25	10	35	-/-
99	**160**	80	100	60	-	80	0	0	0	-	0	-/-
04	**580**	-	520	60	-	40	3	0	0	-	0	-/-
Quercus gambelii												
86	**0**	66	-	-	-	-	0	0	0	-	0	-/-
92	**640**	60	500	-	140	-	0	25	22	3	3	-/-
99	**280**	-	280	-	-	-	0	0	0	-	0	-/-
04	**100**	-	80	20	-	60	0	0	0	-	0	8/10
Rosa woodsii												
86	**766**	100	500	233	33	-	13	0	4	-	0	10/8
92	**900**	260	740	120	40	-	18	2	4	-	2	-/-
99	**160**	-	160	-	-	-	0	0	0	-	0	-/-
04	**340**	-	160	180	-	-	0	0	0	-	0	5/4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus												
86	**7899**	1466	4333	3466	100	-	42	5	1	-	0	22/20
92	**13200**	1880	6900	6060	240	-	33	4	2	.15	2	-/-
99	**7840**	660	1920	5780	140	160	0	0	2	-	0	19/24
04	**6300**	-	400	5740	160	20	10	0	3	.63	.63	18/24

Trend Study 14-22-04

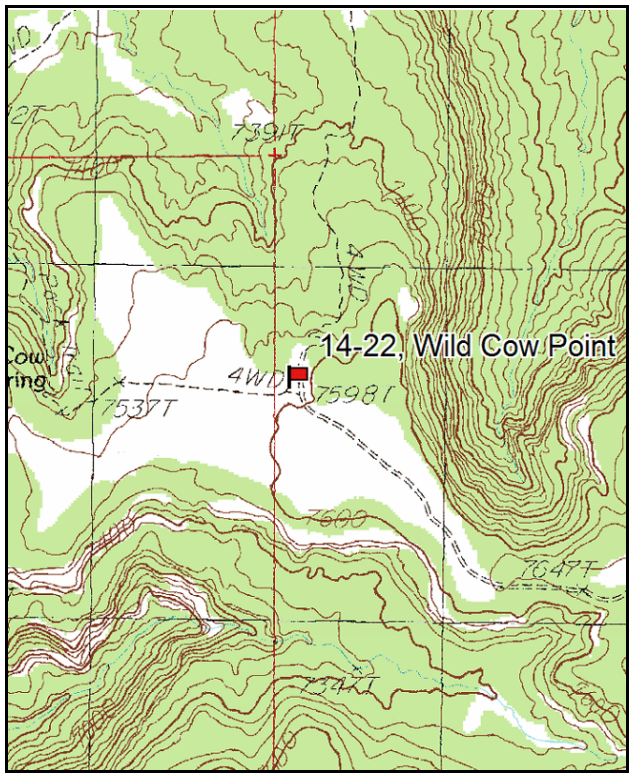
Study site name: Wild Cow Point . Vegetation type: Chained, Seeded P-J .

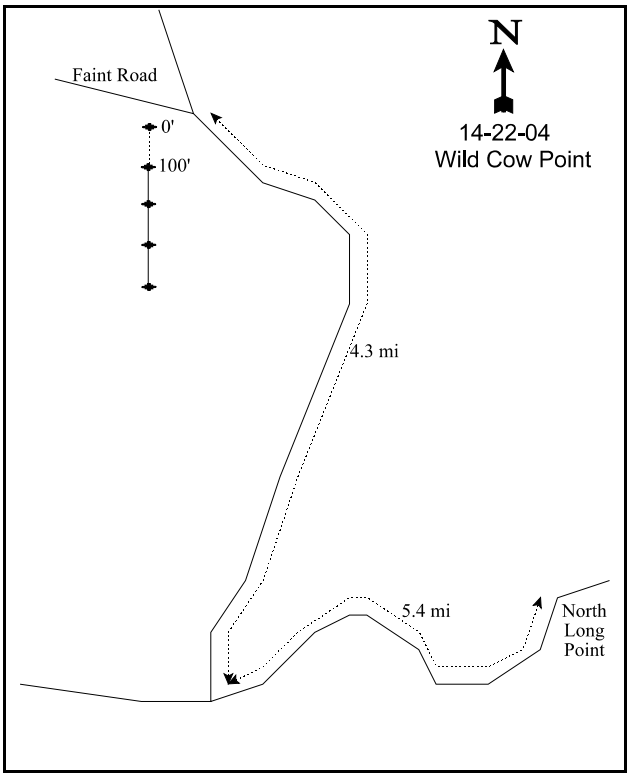
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

Drive to North Long Point. From the west rim of North Long Point, proceed west down the dugway on the Dark Canyon Plateau Road for 5.4 miles. Turn north on the Wild Cow Point Road and go 4.3 miles to a chaining and a faint road to the left (west). The zero foot stake is 10 feet south of the faint road on the west side of the Wild Cow Point Road about 100 hundred feet into the chaining, with the 0-foot stake having browse tag #481 attached. All stakes are 3 ½ foot tall green fence posts.





Map Name: Fable Valley

Diagrammatic Sketch

Township 33S , Range 18E , Section 22

GPS: NAD 27, UTM 12S 4194647 N, 593557 E

DISCUSSION

Wild Cow Point - Trend Study No. 14-22

The Wild Cow Point transect samples a chained and seeded area northwest of Elk Ridge. The narrow plateau is cut back by numerous canyons, which flow south into Fable Valley or north into Beef Basin. The study area is located on the higher, southwest end of Wild Cow Point at an elevation of 7,600 feet. The aspect is generally west on the level to a gently rolling plateau. A large area has been chained and seeded to crested wheatgrass in the early 1960's. The BLM manages the area with permits for 200-300 cattle on the point from January to June 15. The area was rested for 2 years in 2002 and 2003, but cows have returned to graze the area. Deer pellet groups were numerous in 1986 with no elk sign observed. In 1992, some elk pellet groups were encountered. Pellet group data from the site in 1999, estimated 38 deer days use/acre (94 ddu/ha), 1 elk day use/acre (2 edu/ha), and 3 cow days use/acre (7 cdu/ha). Pellet group data in 2004, estimated 27 deer days use/acre (68 ddu/ha) and 11 elk days use/acre (26 edu/ha).

The reddish sandy loam soil is derived from a hematite sandstone parent material. Depth of the loose soil varies from 1.5 to 3 feet over bed rock with an estimated average effective rooting depth of almost 19 inches. The upper horizon contains very little organic matter and phosphorus is low at just 4.8 ppm. Potassium is also low at 61 ppm. Values less than 10 ppm for phosphorus and 70 ppm for potassium may limit normal growth and development of plants. Litter cover is good, especially where the wheatgrass is dense. Protected microsites support limited cryptogamic activity. Soil pedestaling is evident around bunch grasses and shrubs. Some large bare areas are subject to wind erosion. Bare ground increased from 25% in 1999 to 35% in 2004. The ratio of bare soil to protective ground cover (vegetation, litter, and cryptogams) has remained stable since 1992 at 1:3.2 or 1:3.1.

Surviving pinyon and juniper are regaining their dominance since the chaining. They dominate much of the landscape, although the larger openings support good stands of sagebrush. The pinyon and juniper were on average about 7 feet tall in 1986, with some producing seed. Point quarter data from 1999, estimated 59 pinyon and 40 juniper trees/acre. Average diameter of pinyon was estimated at 4.2 inches while juniper was 11.6 inches. In 2004, pinyon and juniper density remained stable. Pinyon density was estimated at 62 trees/acre with an average diameter of 5.5 inches. Juniper density was 41 trees/acre in 2004, with an average diameter of 9.3 inches. In both 1999 and 2004 74% of the junipers sampled were knocked down trees that were still living. Pinyon and juniper trees comprised 30% of the browse cover in 1992, increasing to 38% in 1999 and 46% in 2004. Canopy cover (using line intercept method) in 1999, averaged 7% for pinyon and 4% for juniper. In 2004, pinyon cover increased to 13%, while juniper was up to 7%. When combined values for pinyon and juniper cover begin approaching 20%, the herbaceous understory begins to thin-out. When it exceeds 25%, herbaceous understory cover could easily be reduced to less than 3% (Tausch and West (2004). This site should be thinned out in some way to help restore the productivity of he understory.

The sagebrush community is composed of black sagebrush in association with Wyoming big sagebrush. Density of both Wyoming big sagebrush and black sagebrush has declined since 1992. Black sagebrush declined by 56% between 1992 and 2004. Cover declined 52% in that same period from 10 to 5%. In 1986 and 1992 young plants were common. In 2004, young plants were rare. Percent decadence was 42% in 1986. This declined to 11 and 18% in 1992 and 1999 respectively, but increased to 42% in 2004. Plants classified as dying made up 26% of the population in 2004. Wyoming big sagebrush is less abundant than black sagebrush, but makes up a significant portion of the browse cover. Cover was higher for Wyoming big sagebrush than black sagebrush in 2004. Wyoming big sagebrush density declined 35% between 1992 and 2004. Density was only 10% lower than it was in 1999. Percent decadency was 20% in 1992 and 12% in 1999. This increased to 34% in 2004, with 12% of the population classified as dying. Young plants were abundant in 1992, but were not in 1999 and 2004. Seedlings were very abundant in 2004. Utilization has been moderate to heavy with each reading and was mostly heavy in 2004. Utilization of black sagebrush has been mostly light to moderate. Dwarf rabbitbrush also shows signs of moderate to heavy hedging.

Crested wheatgrass is the dominant herbaceous species as it provided 40% of the herbaceous cover in 1992, increasing to 54% in 1999, and 59% in 2004. The large patches form a dense stand over much of the area and nested frequency has remained stable since 1992. Mutton bluegrass is also common and has been slowly declining since 1992. Cover was only 2% in 2004, down from 6% in 1999. Blue grama was more common in 1992, but declined significantly in 1999. Forbs are not very common or of real importance on this range. The more common and possibly utilized species include redroot buckwheat, Hoods phlox, low fleabane, and Rocky Mountain penstemon.

1986 APPARENT TREND ASSESSMENT

Evidence of wind-scoured depressions are found on some exposed sites. Overall, ground cover is good but does not appear to be increasing. Heavy grazing or removal of vegetation would subject the area to wind erosion and possible gullying and severe soil loss. Currently, soil trend is stable. The area currently provides abundant forage for livestock and big game, but the increasing dominance of young pinyon-Juniper indicates a possible long-term downward trend. Re-treatment of the area may be necessary in the future to maintain productivity, especially if it gains importance as a wintering area for an increasing elk herd.

1992 TREND ASSESSMENT

The soil trend for this site is a little more difficult to determine without the help of photographs for the site. Percent cover of bare ground has declined from 21% to 16%, but litter cover has decreased from 66% to 46%. Trend for soils on this site is considered stable. The key browse species for the site includes: black sagebrush, Wyoming big sagebrush, and dwarf rabbitbrush. Black sagebrush and dwarf rabbitbrush densities are almost the same with percent decadence for the much more important black sagebrush declining from 42% down to 11%. For Wyoming big sagebrush, the data would indicate that there was a large increase in it's density. This is more reflective of the greatly enlarged sampling area. In this community, there are small groups of Wyoming big sagebrush interspersed throughout the black sagebrush population. This sampling procedure gives a better representative sample of what is present in the plant community. This higher density is more representative of what is present in the sampled community. What is actually more descriptive of the community is that percent decadence has decreased from 50% in 1986 to 20% in 1992. Browse trend is stable to slightly improving for this site. The herbaceous understory trend is stable with a slight increase in nested frequency for grasses and substantial decrease in forb cover. The trend was considered stable because the forb component of the herbaceous understory only makes up 24% of the total herbaceous cover. The Desirable Components Index (see methods) rated this site as excellent with a score of 87.

TREND ASSESSMENT
soil - stable (3)
browse - slightly up (4)
herbaceous understory - stable (3)
winter range condition (DC Index) - 87 (excellent) Wyoming big sagebrush/black sagebrush type

1999 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground has increased from 16% to 25%, however litter cover has increase from 46% to 50%. The ratio of bare soil to protective cover has remained almost the same (1:3.2 vs 1:3.1). There is some wind and water erosion occurring, but it is localized and not excessive. Trend for browse is considered stable. Population density of both black and Wyoming big sagebrush declined slightly, yet use is lower, vigor is improved, and percent decadence has declined for Wyoming big sagebrush. Recruitment is poor for both species with the number of seedlings and young sampled steadily declining since 1986. For now, there appears to be enough young to maintain the populations of both species of sagebrush. Trend for the herbaceous understory is down slightly. Sum of nested frequency of perennial grasses and forbs declined since 1992. Frequency of the crested wheatgrass, the most dominant grass, has remained similar. As a result,

crested wheatgrass now provides 61% of the grass cover and 54% of the total herbaceous cover. Forbs occur infrequently. The only common species sampled is bladderpod and desert phlox. The DCI score is excellent (70) for a Wyoming big sagebrush community. The shrub component is abundant and healthy, while the herbaceous understory is also abundant.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 70 (excellent) Wyoming big sagebrush/black sagebrush type

2004 TREND ASSESSMENT

The trend for soil is stable. Bare ground has increased slightly, but the ratio of bare soil to protective ground cover (vegetation, litter, and cryptogams) has remained stable at 1:3.1. The browse trend is down. Black sagebrush has seen the greatest decline as density has decreased by 31% since 1999 (56% since 1992). Cover has decreased by 52% since 1992. Decadence has increased to 42% and there are very few young and seedling plants to replace dying plants. Wyoming big sagebrush density declined 10% since 1999 (35% since 1992). Cover has remained fairly stable since 1992. Percent decadence for Wyoming big sagebrush has also increase since 1999 to 34%. However, only 12% of the population was classified as dying. Seedlings were very abundant in 2004. Dwarf rabbitbrush density has also declined since 1992 (71%). The herbaceous understory trend is slightly down. Nested frequency of perennial grasses declined 21% since 1999, while cover was down 42%. Crested wheatgrass is the dominant species and is healthy and vigorous. Forbs have remained stable since 1999. The DCI score has declined as sagebrush cover and vigor has declined. The loss of perennial grass cover has also lower the score.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 47 (fair) Wyoming big sagebrush/black sagebrush type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 22

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Agropyron cristatum	$_{a}$108	$_{b}$181	$_{b}$194	$_{b}$157	8.47	10.26	7.28
G	Bouteloua gracilis	$_{b}$57	$_{b}$49	$_{a}$18	$_{a}$17	2.04	.14	.11
G	Bromus tectorum (a)	-	$_{a}$-	$_{a}$8	$_{b}$20	-	.01	.05
G	Poa fendleriana	$_{c}$168	$_{bc}$129	$_{ab}$119	$_{a}$87	6.62	6.46	2.42
G	Sitanion hystrix	$_{b}$33	$_{b}$42	$_{a}$4	$_{a}$2	.29	.04	.00
Total for Annual Grasses		0	0	8	20	0	0.01	0.05
Total for Perennial Grasses		366	401	335	263	17.42	16.91	9.82
Total for Grasses		366	401	343	283	17.42	16.93	9.87
F	Allium spp.	2	6	12	10	.01	.11	.03

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
F	Antennaria neglecta	$_{b}$8	$_{ab}$6	$_{a}$1	$_{a}$-	.53	.00	-
F	Arabis spp.	3	-	3	-	-	.18	.00
F	Astragalus convallarius	$_{b}$41	$_{a}$7	$_{a}$2	$_{a}$-	.19	.01	-
F	Castilleja linariaefolia	-	3	2	-	.00	.00	-
F	Calochortus nuttallii	1	-	-	-	-	-	-
F	Cordylanthus kingii (a)	$_{a}$5	$_{a}$26	$_{a}$9	$_{b}$94	.89	.07	1.36
F	Cryptantha flavoculata	2	-	-	-	-	-	-
F	Erigeron flagellaris	-	1	2	-	.03	.03	-
F	Erigeron pumilus	$_{b}$32	$_{a}$3	$_{a}$1	$_{a}$3	.01	.00	.00
F	Eriogonum racemosum	$_{b}$60	$_{a}$22	$_{a}$8	$_{a}$15	.20	.10	.11
F	Eriogonum umbellatum	12	8	10	4	.10	.10	.03
F	Heterotheca villosa	-	2	-	-	.00	-	-
F	Lesquerella rectipes	16	9	15	8	.20	.58	.05
F	Machaeranthera canescens	$_{a}$-	$_{ab}$6	$_{b}$13	$_{c}$36	.02	.10	.62
F	Oenothera caespitosa	-	-	-	2	-	-	.00
F	Penstemon lentus	10	3	3	1	.01	.03	.00
F	Phlox austromontana	$_{b}$46	$_{b}$41	$_{ab}$24	$_{a}$19	1.54	.60	.22
F	Polygonum douglasii (a)	-	11	1	2	.03	.00	.01
F	Senecio multilobatus	15	4	3	5	.03	.01	.07
F	Thlaspi montanum	9	-	-	-	-	-	-
F	Townsendia incana	-	8	5	1	.06	.01	.00
Total for Annual Forbs		5	37	10	96	0.91	0.08	1.37
Total for Perennial Forbs		257	129	104	104	2.96	1.88	1.17
Total for Forbs		262	166	114	200	3.88	1.97	2.54

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

BROWSE TRENDS --
Management unit 14 , Study no: 22

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Artemisia nova	47	43	44	9.66	6.71	4.63
B	Artemisia tridentata wyomingensis	36	43	36	7.38	6.64	6.94
B	Chrysothamnus depressus	41	22	17	2.36	1.02	.64
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	0	-	-	.00
B	Echinocereus spp.	1	0	0	.00	-	-
B	Gutierrezia sarothrae	1	4	1	-	.03	.00
B	Juniperus osteosperma	5	4	3	3.31	2.82	4.53
B	Opuntia spp.	4	3	2	.00	.03	.03
B	Pinus edulis	9	8	10	4.99	6.15	5.93
B	Sclerocactus	0	0	1	-	-	-
Total for Browse		144	128	114	27.73	23.43	22.73

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 22

Species	Percent Cover	
	'99	'04
Artemisia nova	-	5.63
Artemisia tridentata wyomingensis	-	7.23
Chrysothamnus depressus	-	.25
Juniperus osteosperma	4.40	6.73
Pinus edulis	7.40	12.94

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 22

Species	Average leader growth (in)
	'04
Artemisia nova	1.0
Artemisia tridentata wyomingensis	1.5

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 22

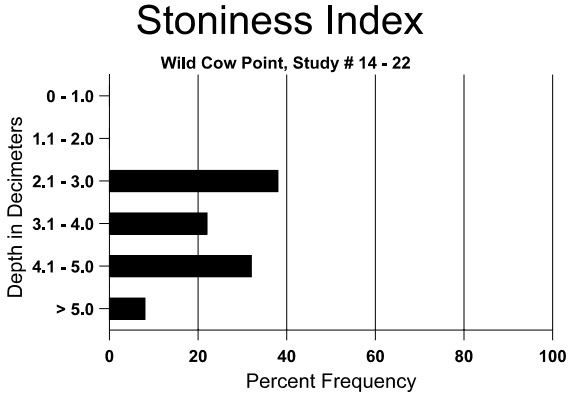
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	40	41.1	11.5	9.3
Pinus edulis	59	62	4.2	5.5

BASIC COVER --
Management unit 14 , Study no: 22

Cover Type	Average Cover %			
	'86	'92	'99	'04
Vegetation	12.25	43.56	38.62	35.64
Rock	.25	1.17	1.22	.66
Pavement	.25	0	.06	.00
Litter	65.50	46.42	50.02	48.98
Cryptogams	.50	5.09	2.24	2.09
Bare Ground	21.25	15.97	24.81	34.81

SOIL ANALYSIS DATA --
Management unit 14, Study no: 22, Study Name: Wild Cow Point

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
18.5	52.7 (18.1)	7.4	72.4	15.1	12.6	1.6	4.8	60.8	0.5



PELLET GROUP DATA --
Management unit 14 , Study no: 22

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	49	39	38
Elk	1	2	2
Deer	29	18	19
Cattle	1	-	2

Days use per acre (ha)	
'99	'04
-	-
1 (2)	11 (27)
38 (94)	27 (68)
3 (7)	-

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 22

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia nova												
86	**5099**	33	633	2300	2166	-	29	45	42	5	10	8/13
92	**5160**	240	900	3680	580	-	45	13	11	5	10	-/-
99	**3260**	120	280	2400	580	200	15	4	18	4	4	11/18
04	**2260**	200	20	1280	960	460	21	3	42	29	29	11/21
Artemisia tridentata wyomingensis												
86	**399**	66	66	133	200	-	42	50	50	-	8	16/15
92	**2560**	40	960	1100	500	-	30	56	20	.78	6	-/-
99	**1840**	-	160	1460	220	40	26	27	12	2	2	20/33
04	**1660**	1620	60	1040	560	440	18	70	34	12	12	17/26
Chrysothamnus depressus												
86	**2365**	33	266	1933	166	-	31	4	7	-	4	4/6
92	**2320**	60	320	1300	700	-	34	32	30	10	16	-/-
99	**880**	-	40	700	140	80	14	30	16	7	7	5/10
04	**680**	20	20	480	180	80	41	21	26	6	9	6/11
Chrysothamnus nauseosus graveolens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	29/36
Chrysothamnus viscidiflorus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	35/53
04	**0**	-	-	-	-	-	0	0	-	-	0	9/10

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Echinocereus spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	20	-	20	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
86	**33**	-	-	33	-	-	0	0	0	-	0	4/3
92	**60**	-	40	20	-	-	0	0	0	-	0	-/-
99	**100**	40	40	40	20	-	0	20	20	-	0	7/11
04	**20**	-	-	20	-	-	0	0	0	-	0	7/9
Juniperus osteosperma												
86	**166**	-	100	66	-	-	0	0	-	-	0	93/89
92	**140**	20	80	60	-	-	0	0	-	-	0	-/-
99	**80**	20	-	80	-	60	0	0	-	-	0	61/63
04	**60**	-	-	60	-	-	0	0	-	-	0	-/-
Opuntia spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**80**	20	-	80	-	-	0	0	-	-	50	-/-
99	**60**	-	-	60	-	-	0	0	-	-	0	4/8
04	**40**	-	-	40	-	-	0	0	-	-	0	2/6
Pinus edulis												
86	**233**	-	233	-	-	-	0	0	-	-	0	-/-
92	**180**	-	100	80	-	-	0	0	-	-	0	-/-
99	**160**	-	60	100	-	-	0	0	-	-	0	-/-
04	**200**	-	20	180	-	-	0	0	-	-	0	-/-
Sclerocactus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	4/4

Trend Study 14-23-04

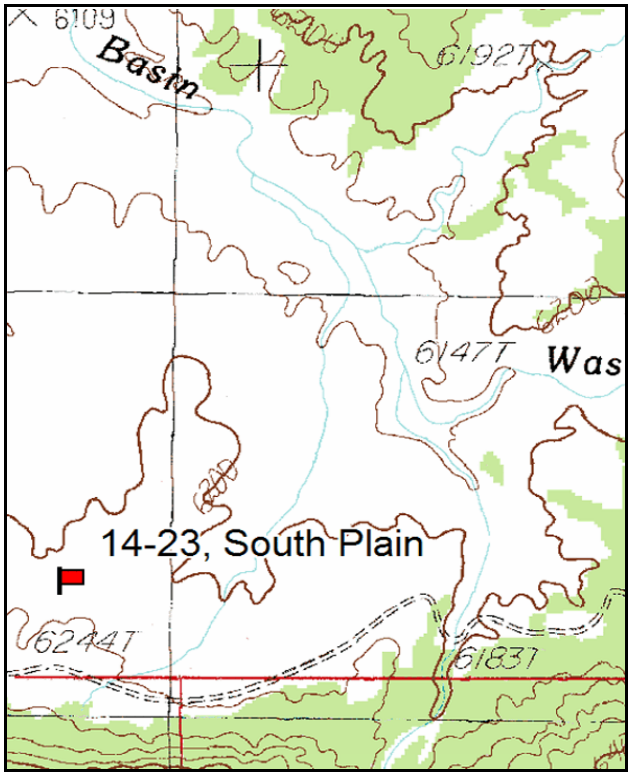
Study site name: South Plain . Vegetation type: Wyoming Big Sagebrush .

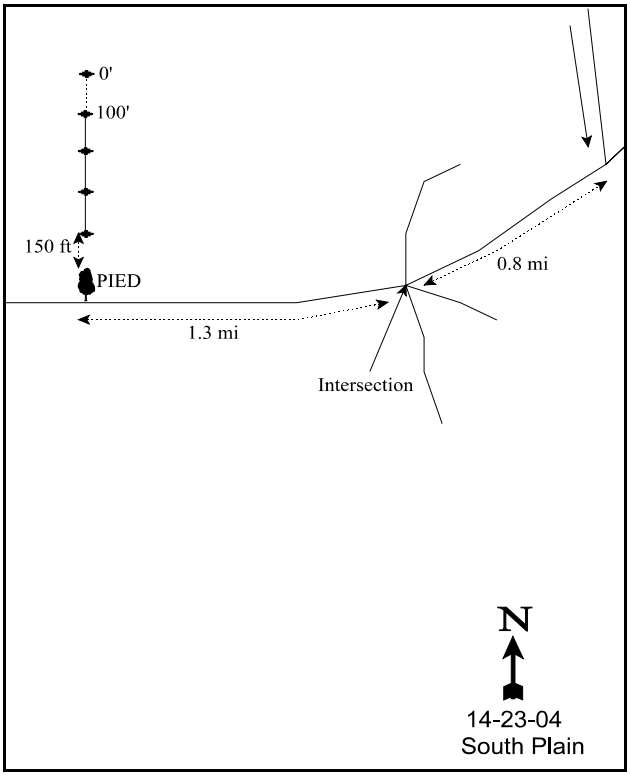
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

At the junction of the Elk Ridge-Salt Creek Mesa-Beef Basin Roads, go north down into the Beef Basin area. Follow the main road for 9.1 miles, passing the FS/BLM boundary down to an intersection where there is a BLM register box. Stay left on County Road #104 and proceed 1.45 miles to the turnoff to an exclosure. Stay left for 0.45 miles to a fork. Stay right again and go 0.4 miles to a fork. Go right at the intersection with the Beef Basin Canyon Road and go 0.8 miles to a 5-way intersection. Take west fork straight through the intersection (left fork goes to Indian ruins) and continue 1.3 miles to a large pinyon pine on the right. Stop here. The 400-stake of the transect starts 150 feet north of the pinyon.





Map Name: Warren Canyon Diagrammatic Sketch

Township 32S , Range 18E , Section 34 GPS: NAD 27, UTM 12S 4200277 N, 594761 E

DISCUSSION

South Plain - Trend Study No. 14-23

This trend study is located in the southern part of Beef Basin, in an area known as South Plain. This study was set up to monitor the condition and trend of Wyoming big sagebrush on critical, heavily used winter range. The gently rolling plain is dominated by an old stand of Wyoming big sagebrush with openings of dense blue gramma. The whole flat is surrounded by pinyon-juniper covered hills and slickrock. There is very little cover over two feet in height out in the flat. Drainage of the open flat is to the west through Beef Basin Wash in the low center of the flat. The elevation of the site is 6,300 feet with drainage and aspect basically to the north.

Besides heavy winter-spring use by deer, Beef Basin also receives heavy grazing pressure from cattle. The BLM permits 150-290 cattle January to June 15. The area was rested for 2 years in 2002 and 2003, but cows have returned the area. Deer pellet groups were numerous in 1986 with no elk sign observed. There are plans for additional water developments to help distribute livestock use to the north part of the basin. A DWR pellet group transect in the area shows years of continuous high use. The 5-year average of 110 deer days use/acre (274 ddu/ha) was estimated from 1982-1986 (Jense et al. 1986) which was coincidently during the exceptionally high precipitation years. The 5-year average between 1987 and 1992 went down to 70 deer days use/acre (173 ddu/ha) (Jense et al. 1992) which is second only to Deer Flat in deer use on the Elk Ridge unit. Deer days use averaged 83 per acre (205 ddu/ha) between 1993 and 1996. Pellet group data taken along the study site baseline in 1999 estimated 76 deer days use/acre (188 ddu/ha) and 13 cow days use/acre (32 cdu/ha). Most of the cattle pats were from last fall, but about 10% were from the spring. Nearly all of the deer pellet groups were from winter. Pellet group data from 2004 estimated only 40 deer days use/acre (99 ddu/ha). Cattle use was estimated at 17 days use/acre.

The soil is a light red, sandy loam with a slightly alkaline pH of 7.6. Effective rooting depth is estimated at nearly 20 inches with no rooting restrictions noted. There is a one inch thick compacted layer about 3 inches below the surface, but past this the soil appears uniform. Phosphorus and potassium are low at 5.3 and 67.2 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium may limit normal plant growth and development. Due to the sandy nature of the soil, average soil temperature was measured at nearly 71°F in 1999 and 65°F in 2004 at an average depth between 15-17 inches. High soil temperatures give winter annuals like cheatgrass a competitive advantage over perennial grasses, especially during dry years. Alkali deposits are present in the creek nearby, but none were found on the study site. Litter and soil are building under plants. However, most of the plant interspaces were completely bare of cover in 1986. The soil was loose and easily moved by wind or water. Gullies are common, but the severity of erosion is limited by the gentle slope.

A moderately dense stand of Wyoming big sagebrush dominated the area in 1986 with a population density of 3,000 plants/acre. However, the stand was overly mature, heavily hedged and in poor vigor. Density increased slightly in1992, but the change is likely due to the greatly increased sample size now used. Use was still heavy, vigor poor on most plants, and percent decadence increased from 47% to 81%. By 1999, the population had declined to only 1,160 plants/acre. Use was similar to 1992, vigor continued to be poor on 52% of the sagebrush sampled, and percent decadence increased to 91%. In addition, 45% of the population sampled were classified as dying. Recruitment was poor with few seedlings and young plants present. There was relatively good leader growth on sagebrush, but seed production was non existent. Data from 2004 show nearly a 50% decline in sagebrush density to only 600 plants/acre. The remaining plants were in poor vigor and 77% were determined as decadent, while 60% were classified as dying. Utilization was heavy, young recruitment poor, and no seedlings were encountered. The livestock exclosure in Beef Basin is a dramatic example of overuse and subsequent decline of sagebrush compared to a protected stand in the total exclosure.

Another preferred browse species on the study site is winterfat. Selected by both cattle and deer, most of these small shrubs show heavy hedging, but still maintain good vigor. The population has shown a steady decline in density between 1986 and 1999. Density increased slightly in 2004 to 440 plants/acre. Narrowleaf low rabbitbrush is also common. It has shown light use on most plants but moderate to heavy use on some. This species of rabbitbrush is usually rarely utilized. There are also a few scattered pinyon pine and juniper throughout the site and into the flat.

Grasses are an important part of the community, providing more than twice as much ground cover as the shrubs. The most abundant species in 1986 and 1992 was blue gramma. It is a warm season grass that cures to palatable winter forage but often escapes grazing because of its low growth habit and dormancy from November through June when livestock are present. Annual cheatgrass occurred in small numbers in 1992 and increased exponentially by 1999. Quadrat frequency increased from 11% in 1992 to 97% by 1999. Cheatgrass provided 88% of the grass cover in 1999. Drought conditions prior to the 2004 reading caused cheatgrass to decline in frequency and cover, but was still very abundant with almost 10% cover and was found in 81% of the quadrats. Other grasses that provide some spring grazing are needle-and-thread, bottlebrush squirreltail, sand dropseed, and Indian ricegrass. The cool season grasses receive excessive use in the fall and spring (livestock are on the site from November until June) when they tend to green-up. Perennial forbs are relatively scarce and provide little forage.

1986 APPARENT TREND ASSESSMENT

Based on excessive use, poor form and vigor, and low reproduction of the key species, Wyoming big sagebrush, the apparent range trend is downward. It appeared that a reduction in use would be the best management approach. This was tried by the DWR with post season antlerless permits issued to reduce the number of wintering deer. Cattle are also contributing to the problem and a reduction in winter grazing should be considered. Spring use by livestock would promote shrub growth by impacting grass production, but if there are no cool season grasses available, then they will utilize sagebrush. The presence of several annuals and increaser species validates the continued downward trend in plant composition and succession. The high amount of bare soil, presence of active gullies, soil movement, and wind erosion indicate a declining soil trend. However, erosion does not appear severe or unusual for such a sandy soil.

1992 TREND ASSESSMENT

This has been an area that historically has been heavily utilized by both cattle and deer. Trend for soil appears stable with a decline in litter cover somewhat compensated by a reduction in percent bare ground. The browse trend is down. The two key species, Wyoming big sagebrush and winterfat have notable downward trends. Sagebrush density shows a slight increase which is more reflective of the larger sample size now used than any change in their actual population. What should be understood is that the proportion of the plants that are considered to have poor vigor have increased from 36% up to 61% and that the proportion of the population that are decadent has also risen from 47% to 81%. To further compound the problem, seedlings are rare and account for less than 1% of the population and the proportion of young in the population is 18%. These last two values are low, but in 1986 there were no seedlings or young. Winterfat makes up less than 5% of the browse cover and the only real positive aspect of this small population is that percent decadency has gone down from 64% to 28%. The trend for the grasses is slightly up with a slight increase in nested frequency values. The trend for forbs is down, but they are relatively uncommon and only make up 1% of the herbaceous understory cover. The overall trend for the herbaceous understory would be stable. The Desirable Components Index (see methods) rating is fair at 39. High decadence negatively impacts the rating for this site.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - stable (3)
winter range condition (DC Index) - 39 (fair) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil appears stable with similar ground cover characteristics compared to 1992. Trend for the key browse species, Wyoming big sagebrush is down due to a three-fold decline in population density, continued heavy use, and a continuing increase in percent decadence from 81% to 91%. The other preferred shrub, winterfat, is also heavily hedged. It has declined in density but shows improved vigor and lower percent decadence. Trend for the herbaceous understory is down. Cheatgrass has increased dramatically and now dominates the site by providing 88% of the grass cover and 87% of the total herbaceous cover. It was present on the site in 1992, but in low numbers. It had a quadrat frequency of only 11% and a cover value of 2% in 1992. In 1999, cheatgrass quadrat frequency increased to 97% with a cover value of almost 27%. Nested frequency of perennial grasses declined since 1992. The frequency of the most abundant perennial, blue grama, declined significantly. The only perennial grass that did not decline is needle-and-thread grass. The decline of blue grama, a warm season grass, could indicate very dry summers in this area since 1992. Forbs are still an insignificant contributor of cover. The DCI score dropped to very poor (-14). Preferred browse, especially sagebrush, cover has dropped while percent decadence is very high and proportion of young plants is very low. Perennial grass cover has declined, while cheatgrass has greatly increased which negatively impacts the rating.

TREND ASSESSMENT
soil - stable, but poor (3)
browse - down and in very poor condition (1)
herbaceous understory - down and now dominated by cheatgrass (1)
winter range condition (DC Index) - -14 (very poor) Wyoming big sagebrush type

2004 TREND ASSESSMENT

Trend for soil is slightly down due to a moderate increase in bare ground cover. Litter and vegetation cover declined and average grass cover dropped 32%. Most of this drop is from the loss of annual grass cover as perennial grass cover actually increased. Erosion is not severe however, due to the level terrain. Trend for the key browse species, Wyoming big sagebrush continues to be down. Density has steadily declined since 1992 and has dropped nearly 50% since 1999 to only 600 plants/acre. Utilization remains heavy (but difficult to determine because of the lack of significant annual growth), vigor poor, and decadence high at 77%. More than 75% of the decadent sagebrush sampled were rated as dying. Total line intercept canopy cover of sagebrush is less than 1%. No seedlings were encountered and young plants are rare. Winterfat is has remained stable at around 400 plants/acre. It displays heavy use, good vigor and low decadence. Trend for the herbaceous understory is up slightly. Sum of nested frequency of perennial grasses increased slightly while frequency and cover of cheatgrass declined significantly. Blue grama is the most abundant perennial species. It increased significantly in nested frequency and cover rose more than 4 fold (1.2% to 5.5%). Sand dropseed and needle-and-thread are also fairly abundant and increased in frequency and cover since 1999. Cheatgrass was very abundant in 1999 with a cover value of nearly 27%. It provided 88% of the total grass cover in 1999. Drought conditions for the past few years have caused a significant decline in its nested frequency and cover declined nearly 3 fold to 9.6%. It still provides 45% of the grass cover however. Forbs continue to be rare and unimportant on this site. The DCI score improved slightly, but is still poor at 21. Perennial grasses are higher, while cheatgrass is lower.

TREND ASSESSMENT
soil - down (1)
browse - down and in very poor condition (1)
herbaceous understory - up slightly (4)
winter range condition (DC Index) - 21 (poor) Wyoming big sagebrush type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 23

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Bouteloua gracilis	$_{b}$141	$_{c}$192	$_{a}$58	$_{b}$100	18.76	1.20	5.47
G	Bromus tectorum (a)	-	$_{a}$27	$_{c}$336	$_{b}$268	1.95	26.46	9.62
G	Oryzopsis hymenoides	$_{a}$-	$_{ab}$7	$_{ab}$2	$_{b}$12	.21	.03	.16
G	Sitanion hystrix	$_{a}$42	$_{b}$96	$_{a}$48	$_{a}$36	1.10	.46	.41
G	Sporobolus cryptandrus	$_{b}$95	$_{b}$92	$_{a}$20	$_{a}$42	4.32	.32	2.07
G	Stipa comata	$_{a}$67	$_{a}$54	$_{ab}$74	$_{b}$100	1.50	1.57	2.70
G	Vulpia octoflora (a)	-	$_{b}$21	$_{a}$5	$_{a}$1	.10	.01	.00
Total for Annual Grasses		0	48	341	269	2.06	26.47	9.63
Total for Perennial Grasses		345	441	202	290	25.90	3.60	10.82
Total for Grasses		345	489	543	559	27.97	30.07	20.45
F	Antennaria rosea	-	-	-	1	-	-	.00
F	Astragalus mollissimus	9	18	12	-	.06	.06	-
F	Calochortus nuttallii	-	1	-	-	.00	-	-
F	Chenopodium leptophyllum(a)	-	11	-	1	.03	-	.00
F	Collinsia parviflora (a)	-	-	-	10	-	-	.02
F	Descurainia pinnata (a)	-	-	1	5	-	.00	.02
F	Eriogonum cernuum (a)	-	4	-	-	.01	-	-
F	Erigeron pumilus	$_{b}$35	$_{a}$7	$_{a}$2	$_{a}$2	.06	.06	.03
F	Gayophytum ramosissimum(a)	-	-	5	-	-	.01	-
F	Lappula occidentalis (a)	-	-	-	4	-	-	.04
F	Machaeranthera canescens	12	8	7	1	.07	.09	.00
F	Phlox austromontana	-	3	-	3	.03	-	.15
F	Phlox longifolia	-	-	2	5	-	.00	.01
F	Plantago patagonica (a)	-	$_{a}$18	$_{ab}$28	$_{b}$35	.03	.16	.45
F	Sphaeralcea coccinea	2	-	-	-	-	-	-
Total for Annual Forbs		0	33	34	55	0.07	0.18	0.53
Total for Perennial Forbs		58	37	23	12	0.24	0.21	0.20
Total for Forbs		58	70	57	67	0.31	0.40	0.74

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

BROWSE TRENDS --
Management unit 14 , Study no: 23

Type	Species	Strip Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
B	Artemisia tridentata wyomingensis	0	60	38	22	4.69	2.00	.99
B	Atriplex canescens	0	3	2	3	.00	.15	.15
B	Ceratoides lanata	0	10	7	5	.30	.53	.33
B	Chrysothamnus viscidiflorus stenophyllus	0	47	51	42	3.82	4.67	4.76
B	Gutierrezia sarothrae	0	0	1	0	-	-	-
B	Juniperus osteosperma	0	0	1	0	-	.03	-
B	Opuntia spp.	0	6	4	6	.15	.15	.06
B	Pinus edulis	0	0	2	1	.85	.63	.85
B	Sclerocactus whipplei	0	5	8	6	.04	.12	.12
Total for Browse		0	131	114	85	9.87	8.31	7.27

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 23

Species	Percent Cover '04
Artemisia tridentata wyomingensis	.68
Atriplex canescens	.90
Ceratoides lanata	.66
Chrysothamnus viscidiflorus stenophyllus	5.31
Opuntia spp.	.06
Pinus edulis	1.04
Sclerocactus whipplei	.05

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 23

Species	Average leader growth (in) '04
Artemisia tridentata wyomingensis	1.4
Atriplex canescens	2.2
Ceratoides lanata	3.4

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 23

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	10	-
Pinus edulis	11	-

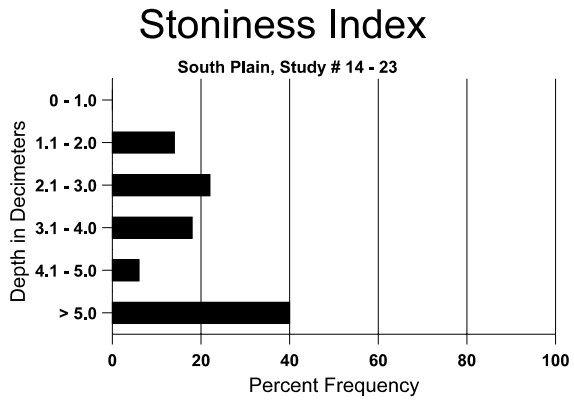
Average diameter (in)	
'99	'04
6.8	-
7.7	-

BASIC COVER --
Management unit 14 , Study no: 23

Cover Type	Average Cover %			
	'86	'92	'99	'04
Vegetation	9.50	39.09	37.93	32.02
Rock	0	1.76	.06	.00
Pavement	0	0	.65	.33
Litter	52.75	30.99	34.20	24.15
Cryptogams	0	.68	.33	.38
Bare Ground	37.75	33.59	33.42	52.01

SOIL ANALYSIS DATA --
Management unit 14, Study no: 23, Study Name: South Plain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
19.8	65.3 (14.8)	7.6	60.0	23.4	16.6	0.8	5.3	67.2	.4



PELLET GROUP DATA --
Management unit 14 , Study no: 23

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	25	28	9
Elk	-	-	2
Deer	47	47	32
Cattle	1	6	17

Days use per acre (ha)	
'99	'04
-	-
-	1 (2)
76 (188)	40 (99)
13 (32)	17 (43)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 23

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**3000**	-	-	1600	1400	-	0	96	47	7	36	19/23
92	**3520**	20	620	60	2840	-	19	77	81	11	61	-/-
99	**1160**	140	20	80	1060	1120	22	66	91	45	52	18/23
04	**600**	-	40	100	460	1240	0	93	77	60	60	17/24
Atriplex canescens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**60**	-	-	60	-	-	67	0	-	-	0	-/-
99	**40**	-	-	40	-	-	0	0	-	-	0	39/58
04	**60**	20	-	60	-	-	67	33	-	-	0	41/59
Ceratoides lanata												
86	**933**	-	-	333	600	-	36	64	64	-	0	11/8
92	**640**	20	420	40	180	-	25	53	28	-	13	-/-
99	**400**	-	-	380	20	-	0	100	5	5	5	16/12
04	**440**	20	80	360	-	-	18	64	0	-	0	11/11
Chrysothamnus viscidiflorus stenophyllus												
86	**2333**	200	533	400	1400	-	17	6	60	2	23	12/14
92	**2320**	-	720	1200	400	-	9	0	17	-	22	-/-
99	**1920**	-	80	1480	360	20	13	2	19	3	3	18/28
04	**1500**	-	-	1200	300	60	0	0	20	16	16	16/27
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	100	0	-	-	0	9/10
04	**0**	-	-	-	-	-	0	0	-	-	0	7/7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus osteosperma												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	20	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**200**	60	200	-	-	-	0	0	0	-	30	-/-
99	**80**	20	20	60	-	-	0	0	0	-	0	6/13
04	**220**	-	-	200	20	-	0	0	9	9	9	4/12
Pinus edulis												
86	**0**	66	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**40**	-	-	40	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Sclerocactus whipplei												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**100**	20	60	40	-	-	0	0	-	-	0	-/-
99	**160**	-	-	160	-	-	0	0	-	-	0	4/6
04	**120**	-	-	120	-	-	0	0	-	-	0	5/6

Trend Study 14-24-04

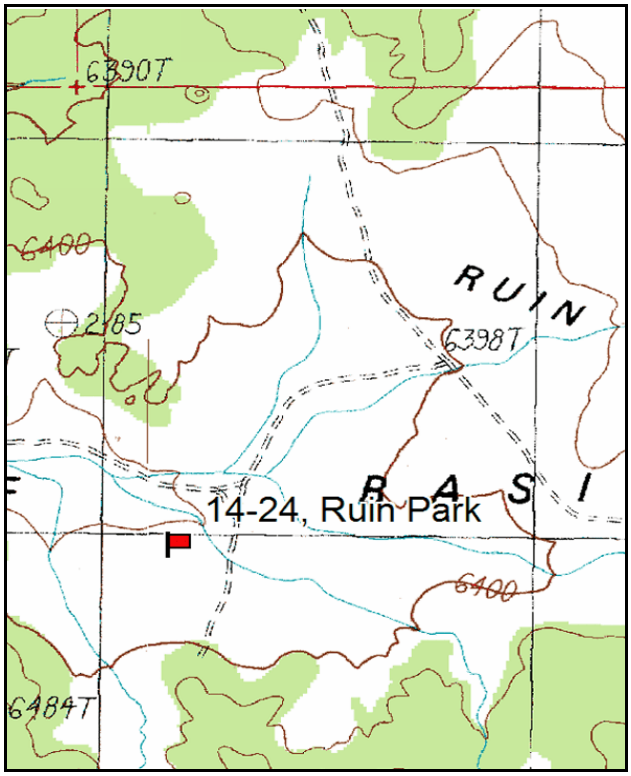
Study site name: Ruin Park . Vegetation type: Wyoming Big Sagebrush .

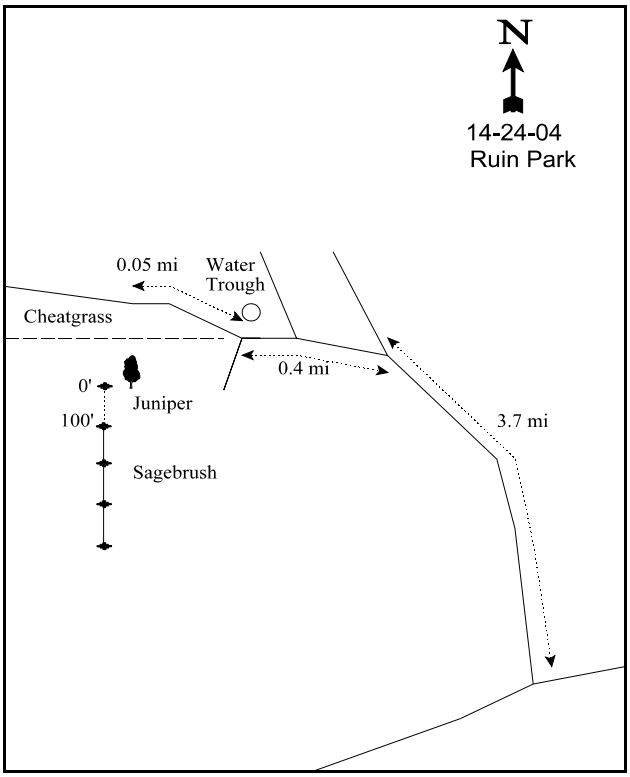
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

At the junction of the Elk Ridge-Salt Creek Mesa-Beef Basin Roads, go north down into the Beef Basin area. Follow the main road for 9.1 miles, passing the FS/BLM boundary, down to an intersection where there is a BLM register box. Bear right and go 3.7 miles on the main road disregarding all forks until you come to a fork at this mileage. Stay left and continue 0.3 miles to a right turnoff to a ruin. Continue left 0.1 miles to a water trough by a fork. Turn right for approximately 0.05 miles before turning south and driving southwest across the cheatgrass flat (no road). Stop at the sagebrush border and look out in the sagebrush flat for a small lone juniper near a shallow gully. The frequency baseline starts by this juniper and runs south towards the P-J covered hills. All stakes are 3 1/2 foot tall green steel fence posts.





Map Name: Cross Canyon

Diagrammatic Sketch

Township 32S , Range 18E , Section 11

GPS: NAD 27, UTM 12S 4206937 N, 595157 E

DISCUSSION

Ruin Park - Trend Study No. 14-24

The Ruin Park trend study samples the typical Wyoming big sagebrush-grass range in Beef Basin. The site consists of a large open park surrounded by rocky, pinyon-juniper covered hills. Numerous Anasazi Indian ruins are found in the hills near the study, therefore the name Ruin Park for the large open flat. Located in the lower, western end of the park, the study site has a northern aspect to the intermittent gully, which runs west down the center of Ruin Park. A water development for cattle is located just northeast of the transect, in an area dominated by cheatgrass and a few Atriplex. Ruin Park is grazed under the same schedule as South Plain (14-23). Cattle distribution is controlled mainly by water and there are few fences. Deer use has been moderately heavy in this part of Beef Basin. Pellet groups and antler drops were numerous in 1986. Pellet group data from the site in 1999 estimated 70 deer days use/acre (173 ddu/ha) and 26 cow days use/acre (64 cdu/ha). Cattle pats were mostly older, but a few were from the spring. Pellet group data from 2004 estimated only 13 deer days use/acre (31 ddu/ha). Cattle use was estimated at 11 days use/acre (27 cdu/ha).

The reddish sandy loam soil is fairly deep with an effective rooting depth estimated at 18 inches. It has a moderately alkaline pH of 7.9 with low organic matter (0.6%) and phosphorus (5.9 ppm). Phosphorus values of less than 10 ppm are considered minimal for normal plant growth and development. Average soil temperature was high at 76°F at an depth of 18 inches in 1999. In 2004, soil temperature was lower at 66°F. High soil temperatures tend to give winter annuals like cheatgrass, a competitive advantage over perennial grasses, especially during dry years with unusually dry summers. About 50% of the ground surface was bare in 1986 and 2004, due to the patchy distribution of the vegetative cover. Percent bare ground declined to 34% in 1992 and 1999 due to the increase in cheatgrass cover. A buildup of litter and soil, along with some cryptogamic development, is found at the base of sagebrush. A gully runs parallel to the baseline and has grass growing in the bottom. Overall, erosion is not severe, although there is soil movement and deposition from the hills above.

Wyoming big sagebrush is the key browse species in Ruin Park. The plants were severely hedged with 58% being classified as decadent in 1986. Percent decadence increased substantially to 77% in 1992. This trend continued with further increases to 91% in 1999. Protected plants showed better growth and vigor. There were few young plants but no seedlings encountered during any reading. Density was estimated at 2,198 sagebrush/acre in 1986, declining to 1,520 by 1992, then only 640 plants/acre in 1999. In 2004, no live sagebrush plants were sampled.

A large, very woody winterfat ecotype is found on this site which was fairly common in 1986 and 1992. In 1999, only 300 mostly heavily hedged plants/acre were estimated. Density declined to only 160 plants/acre in 2004. Narrowleaf low rabbitbrush was fairly common in 1992 and 1999 at about 1,000 plants/acre. Density declined 54% to 460 plants/acre in 2004.

Perennial grasses provides important ground cover and soil protection. The most abundant perennial species is needle-and-thread grass which shows the influence of heavy cattle grazing. Blue grama and Indian ricegrass are also common. Cheatgrass occurred on the site in 1992 in small numbers. By 1999 cheatgrass frequency and cover exploded and it dominated the site by providing 69% of the grass cover and 61% of the total vegetation cover. Drought conditions prior to the 2004 reading caused cheatgrass to decline significantly. Cheatgrass was found in 97 of the 100 quadrats placed in 1999 with an average cover value of 21%. By 2004, only one cheatgrass plant was sampled and cover declined to zero. Although several species of forbs were encountered on the transect, most species occur rarely. The only fairly common forb is the annual slimleaf goosefoot.

1986 APPARENT TREND ASSESSMENT

This sagebrush flat, as does most all of Beef Basin, receives heavy late fall, winter, and spring use by cattle and winter use by deer. As a consequence, the Wyoming big sagebrush is deteriorating in form, vigor, and recruitment. Forage production has also suffered. Because of the poor site potential and grazing pressure, grasses have not really had the opportunity to responded. Continued persistent use could eliminate the key browse species. A reduction in use, through better distribution and lower animal numbers, seems to be the only feasible answer. Current vegetative trend appears to be declining.

1992 TREND ASSESSMENT

The soil trend for this site is stable, but in only fair to poor condition. Percent cover for bare ground has declined, but so has litter cover. Trend for browse is down due to reduced population density, continued moderate to heavy use, poor vigor, and an increase in percent decadence for Wyoming big sagebrush. Recruitment is also poor with no seedlings and few young plants sampled. Population density for winterfat has also declined slightly, although percent decadence has actually gone down from 54% in 1986 to 4% now with no plants classified with poor vigor. The overall trend for browse would be considered downward. Winterfat, which is a warm season species, is escaping harmful utilization because most of the use is during the cool season (winter and spring) when it is not actively growing. The herbaceous understory is made up mostly of grasses (87% of the herbaceous cover), while forbs are only a minor component. With this in mind, the trend for the herbaceous understory is stable, but only fair condition. The Desirable Components Index (see methods) rating is fair at 36. Low preferred browse cover (primary species is sagebrush) and high decadence prevent this site from a higher rating.

TREND ASSESSMENT
soil - stable (3), but only fair to poor condition
browse - downward (1)
herbaceous understory - stable (3)
winter range condition (DC Index) - 36 (fair) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1992. Some erosion is occurring, but it appears minimal due to the levelness of the terrain. Trend for browse continues to decline with density of Wyoming big sagebrush now at only 640 plants/acre and percent decadence up to 91%. In addition, dead plants are twice as abundant as live plants and 41% of the decadent plants sampled appeared to be dying. With no noticeable recruitment, the population will continue to decline. Density of winterfat has also declined from 640 to only 300 plants/acre. Trend for the herbaceous understory is also down. Sum of nested frequency of perennial grasses has declined and conversely annual cheatgrass has increased significantly. Cheatgrass had a cover value of only .04% in 1992, increasing to 21% by 1999. Quadrat frequency rose from only 3% in 1992 to 97% in 1999. Cheatgrass now totally dominates the site by providing 61% of the total vegetative cover. Forbs are lacking and have also declined in nested frequency since the last reading. Cover of forbs has decreased from 4% in 1992 to less than 1% in 1999. The DCI declined to a very poor rating with a score of -5. Preferred browse cover is even lower and decadence is very high. The high amount of cheatgrass also negatively impacts the rating.

TREND ASSESSMENT
soil - stable, but poor condition (3)
browse - downward (1)
herbaceous understory - down and dominated by cheatgrass (1)
winter range condition (DC Index) - -5 (very poor) Wyoming big sagebrush type

2004 TREND ASSESSMENT

Trend for soil is down due to a 38% increase in cover of bare ground and a 25% decline in vegetation cover. Litter cover declined by 30%. There is some localized soil movement occurring, but it is minimal due to the level terrain. Trend for browse is down. The key browse species, Wyoming big sagebrush has been declining since 1986 and no live plants were sampled in 2004. The only useful browse left on the site is a small population of winterfat which number only 160 plants/acre. This area is no longer an effective winter range for deer due to the lack of sagebrush. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses showed some improvement from 1999, while cheatgrass declined from a cover value of 21% to zero in 2004. Only one cheatgrass plant was sampled in 2004. The site is now dominated by needle-and-thread, blue grama, and Indian rice grass. Nested frequency of needle-and-thread grass increased significantly and average cover more than doubled from 7% to 17%. Blue grama remained stable in frequency but cover increased from 1% to over 3%. Indian ricegrass declined significantly in nested frequency and average cover declined slightly. Forbs remain an insignificant part of the understory. The DCI score improved to 31 (fair). This is due to the major decline of cheatgrass and in increase in perennial grasses. However, there is very little preferred browse cover which deer depend on for winter survival.

TREND ASSESSMENT
soil - down (1)
browse - down with no live sagebrush (1)
herbaceous understory - up slightly (4)
winter range condition (DC Index) - 31 (fair) Wyoming big sagebrush type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 24

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Bouteloua gracilis	$_{a}$95	$_{b}$146	$_{a}$58	$_{a}$62	9.26	.80	3.37
G	Bromus tectorum (a)	-	$_{a}$5	$_{b}$336	$_{a}$1	.04	21.28	.00
G	Oryzopsis hymenoides	$_{a}$56	$_{ab}$61	$_{b}$96	$_{a}$47	1.40	2.20	1.82
G	Sitanion hystrix	$_{b}$47	$_{a}$11	$_{a}$3	$_{a}$9	.07	.00	.33
G	Sporobolus cryptandrus	$_{ab}$10	$_{b}$12	$_{a}$1	$_{a}$-	.15	.00	-
G	Stipa comata	$_{b}$278	$_{b}$262	$_{a}$176	$_{b}$244	16.82	6.71	17.45
G	Vulpia octoflora (a)	-	9	5	-	.02	.01	-
Total for Annual Grasses		0	14	341	1	0.05	21.30	0.00
Total for Perennial Grasses		486	492	334	362	27.72	9.74	22.98
Total for Grasses		486	506	675	363	27.78	31.04	22.99
F	Astragalus mollissimus	$_{b}$7	$_{ab}$8	$_{ab}$6	$_{a}$-	.04	.02	-
F	Calochortus nuttallii	-	-	-	-	-	-	.00
F	Chenopodium leptophyllum(a)	$_{a}$8	$_{b}$68	$_{a}$-	$_{b}$54	1.44	-	1.36
F	Descurainia pinnata (a)	-	-	-	7	-	-	.04
F	Eriogonum spp.	-	2	-	-	.03	-	-
F	Erigeron pumilus	4	7	2	-	.06	.00	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
F	Euphorbia fendleri	11	3	10	8	.06	.24	.07
F	Helianthus annuus (a)	-	2	-	-	.00	-	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{ab}$6	$_{b}$11	-	.06	.10
F	Machaeranthera canescens	$_{a}$4	$_{b}$40	$_{a}$7	$_{a}$-	1.79	.02	-
F	Microsteris gracilis (a)	-	-	1	-	-	.00	-
F	Navarretia intertexta (a)	-	-	-	1	-	-	.00
F	Penstemon spp.	-	1	-	-	.03	-	-
F	Phlox hoodii	$_{a}$3	$_{b}$20	$_{b}$14	$_{a}$-	.17	.28	-
F	Phlox longifolia	$_{c}$32	$_{bc}$23	$_{a}$2	$_{ab}$6	.10	.00	.06
F	Plantago patagonica (a)	-	$_{a}$-	$_{b}$28	$_{a}$6	-	.06	.01
F	Ranunculus testiculatus (a)	-	-	3	-	-	.00	-
F	Salsola iberica (a)	-	3	-	5	.15	-	.01
F	Senecio multilobatus	4	-	-	-	-	-	-
F	Sphaeralcea coccinea	$_{b}$15	$_{a}$2	$_{a}$-	$_{a}$1	.16	-	.03
F	Tragopogon dubius	-	-	2	-	-	.00	-
F	Unknown forb-annual (a)	-	2	-	-	.01	-	-
Total for Annual Forbs		8	75	38	84	1.61	0.13	1.53
Total for Perennial Forbs		80	106	43	15	2.45	0.57	0.17
Total for Forbs		88	181	81	99	4.06	0.71	1.71

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

BROWSE TRENDS --
Management unit 14 , Study no: 24

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Artemisia frigida	4	2	2	.03	-	.06
B	Artemisia tridentata wyomingensis	43	23	0	4.15	1.77	-
B	Ceratoides lanata	13	8	4	.51	.18	.15
B	Chrysothamnus nauseosus albicaulis	1	1	0	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	25	28	11	1.24	1.43	.31
B	Opuntia spp.	1	0	0	-	-	-
Total for Browse		87	62	17	5.93	3.39	0.51

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 24

Species	Percent Cover '04
Ceratoides lanata	.30
Chrysothamnus viscidiflorus stenophyllus	1.79

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 24

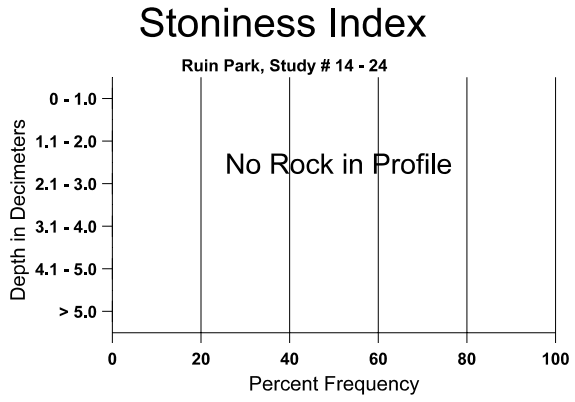
Species	Average leader growth (in) '04
Ceratoides lanata	1.8

BASIC COVER --
Management unit 14 , Study no: 24

Cover Type	Average Cover % '86	'92	'99	'04
Vegetation	6.50	36.31	36.66	27.64
Rock	0	.83	0	.01
Pavement	0	0	.30	.26
Litter	41.00	22.78	34.33	24.71
Cryptogams	2.50	.55	.24	.18
Bare Ground	50.00	33.97	34.17	55.52

SOIL ANALYSIS DATA --
Management unit 14, Study no: 24, Study Name: Ruin Park

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
18.1	66.3 (17.7)	7.9	60.0	21.8	16.6	0.6	5.9	80.0	0.4



PELLET GROUP DATA --
Management unit 14 , Study no: 24

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	17	19	10
Elk	1	-	-
Deer	57	40	16
Cattle	10	12	2

Days use per acre (ha)	
'99	'04
-	-
-	-
70 (173)	13 (31)
26 (64)	11 (27)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 24

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**140**	-	-	140	-	-	0	0	-	-	0	-/-
99	**60**	-	20	40	-	-	67	0	-	-	0	7/7
04	**40**	-	-	40	-	-	0	0	-	-	0	2/4
Artemisia tridentata wyomingensis												
86	**2198**	-	266	666	1266	-	15	85	58	-	0	24/27
92	**1520**	-	80	280	1160	-	43	38	76	12	24	-/-
99	**640**	-	-	60	580	1320	9	88	91	38	50	21/29
04	**0**	-	-	-	-	1900	0	0	0	-	0	-/-
Ceratoides lanata												
86	**1732**	133	333	466	933	-	73	23	54	-	0	8/9
92	**640**	-	220	380	40	-	13	6	6	-	0	-/-
99	**300**	-	140	80	80	-	13	40	27	7	7	13/13
04	**160**	-	-	160	-	-	13	0	0	-	0	14/16
Chrysothamnus nauseosus albicaulis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	-	-	20	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	100	-	-	0	14/19
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus stenophyllus												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**900**	40	220	680	-	-	0	0	0	-	0	-/-
99	**1000**	-	60	680	260	20	4	0	26	2	8	12/21
04	**460**	-	-	380	80	100	0	0	17	13	13	9/15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**40**	-	40	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	6/24
04	**0**	-	-	-	-	-	0	0	-	-	0	7/21
Sclerocactus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	4/6
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 14-27-04

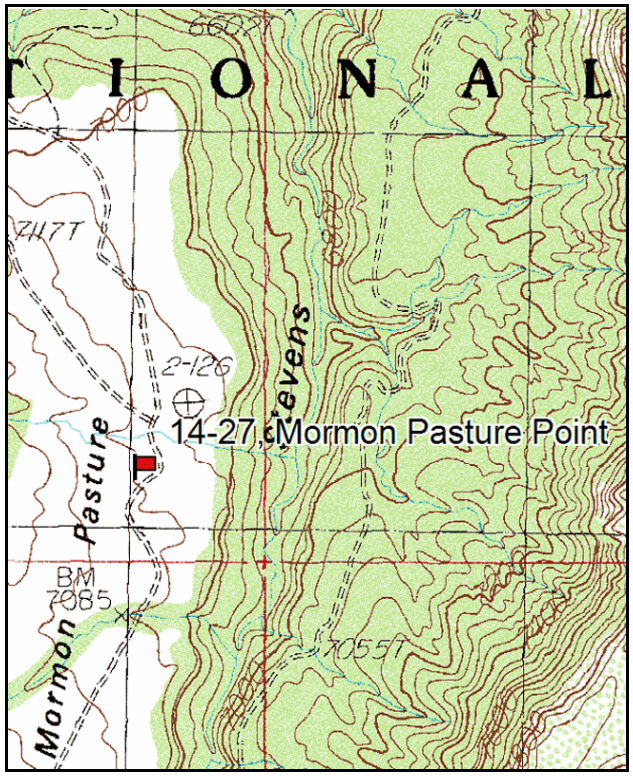
Study site name: Mormon Pasture Point . Vegetation type: Chained, Seeded P-J .

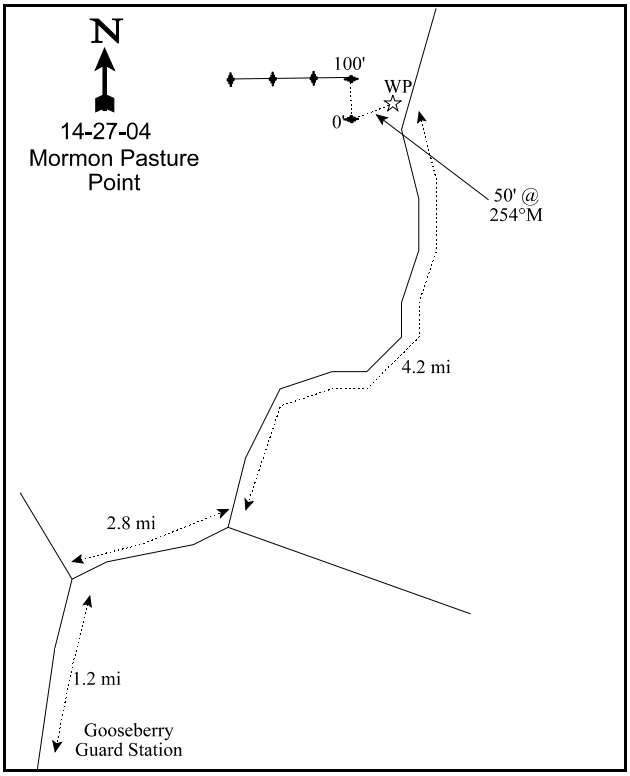
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the Gooseberry Guard Station, go 1.2 miles to the Causeway to a fork. Turn right and go 2.8 miles to a fork. Turn left towards Mormon Pasture and drive 1.2 miles to two mining cabins. Stay right, pass the uranium quarry, and go 0.9 miles to a fork. Stay left for 2.1 miles to the transect. There is a witness post (3 foot tall green fence post) on the left side of the road. The 0-foot end of the baseline is 50 feet west of the witness post (@ 254°M) and is marked with browse tag #7883.





Map Name: Cathedral Butte Diagrammatic Sketch

Township 33S , Range 20E , Section 22 GPS: NAD 27, UTM 12S 4194117 N, 614015 E

DISCUSSION

Mormon Pasture Point - Trend Study No. 14-27

The Mormon Pasture Point trend study is located in an open rolling valley between high red cliffs and the head of a deep canyon. The area drains to the north into Steven's Canyon. The aspect is east on a 10% slope at an elevation of 7,100 feet. The site once supported a pinyon-juniper woodland, but approximately 900 acres were chained and seeded in the early 1970's. A follow-up treatment of Tordon was done in 1985 on 200 acres at the north end of the chaining. Prescribed burning is a possible future treatment. The Forest Service is managing the area for cattle grazing. As part of the Cottonwood allotment, it is grazed by 676 cattle (3,718 AUMs) on a three unit rest-rotation system. In 1986, this unit was grazed during the first half of the season. Utilization of grasses was light to moderate. In 1992, cattle use was moderate for grasses. The area also receives spring and fall deer and elk use, with some summer use. Pellet group data from 1999 estimated 5 deer days use/acre (12 ddu/ha), 21 elk days use/acre (52 edu/ha), and 36 cow days use/acre (89 cdu/ha). Most of the cow pats appeared to be from the previous season, however there were some cows a few hundred yards south of the study site in 1999. In 2004, use was lower for each species with an estimated 4 deer days use/acre (10 ddu/ha), 6 elk days use/acre (15 edu/ha), and 14 cow days use/acre (34 cdu/ha).

The light tan soil is moderately deep with a layer of loose duff on the surface. Effective rooting depth varied from about 8 inches to 21 inches and averaged almost 16 inches. A calcium carbonate hard pan was encountered in some areas of the study, overall there is little rock in the profile. Soil texture is a sandy clay loam with a slightly alkaline pH (7.5). Phosphorus is limited at just 3.8 ppm. Amounts less than 10 ppm may inhibit normal plant growth and development. There are some gullies on the site, although they appear to be healing. Protective ground cover is moderately high leaving only isolated areas of exposed bare ground.

Point quarter data from 1999 estimated 52 juniper and 41 pinyon trees/acre. Juniper average diameter was 3.5 inches and pinyon was 3.1 inches. Twenty-one percent of the juniper sampled were knocked down (tipped over) chained trees that are still living. In 2004, density remained stable. Juniper density was estimated at 54 trees/acre with an average diameter of 6.7 inches. Thirty eight percent of the junipers were trees that survived the chaining. Pinyon density was 43 trees/acre with an average diameter of 3.2 inches. Cover increased slightly for each species between 1999 and 2004. Combined cover was approaching 5% in 2004. Some kind of followup treatment should be utilized in the near future and not allow the increasing tree cover to effect the production of the herbaceous understory.

The chained site is dominated by mixed browse in association with a dense perennial grass understory. The browse component is mainly clumps of Gambel oak, with scattered serviceberry, true mountain mahogany, bitterbrush, snowberry, and young pinyon and juniper. There is also some mountain big sagebrush that was not encountered in the 1986 or 1992 samples, but was picked up in 1999. The low-growing bitterbrush, a preferred browse forage, is heavily utilized giving plants a clubbed growth form. The oak and serviceberry are the largest plants, averaging 5 to 7 feet in height. The oak, serviceberry, and bitterbrush were healthy and had slightly higher densities in 2004. Each species, including sagebrush, had good leader growth in 2004.

Perennial grasses are abundant and provide valuable forage. Intermediate wheatgrass is the most abundant species, nested frequency and cover have slowly declined since 1992. Intermediate wheatgrass made up 67% of the total grass cover in 2004 with 11% cover. Crested wheatgrass was the other dominant species. In 2004, nested frequency had declined significantly since 1992, but cover was just as high as it was in 1992. In 2004, these two seeded grasses accounted for 95% of the grass cover. There were a few native perennial grasses present, but they only occur in small numbers. At least 12 species of forbs occur on the site, with none especially abundant, nor do they provide much forage. Looseflower milkvetch, bladderpod, and scarlet globemallow are the most abundant forbs.

1986 APPARENT TREND ASSESSMENT

It appears that the woody plants, especially oak and possibly pinyon-juniper are on the increase. However, the grasses are also vigorous. Without heavy grazing pressure, they should be able to maintain a stable population. Currently the area provides a variety of browse and herbaceous forage. Considering the variety of uses it receives, it appears at the ideal successional point at which to maintain the composition. The woody species will continue to increase, as demonstrated by nearby areas with a thick browse cover. Future treatments may be warranted on small tracts of woody species. The soil is easily erodible and disturbance could cause serious soil loss. Current trend is probably improving because of the increasing vegetation and litter cover.

1992 TREND ASSESSMENT

Trend for soil appears to be improving. Percent cover for bare ground has declined from 27% to 19%. Litter cover has also declined slightly, but not enough to warrant a declining trend. Because of the expanded sampling size more shrub species have been picked up. This gives a much better estimate of some species, especially oak. By inspecting the data, one can see that with only one exception (bitterbrush), the shrubs all show signs of expanding populations with outstanding biotic potentials (proportion of seedlings to the population) with a high percentage of young plants. Trend for browse is up. Trend for herbaceous understory is down slightly with nested frequency values for grasses and forbs both showing significant declines since 1986. The Desirable Components Index (see methods) rating is fair to good with 63 points. The herbaceous understory is good and the proportion of young browse is excellent. Preferred browse cover is lower than would be desired for a higher rating.

TREND ASSESSMENT
soil - slightly up (4)
browse - up (5)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 63 (fair to good) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soil is slightly down since 1992 due to a small decline in litter cover combined with a dramatic increase in relative percent cover of bare ground from 17% to 28%. Relative percent cover of vegetation also fell from 36% to 26%. Trend for browse is up slightly. Density of bitterbrush and Gambel oak have increased and Mountain big sagebrush has finally become abundant enough to be picked up in the sample. Utilization of bitterbrush is more moderate this year, but vigor is poor on 38% of the plants sampled and percent decadence has increased to 38%. Oak is more heavily browsed, although vigor is good and percent decadence has declined from 16% to only 1%. Trend for the herbaceous understory is slightly down. Sum of nested frequency for perennial grasses has declined slightly, while frequency of forbs increased slightly. However, perennial forbs only contribute to only 10% of the herbaceous cover. Nested frequency of the dominant grass, intermediate wheatgrass declined, but not significantly. The DCI score is fair at 60. Preferred browse cover is not as high as desired, but the herbaceous understory is very good.

TREND ASSESSMENT
soil - down (1)
browse - up slightly (4)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 60 (fair) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

Trend for soil is stable. Bare ground increased slightly, but the ratio of bare soil to protective ground cover (vegetation, litter, and cryptogams) has actually improved slightly from 1:2.5 to 1:2.7. Grasses and litter are abundant to prevent erosion. The browse trend is slightly up. Serviceberry density and cover increased, while use was lower. Bitterbrush density also increased slightly and continues to receive heavy use, yet percent decadence went down. Oak density and cover also increased. Pinyon and juniper density has remained stable, but cover has increased as the trees continue to mature. The herbaceous understory trend is slightly down. Sum of nested frequency for perennial grasses declined 18% since 1999, while cover remained about the same at about 17%. Intermediate wheatgrass nested frequency was not significantly lower than it was in 1999, but it was significantly lower than 1992. Nested frequency of perennial forbs was 27% lower than it was in 1999, but they were more robust. Cover of forbs increased from 2% to nearly 4%. The DCI rating has remained at fair with 60 points.

TREND ASSESSMENT
soil - stable (3)
browse - up slightly (4)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 60 (fair) Mountain big sagebrush/chaining type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 27

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	Agropyron cristatum	$_{a}$32	$_{c}$88	$_{bc}$80	$_{ab}$57	4.67	2.90	4.52
G	Agropyron dasystachyum	$_{b}$218	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
G	Agropyron intermedium	$_{a}$157	$_{b}$316	$_{b}$270	$_{b}$227	19.59	13.35	10.83
G	Carex spp.	12	9	14	15	.46	.16	.28
G	Oryzopsis hymenoides	$_{b}$36	$_{a}$16	$_{ab}$19	$_{ab}$15	.28	.26	.16
G	Poa fendleriana	$_{a}$1	$_{b}$25	$_{b}$22	$_{ab}$16	.23	.29	.43
G	Poa pratensis	7	-	-	-	-	-	-
G	Sitanion hystrix	$_{b}$63	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
G	Stipa comata	-	-	3	3	-	.03	.04
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		526	454	408	333	25.26	17.00	16.28
Total for Grasses		526	454	408	333	25.26	17.00	16.28
F	Arabis spp.	-	-	6	-	-	.01	-
F	Astragalus tenellus	$_{b}$68	$_{a}$29	$_{a}$9	$_{a}$12	.85	.49	.98
F	Calochortus nuttallii	3	-	7	-	-	.01	-
F	Cirsium spp.	3	6	5	3	.18	.01	.03
F	Cymopterus spp.	5	-	7	8	-	.04	.02
F	Descurainia pinnata (a)	-	-	1	-	-	.00	-
F	Eriogonum racemosum	2	-	-	3	-	-	.00

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
F	Hedysarum boreale	-	-	-	8	-	-	.63
F	Heterotheca villosa	-	3	-	-	.03	.00	.00
F	Hymenoxys acaulis	$_{b}$22	$_{a}$-	$_{ab}$12	$_{ab}$6	-	.09	.21
F	Ipomopsis aggregata	3	3	-	-	.01	.00	-
F	Lappula occidentalis (a)	-	-	-	8	-	-	.04
F	Lesquerella rectipes	$_{a}$17	$_{b}$42	$_{ab}$30	$_{ab}$25	.28	.16	.11
F	Lomatium spp.	-	-	6	-	-	.02	-
F	Machaeranthera canescens	3	3	1	-	.00	.00	-
F	Pedicularis centranthera	-	-	4	-	-	.00	-
F	Penstemon lentus	$_{b}$26	$_{ab}$20	$_{ab}$18	$_{a}$4	.59	.20	.07
F	Petradoria pumila	3	8	14	18	.66	.66	.90
F	Phlox longifolia	11	11	25	7	.04	.07	.04
F	Polygonum douglasii (a)	-	-	1	-	-	.00	-
F	Senecio multilobatus	2	-	3	4	-	.00	.01
F	Sphaeralcea coccinea	$_{b}$70	$_{ab}$45	$_{ab}$38	$_{a}$38	.76	.35	.72
F	Taraxacum officinale	1	1	-	-	.03	-	-
F	Tragopogon dubius	$_{b}$22	$_{a}$-	$_{a}$-	$_{a}$-	-	-	.00
F	Trifolium spp.	$_{a}$-	$_{ab}$7	$_{b}$12	$_{ab}$7	.04	.07	.02
Total for Annual Forbs		0	0	2	8	0	0.00	0.04
Total for Perennial Forbs		261	178	197	143	3.49	2.23	3.78
Total for Forbs		261	178	199	151	3.49	2.24	3.83

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

BROWSE TRENDS --
Management unit 14 , Study no: 27

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Amelanchier utahensis	5	4	5	1.33	1.97	2.14
B	Artemisia tridentata vaseyana	0	5	4	-	.01	.15
B	Cercocarpus montanus	1	0	0	-	.15	.38
B	Gutierrezia sarothrae	8	1	7	.00	.15	.36
B	Juniperus osteosperma	5	2	1	1.67	1.38	.68
B	Juniperus scopulorum	1	0	0			
B	Opuntia spp.	5	6	6	.04	.03	.18
B	Pinus edulis	0	2	3	3.08	.88	3.07
B	Purshia tridentata	2	7	8	1.00	.93	.33
B	Quercus gambelii	4	13	19	2.00	2.59	4.13
B	Ribes spp.	1	0	0	-	-	-
B	Symphoricarpos oreophilus	1	0	0	-	-	-
Total for Browse		33	40	53	9.17	8.13	11.43

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 27

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	.40	6.84
Artemisia tridentata vaseyana	-	.23
Gutierrezia sarothrae	-	.31
Juniperus osteosperma	.80	1.76
Pinus edulis	2.40	3.16
Purshia tridentata	-	.55
Quercus gambelii	4.59	8.88

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 27

Species	Average leader growth (in)
	'04
Amelanchier utahensis	1.3
Artemisia tridentata vaseyana	2.2
Cercocarpus montanus	3.9
Purshia tridentata	2.6

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 27

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	52	54
Pinus edulis	41	43
Quercus gambelii	31	-

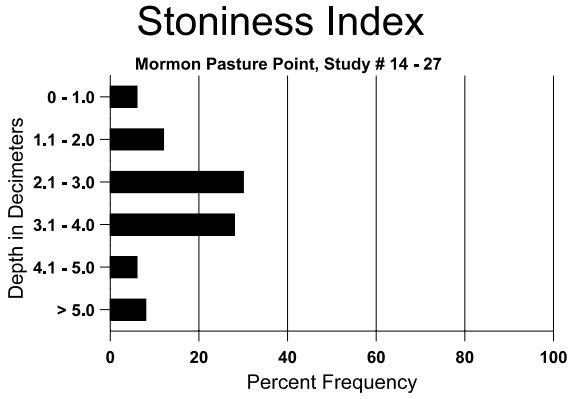
Average diameter (in)	
'99	'04
3.5	6.7
3.1	3.2
1.1	-

BASIC COVER --
Management unit 14 , Study no: 27

Cover Type	Average Cover %			
	'86	'92	'99	'04
Vegetation	2.50	39.79	29.47	30.57
Rock	0	2.72	.47	.54
Pavement	.75	0	1.24	1.02
Litter	69.50	51.04	48.66	45.04
Cryptogams	0	.24	.06	.66
Bare Ground	27.25	18.57	31.65	36.72

SOIL ANALYSIS DATA --
Management unit 14, Study no: 27, Study Name: Mormon Pasture Point

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.8	50.7 (12.2)	7.5	53.6	17.8	28.6	1.4	3.9	118.4	0.6



PELLET GROUP DATA --
Management unit 14 , Study no: 27

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	51	20	19
Elk	8	8	4
Deer	15	1	-
Cattle	7	5	4

Days use per acre (ha)	
'99	'04
-	-
21 (52)	6 (15)
5 (12)	4 (10)
36 (89)	14 (34)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 27

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**100**	-	60	40	-	-	60	0	-	-	0	-/-
99	**80**	-	-	80	-	-	25	25	-	-	0	89/90
04	**220**	-	20	200	-	-	9	0	-	-	0	69/70
Artemisia tridentata vaseyana												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**200**	20	80	120	-	-	40	10	-	-	0	16/24
04	**140**	-	20	120	-	-	86	0	-	-	0	25/37
Cercocarpus montanus												
86	**33**	-	-	33	-	-	100	0	-	-	0	55/43
92	**20**	40	-	20	-	-	100	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	44/39
04	**0**	-	-	-	-	-	0	0	-	-	0	64/66
Chrysothamnus nauseosus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	21/32
04	**0**	-	-	-	-	-	0	0	-	-	0	33/38
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
92	**380**	120	140	240	-	-	0	0	0	-	0	-/-
99	**40**	-	20	20	-	-	0	0	0	-	0	-/-
04	**240**	-	-	200	40	-	0	0	17	-	0	9/10

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus osteosperma												
86	**33**	-	33	-	-	-	0	0	-	-	0	-/-
92	**100**	-	80	20	-	-	0	0	-	-	0	-/-
99	**40**	-	-	40	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Juniperus scopulorum												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	-	-	20	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**200**	-	120	80	-	-	0	0	-	-	0	-/-
99	**200**	20	120	80	-	-	0	0	-	-	0	4/13
04	**240**	-	20	220	-	40	0	0	-	-	0	8/12
Pinus edulis												
86	**33**	66	33	-	-	-	0	0	-	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**40**	-	20	20	-	-	0	0	-	-	0	-/-
04	**60**	-	-	60	-	-	0	0	-	-	0	-/-
Purshia tridentata												
86	**100**	-	-	100	-	-	33	67	0	-	0	12/20
92	**80**	-	-	80	-	-	0	100	0	-	0	-/-
99	**160**	-	-	100	60	40	50	50	38	25	38	19/50
04	**200**	-	-	140	60	240	30	70	30	30	30	18/43
Quercus gambelii												
86	**2165**	800	1266	566	333	-	62	3	15	.92	3	63/35
92	**500**	40	340	80	80	-	4	0	16	-	0	-/-
99	**1380**	20	620	740	20	140	0	14	1	-	0	61/40
04	**1460**	-	320	1060	80	80	0	0	5	3	21	46/35
Ribes spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	-	20	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	59/31
04	**0**	-	-	-	-	-	0	0	-	-	0	60/33

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
92	**20**	40	20	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	28/72
04	**0**	-	-	-	-	-	0	0	-	-	0	31/53

Trend Study 14-29-04

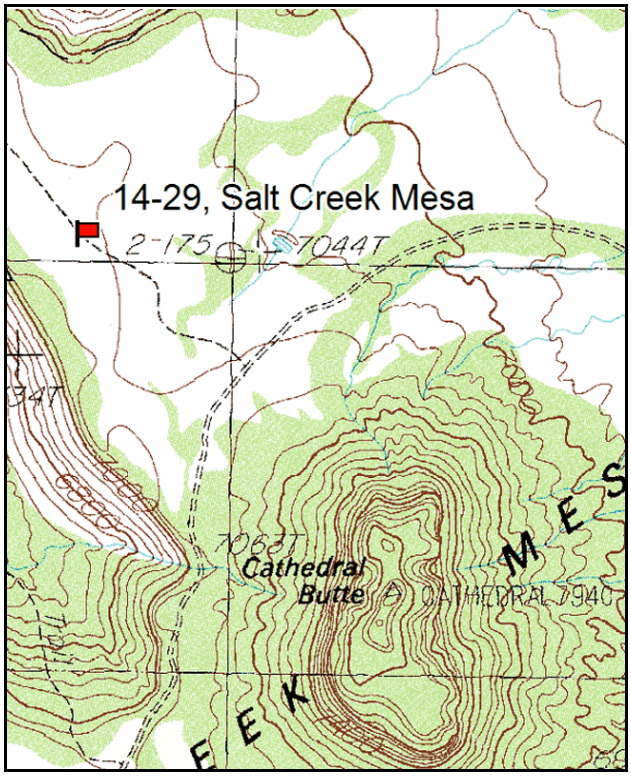
Study site name: Salt Creek Mesa . Vegetation type: Chained, Seeded P-J .

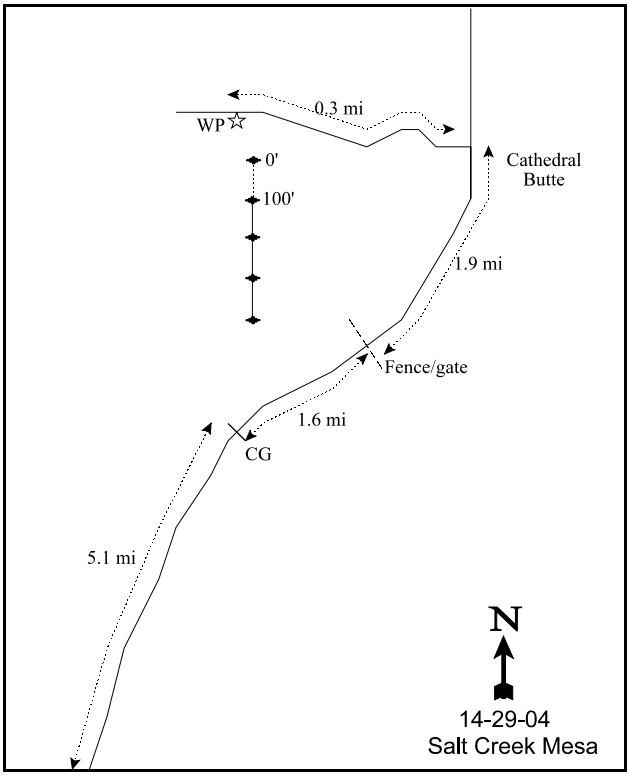
Compass bearing: frequency baseline 156 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection in Sego Flat, go left towards Dugout Ranch 5.9 miles to the Beef Basin turnoff. Continue down Salt Creek Mesa Road for 5.1 miles to a cattleguard at the BLM/USFS boundary. Continue 1.6 miles on the main road to a fence/gate. Continue 1.9 miles to a fork on the west side of Cathedral Butte. Turn left and go 0.3 miles through junipers, into a chaining and to a witness post (full-high fence post) 18 feet off the left side of the road. The 0-foot baseline is 15 paces at a bearing of 220°M from the witness post.





Map Name: Cathedral Butte Diagrammatic Sketch

Township 32S , Range 20E , Section 27 GPS: NAD 27, UTM 12S 4202031 N, 613621 E

DISCUSSION

Salt Creek Mesa - Trend Study No. 14-29

The Salt Creek Mesa study was established in 1992 on an old chaining that is a wintering area for deer and elk. This site has a northeast aspect and a 3% slope. The treated area appears to have been seeded with crested wheatgrass, intermediate wheatgrass, and alfalfa. Pinyon and juniper trees are scattered across the site that were probably individuals that escaped the chaining because of their small size and now have been released from competition with the removed adult trees. This area was targeted for a prescribed fire sometime between 2001 and 2003. The fire did not carry across the site and only a few trees were burned. This result should have been anticipated by looking over the data and pictures from the range trend report. In 2004, pellet group data estimated light use with 7 deer days use/acre (18 ddu/ha), 3 elk days use/acre (7 edu/ha), and 3 cow days use/acre (7 cdu/ha).

The soil varies in depth from 11 inches to 22 inches due to a layer of soft sandstone which is also found on the surface in some places. The sandy soil is noticeably deeper on the lower portions of the site. Effective rooting depth averages almost 15 inches over the site. Soil texture is a sandy clay loam with a slightly alkaline pH (7.5). Phosphorus is low at 5.3 ppm. It should be noted that values less than 10 ppm may limit normal plant growth and development. There are many wind scoured depressions with large rock scattered throughout the site. Pavement is commonly found in small localized intervals. Litter is comprised mostly of pinyon-juniper debris from the chaining. Even with fairly good cover, there are small scattered bare areas where erosion (both wind and water) may occur. Relative percent bare ground was quite high at 38% in 1999. This increased to 47% by 2004.

This chained site also supports a high density of released pinyon and juniper trees. Density was estimated using the point quarter method. Pinyon density was 59 trees/acre in 1992, 60 trees/acre in 1999, and decreased after the fire to 50 trees/acre in 2004. Average diameter was estimated at 3.5 inches in 1999 and 5.1 inches in 2004. Juniper density was about 33 trees/acre in 1992, increased to 51 trees/acre by 1999, and was down to 42 trees/acre in 2004. Average diameter of juniper was estimated at 2.8 inches in 1999 and 3.7 inches in 2004.

Useful browse is limited on the site. Only a low density of Utah serviceberry, four-wing saltbush, true-mountain mahogany, and green ephedra are found within the chaining. Use of these shrubs varies from light to heavy. Utah serviceberry density and cover increased in 2004, as 83% of the population was classified as young. True mountain mahogany density has decreased slightly with each reading since 1992 and all plants showed signs of heavy use in 2004. Mahogany plants that were burned were resprouting in 2004. Broom snakeweed has been very abundant, but declined dramatically in 2004. In 1999, density was over 23,000 plants/acre with over 6% cover. After many drought years snakeweed declined to only 1,400 plants/acre and less than 1% cover in 2004.

The dominant herbaceous species are intermediate wheatgrass, crested wheatgrass, and Indian ricegrass, each of which had significant declines in nested frequency between 1999 and 2004. Perennial grass cover declined from 10 to 4% in that same period. Cover for perennial grasses was highest in 1992 at 24%. Forbs are lacking with the 2 most dominant species being dusty penstemon (a desirable species) and Fendler euphorbia (an undesirable increaser). Other early seral forbs were found where the fire had burned.

1992 APPARENT TREND ASSESSMENT

The soil trend is considered stable with relative cover for bare ground at 20%. There are small scattered bare areas where erosion is occurring. Because of the low densities for all browse except for broom snakeweed, which demonstrates characteristics of an expanding population, trend for browse appears to be declining. The herbaceous understory is in good condition with the forbs and grasses together making up 79% of the

vegetative cover and grasses alone constituting 66% of the total vegetative cover. Trend, after only being sampled once, should be considered stable until the next sampling date. The Desirable Components Index (see methods) rating is poor at 39. The herbaceous understory is good, but this chaining lacks preferred browse that deer use for winter forage.

winter range condition (DC Index) - 39 (poor) Chaining (rated on mountain big sage scale)

1999 TREND ASSESSMENT

Trend for soil is slightly down due to a decline in relative litter cover from 44% to 32% and an increase in relative percent bare ground from 20% to 38%. Vegetation and litter distribution are variable with bare areas showing signs of wind and water erosion. Trend for browse is slightly down due to mostly declining populations of preferred species combined with a dramatic increase in density of broom snakeweed. Trees are also increasing in density and cover. Trend for the herbaceous understory is slightly down due to a significant decline in the sum of nested frequency for intermediate wheatgrass. It was the dominant grass in 1992. Crested wheatgrass and Indian ricegrass remained stable. Forbs are still rare but nested frequency increased slightly. The DCI score has declined to very poor due to decreases in the herbaceous understory. The preferred browse component is still very poor for deer winter range.

TREND ASSESSMENT
soil - slightly down (2)
browse - slightly down (2)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 29 (very poor) Chaining (rated on mountain big sage scale)

2004 TREND ASSESSMENT

The trend for soil is slightly down. Relative percent bare ground increased from 38% to 47%. Litter remained fairly stable, but vegetation cover decreased since 1999, due to drought and the fire that partially burned the site. The browse trend is slightly up. Pinyon and juniper density is slightly lower due to the prescribed fire. Broom snakeweed density and cover decreased with the dry conditions of the past several years. Utah serviceberry density is slightly higher and many young plants were sampled. True mountain mahogany density is down, but resprouting plants are found in the burn and annual leader growth is very good. The herbaceous understory trend is down. Nested frequency for all 3 common grasses is significantly lower than it was in 1999. Cover is also down from 10 to 4%. Nested frequency for perennial forbs is higher, but still not very abundant. The DCI score is even lower and classified as very poor. Perennial grass cover has continued to decline and preferred browse is lower than desired.

TREND ASSESSMENT
soil - slightly down (2)
browse - slightly up (4)
herbaceous understory - down (1)
winter range condition (DC Index) - 21 (very poor) Chaining (rated on mountain big sage scale)

HERBACEOUS TRENDS --
Management unit 14 , Study no: 29

Type	Species	Nested Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
G	Agropyron cristatum	$_{b}$112	$_{b}$106	$_{a}$47	5.34	5.89	2.25
G	Agropyron intermedium	$_{c}$230	$_{b}$169	$_{a}$55	13.05	2.52	1.12
G	Oryzopsis hymenoides	$_{b}$96	$_{b}$80	$_{a}$42	5.10	1.70	.78
G	Sitanion hystrix	-	-	-	-	.00	-
G	Stipa comata	$_{a}$-	$_{a}$-	$_{b}$6	-	.00	.18
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		438	355	150	23.50	10.13	4.35
Total for Grasses		438	355	150	23.50	10.13	4.35
F	Astragalus utahensis	-	-	2	-	-	.01
F	Chenopodium album (a)	$_{b}$4	$_{a}$-	$_{a}$-	.01	-	.00
F	Chaenactis douglasii	-	1	3	-	.03	.00
F	Chenopodium fremontii (a)	-	-	7	-	-	.16
F	Cordylanthus spp. (a)	$_{a}$-	$_{a}$-	$_{b}$17	-	-	.53
F	Cryptantha spp.	-	3	6	-	.03	.04
F	Descurainia pinnata (a)	5	2	10	.02	.00	.23
F	Erigeron spp.	-	-	-	-	-	.00
F	Euphorbia fendleri	$_{ab}$44	$_{a}$25	$_{b}$52	2.37	.52	1.35
F	Heterotheca villosa	-	-	5	-	-	.18
F	Hymenoxys acaulis	-	-	1	-	-	.03
F	Lappula occidentalis (a)	-	-	9	-	-	.24
F	Lepidium spp. (a)	-	-	1	-	-	.00
F	Lesquerella spp.	$_{a}$14	$_{a}$25	$_{b}$48	.03	.09	.67
F	Lupinus spp.	-	4	5	-	.04	.21
F	Machaeranthera canescens	2	1	3	.01	.03	.01
F	Medicago sativa	7	-	-	.22	-	-
F	Nicotiana attenuata (a)	-	-	1	-	-	.00
F	Orobanche spp.	2	-	-	.00	-	-
F	Penstemon comarrhenus	$_{a}$43	$_{b}$55	$_{a}$31	.82	1.06	.44
F	Penstemon spp.	$_{a}$-	$_{a}$-	$_{b}$22	-	-	.33
F	Petradoria pumila	-	-	-	-	-	.00
F	Salsola iberica (a)	-	-	5	-	-	.01
F	Salsola pestifer (a)	10	-	-	.02	-	-
F	Senecio multilobatus	$_{a}$-	$_{b}$14	$_{a}$4	-	.30	.04
F	Sphaeralcea coccinea	-	1	3	-	.00	.00
F	Streptanthus cordatus	1	-	-	.00	-	-

Type	Species	Nested Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
F	Townsendia spp.	-	3	2	-	.03	.00
F	Tragopogon dubius	3	-	-	.00	-	-
Total for Annual Forbs		19	2	50	0.05	0.00	1.19
Total for Perennial Forbs		116	132	187	3.48	2.16	3.37
Total for Forbs		135	134	237	3.54	2.16	4.57

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

BROWSE TRENDS --
Management unit 14 , Study no: 29

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Amelanchier utahensis	2	2	5	1.36	1.77	3.15
B	Atriplex canescens	3	1	0	.03	-	-
B	Cercocarpus montanus	3	3	1	.03	1.00	-
B	Ephedra viridis	0	1	1	-	-	-
B	Gutierrezia sarothrae	80	87	34	3.77	6.47	.73
B	Juniperus osteosperma	5	6	6	.18	.59	.81
B	Mahonia fremontii	2	0	2	-	-	1.00
B	Mahonia repens	-	-	-	.15	-	-
B	Opuntia spp.	1	0	1	-	-	.03
B	Pinus edulis	6	7	4	3.15	4.44	4.50
B	Pseudotsuga menziesii	0	0	0	.03	-	-
B	Symphoricarpos oreophilus	2	1	2	.06	.38	.41
Total for Browse		104	108	56	8.76	14.65	10.64

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 29

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	1.79	4.05
Gutierrezia sarothrae	-	.96
Juniperus osteosperma	-	2.90
Mahonia fremontii	-	2.71
Opuntia spp.	-	.06
Pinus edulis	4.19	5.80
Symphoricarpos oreophilus	-	1.23

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 29

Species	Average leader growth (in)
	'04
Amelanchier utahensis	3.4
Atriplex canescens	4.2
Cercocarpus montanus	7.8
Purshia tridentata	2.7

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 29

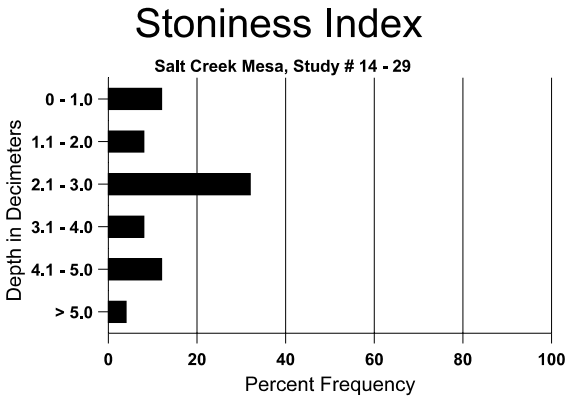
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	51	42	2.8	3.7
Pinus edulis	60	50	3.5	5.1

BASIC COVER --
Management unit 14 , Study no: 29

Cover Type	Average Cover %		
	'92	'99	'04
Vegetation	32.15	25.35	19.69
Rock	8.50	2.85	3.11
Pavement	0	4.39	5.96
Litter	50.20	32.48	32.18
Cryptogams	0	0	.03
Bare Ground	22.32	39.33	53.29

SOIL ANALYSIS DATA --
Management unit 14, Study no: 29, Study Name: Salt Creek Mesa

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
14.5	56.3 (11.7)	7.5	56.0	21.4	22.6	2.7	5.3	92.8	0.6



PELLET GROUP DATA --
Management unit 14 , Study no: 29

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	39	37	27
Elk	4	21	11
Deer	17	16	3
Cattle	8	10	1

Days use per acre (ha)	
'99	'04
-	-
18 (45)	3 (7)
19 (48)	7 (18)
23 (56)	3 (7)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 29

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
92	**40**	-	20	20	-	-	0	50	-	-	0	-/-
99	**40**	-	-	40	-	20	0	0	-	-	0	98/125
04	**120**	100	100	20	-	20	17	0	-	-	17	94/110
Atriplex canescens												
92	**60**	-	-	40	20	-	0	100	33	-	0	-/-
99	**20**	-	-	-	20	-	0	100	100	100	100	23/26
04	**0**	-	-	-	-	-	0	0	0	-	0	26/33

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
92	**100**	-	60	40	-	-	20	80	-	-	0	-/-
99	**60**	-	-	60	-	-	33	33	-	-	0	48/55
04	**40**	-	-	40	-	-	0	100	-	-	0	44/55
Ephedra viridis												
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	20	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	16/21
Gutierrezia sarothrae												
92	**9960**	360	2020	7860	80	-	0	0	1	-	.40	-/-
99	**23760**	80	3020	20580	160	200	0	0	1	.16	.16	6/9
04	**1400**	360	740	620	40	300	1	0	3	3	3	6/11
Juniperus osteosperma												
92	**100**	-	80	20	-	-	20	0	0	-	0	-/-
99	**120**	-	120	-	-	20	0	0	0	-	0	-/-
04	**120**	-	20	60	40	-	0	0	33	17	17	-/-
Mahonia fremontii												
92	**40**	-	-	40	-	-	50	50	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	-	40	-	-	0	0	-	-	0	67/84
Opuntia spp.												
92	**20**	-	20	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	20	0	0	-	-	0	4/10
Pinus edulis												
92	**140**	-	80	60	-	-	29	0	0	-	0	-/-
99	**140**	20	40	100	-	-	0	0	0	-	0	-/-
04	**80**	-	20	40	20	-	0	0	25	-	0	-/-
Purshia tridentata												
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	6/15
04	**0**	-	-	-	-	-	0	0	-	-	0	7/16
Symphoricarpos oreophilus												
92	**40**	-	-	40	-	-	0	100	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	39/82
04	**60**	-	-	60	-	20	0	0	-	-	67	42/69

Trend Study 14-30-04

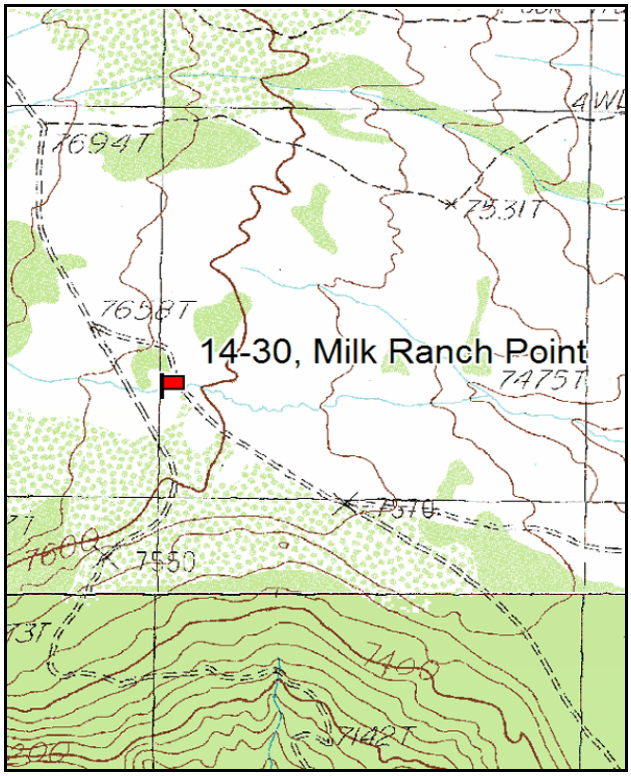
Study site name: Milk Ranch Point . Vegetation type: Mixed Mountain Brush .

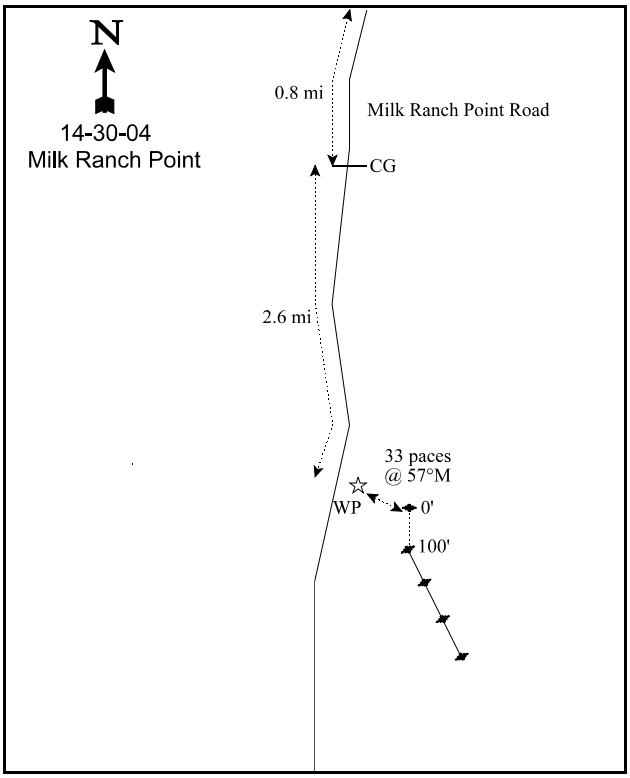
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From Forest Service Road # 92, turn south onto Milk Ranch Point road. Drive 0.8 miles to a cattleguard. Continue 2.6 miles to a witness post. From the witness post, walk 33 paces at 57°M to the 0-foot stake. The 200'-400' stakes are at a bearing of 145°M.





Map Name: Cream Pots

Diagrammatic Sketch

Township 36S , Range 20E , Section 29

GPS: NAD 27, UTM 12S 4165241 N, 611012 E

DISCUSSION

Milk Ranch Point - Trend Study No. 14-30

The Milk Ranch Point study was established in 1992. This study is located at an elevation of 7,600 feet with an eastern aspect near the edge of a bench as it drops off to the south to lower pinyon-juniper and sagebrush covered mesas above Arch Canyon. The site was originally plowed and seeded in 1953. Part of the bench burned sometime prior to 2004 in a prescribed burn, but the sampling area was not effected. There are many stock ponds along the bench which contained water in 1992 due to an exceptionally wet August. This area is used for cattle grazing and elk winter and/or transition range. Cattle use the area as part of the Babylon allotment which is grazed from June 1 to Oct 15 by 205 head. Pellet group data from 1999 estimated 11 deer days use/acre (27 ddu/ha), 1 elk days use/acre (2 edu/ha), and 6 cow days use/acre (15 cdu/ha). In 2004, pellet group data estimated 4 deer and 3 elk days use/acre (8 ddu/ha and 7 edu/ha).

Soil is very sandy, fairly shallow, and compact. Effective rooting depth is variable, but averages just over 14 inches through the site. Soil texture is a sandy loam with a neutral pH (6.7). Parent material is sandstone. There are a few rocks strewn over the surface with very little pavement present. Soil erosion has taken place in the past, as evidenced by plant pedestaling, especially for the shrubs. There is also an active gully near the site.

This mountain brush community is dominated by serviceberry, mountain big sagebrush, and Gambel oak. The serviceberry is large and some are tall enough to be partly unavailable. It provided 50% of the browse cover in 1992 with an estimated population of 3,800 plants/acre and seedlings and young plants were numerous. Density declined to 980 plants/acre in 1999, primarily due to a dramatic reduction in young plants. It still provided 45% of the browse cover. In 2004, density was 13% higher with an increase in young plants. Mature plant density and cover remained stable between 1999 and 2004. Utilization was light to moderate in 1992, moderate to heavy in 1999, then categorized as moderate in 2004. Mountain big sagebrush has a stable population of about 1,500 plants/acre. Gambel oak provided 20% of the browse cover in 1992 with a population of 1,620 stems/acre. Utilization was light to moderate with good vigor. Density has remained relatively stable in 1999 and 2004 with only light use. Pinyon and juniper trees are found throughout the site. Most of the mature trees are about 15 to 20 feet in height. Point quarter data from 1999 estimated 84 pinyon and 20 juniper trees/acre. Average diameter of pinyon was 3.5 inches, while juniper was 4.5 inches. Pinyon density increased to 95 trees/acre in 2004, with an average diameter of 4.5 inches.

The herbaceous understory is diverse. Crested wheatgrass, intermediate wheatgrass, and mutton bluegrass are the most dominate grass species. Intermediate wheatgrass was most abundant in 1992, but has declined since. Nested frequency for perennial grasses was stable between 1992 and 1999, but declined 25% in 2004. Cover remained stable. Forbs are more abundant than grasses and provide more cover. There are many useful and preferred species present including arrowleaf balsamroot, Indian paintbrush, winged eriogonum, redroot eriogonum, thickleaf peavine, silvery lupine, and several species of penstemon. The most dominant species are arrowleaf balsamroot, silvery lupine, Washington lupine, and rock goldenrod. Nested frequency and cover of perennial forbs has declined since 1992. Nested frequency in 2004 was just over half of what it was in 1992 and down one-third since 1999.

1992 APPARENT TREND ASSESSMENT

With high species diversity and good vegetative cover, the trend for this site at this time would be considered stable. All the key browse species for the site have excellent vigor with very good biotic potentials and age class structures. Trend for browse appears stable and in excellent condition. The herbaceous understory is also in very good condition with 10 species of grasses and 22 species of forbs on the site. The Desirable Components Index (see methods) rating is good at 88. The preferred browse species are abundant and healthy,

while the herbaceous understory is also abundant.

winter range condition (DC Index) - 88 (good) Mountain brush type

1999 TREND ASSESSMENT

Trend for soil is down slightly. Percent cover of vegetation and litter have declined slightly while percent cover for bare ground has increased from 19% to 26%. Cryptogamic cover has also decreased from 7% to 3%. There is some erosion occurring on the site, but it is slight due to the gentle terrain. Density of serviceberry has declined from 3,800 to 980 plants/acre. Most of the change is due to a reduction in the number of young sampled. Cover also declined from 16% to 11% and use was heavier with 35% of the plants sampled displaying heavy browsing. Mountain big sagebrush and Gambel oak appear to have stable populations. Since serviceberry provides nearly half of the shrub cover, the browse trend is considered down slightly. Trend for the herbaceous understory is mixed. Sum of nested frequency for grasses has remained stable. Nested frequency of crested wheatgrass increased since 1992, while frequency of intermediate wheatgrass declined significantly. This appears to be a response to drought conditions which occurred in this area during the late 1990's, since crested wheatgrass is more drought tolerant than intermediate wheatgrass, its nested frequency value increased. Sum of nested frequency of forbs declined. Since forbs are more abundant and produce more cover than grasses, overall trend for the herbaceous understory is considered down slightly but still in good condition. The DCI score has dropped to fair to good due to lower preferred browse cover and decreased perennial grass cover.

TREND ASSESSMENT
soil - down slightly (2)
browse - down slightly, especially for serviceberry (2)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 68 (fair to good) Mountain brush type

2004 TREND ASSESSMENT

The soil trend is slightly down once again. Bare ground increased from 26 to 35%, while vegetation, litter, and cryptogam cover all declined. The browse trend is stable. Density and cover has remained stable for all of the important browse species. Utah serviceberry, mountain big sagebrush, and gambel oak all have stable populations. Many seedlings of mountain big sagebrush were sampled. One negative is the increased density of broom snakeweed which increased 68%, but cover is still less than 1%. The herbaceous understory trend is down. Nested frequency of perennial grasses decreased by about one-fourth since 1999, but cover has remained stable. Nested frequency of perennial forbs decreased by one-third, while cover declined from about 15% to 11%. The DCI score is stable at fair to good (71).

TREND ASSESSMENT
soil - down slightly (2)
browse - stable (3)
herbaceous understory - down (1)
winter range condition (DC Index) - 71 (fair to good) Mountain brush type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 30

Type	Species	Nested Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
G	Agropyron cristatum	59	95	83	.43	1.48	1.60
G	Agropyron intermedium	$_{b}$173	$_{a}$127	$_{a}$96	5.66	2.98	3.07
G	Bouteloua gracilis	4	4	4	.15	.03	.15
G	Carex spp.	$_{b}$17	$_{ab}$10	$_{a}$1	.39	.24	.18
G	Koeleria cristata	7	5	-	.30	.03	-
G	Oryzopsis hymenoides	$_{a}$4	$_{b}$19	$_{a}$4	.04	.29	.02
G	Poa bulbosa	-	6	-	-	.01	-
G	Poa fendleriana	71	99	86	2.89	2.20	2.78
G	Poa pratensis	2	-	-	.03	-	-
G	Sitanion hystrix	9	-	3	.03	-	.00
G	Stipa columbiana	3	4	-	.03	.15	-
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		349	369	277	9.97	7.43	7.82
Total for Grasses		349	369	277	9.97	7.43	7.82
F	Agoseris glauca	$_{a}$-	$_{b}$7	$_{a}$-	-	.12	-
F	Androsace septentrionalis (a)	-	3	-	-	.00	-
F	Arabis spp.	-	2	2	-	.00	.00
F	Balsamorhiza sagittata	$_{a}$46	$_{b}$89	$_{a}$57	2.50	4.48	3.39
F	Castilleja linariaefolia	$_{c}$59	$_{b}$38	$_{a}$-	.87	.46	-
F	Comandra pallida	-	-	5	-	-	.03
F	Collinsia parviflora (a)	-	2	10	-	.00	.02
F	Crepis acuminata	10	22	6	.12	.30	.05
F	Cryptantha spp.	$_{b}$44	$_{a}$-	$_{a}$2	1.86	-	.03
F	Cymopterus spp.	-	6	4	-	.05	.04
F	Eriogonum alatum	$_{b}$102	$_{a}$51	$_{a}$43	2.23	.48	.28
F	Erigeron eatonii	18	9	13	.39	.07	.02
F	Erigeron pumilus	16	14	10	.14	.05	.07
F	Eriogonum racemosum	43	30	23	.56	.19	.21
F	Eriogonum umbellatum	-	-	3	-	-	.03
F	Euphorbia spp.	-	2	-	-	.00	-
F	Haplopappus acaulis	-	1	-	-	.00	-
F	Hymenoxys acaulis	$_{b}$95	$_{a}$37	$_{ab}$68	.90	.45	.46
F	Ipomopsis aggregata	5	6	1	.01	.18	.00
F	Lathyrus lanszwertii	7	1	8	1.00	.03	.04
F	Lesquerella spp.	$_{b}$98	$_{ab}$63	$_{a}$58	.54	.30	.37

Type	Species	Nested Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
F	Lupinus argenteus	$_{b}$79	$_{b}$96	$_{a}$2	2.85	2.36	.09
F	Lupinus polyphyllus	$_{a}$6	$_{b}$41	$_{b}$41	.03	1.72	1.82
F	Microsteris gracilis (a)	$_{a}$-	$_{b}$1	$_{b}$25	-	.00	.04
F	Penstemon lentus	$_{b}$68	$_{a}$57	$_{a}$37	.37	1.39	.24
F	Petradoria pumila	$_{b}$58	$_{a}$35	$_{b}$54	2.45	1.73	3.30
F	Penstemon strictus	6	14	1	.04	.05	.00
F	Phlox longifolia	$_{b}$77	$_{b}$72	$_{a}$30	.43	.23	.13
F	Polygonum douglasii (a)	$_{b}$60	$_{a}$1	$_{a}$-	.22	.00	-
F	Senecio multilobatus	-	3	-	-	.03	-
F	Senecio neomexicanus	25	16	10	.10	.07	.05
F	Taraxacum officinale	-	4	1	-	.03	.00
F	Unknown forb-perennial	3	-	-	.01	-	-
F	Vicia americana	-	2	-	-	.00	-
F	Zigadenus paniculatus	-	2	-	-	.00	-
Total for Annual Forbs		60	7	35	0.22	0.01	0.05
Total for Perennial Forbs		865	720	479	17.46	14.89	10.72
Total for Forbs		925	727	514	17.69	14.92	10.78

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

BROWSE TRENDS --
Management unit 14 , Study no: 30

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Amelanchier utahensis	41	36	34	16.15	11.07	11.76
B	Artemisia tridentata vaseyana	48	47	42	4.74	4.58	5.17
B	Chrysothamnus depressus	40	28	30	.28	.28	.25
B	Gutierrezia sarothrae	44	20	39	1.19	.10	.72
B	Juniperus osteosperma	1	0	0	.63	.15	.15
B	Pinus edulis	6	5	4	2.55	2.09	2.39
B	Purshia tridentata	5	4	3	.41	.03	-
B	Quercus gambelii	19	16	16	6.48	6.48	4.71
B	Symphoricarpos oreophilus	2	0	0	-	-	-
Total for Browse		206	156	168	32.46	24.80	25.16

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 30

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	1.39	15.39
Artemisia tridentata vaseyana	-	5.09
Chrysothamnus depressus	-	.65
Gutierrezia sarothrae	-	.60
Juniperus osteosperma	-	.50
Pinus edulis	3.79	4.53
Quercus gambelii	6.40	7.08

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 30

Species	Average leader growth (in)
	'04
Amelanchier utahensis	3.4
Artemisia tridentata vaseyana	1.9

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 30

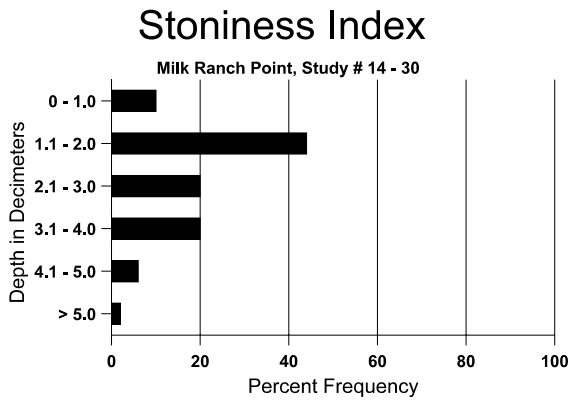
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	20	-	4.5	-
Pinus edulis	84	95	3.5	4.5
Quercus gambelii	49	-	1.3	-

BASIC COVER --
Management unit 14 , Study no: 30

Cover Type	Average Cover %		
	'92	'99	'04
Vegetation	47.50	44.46	41.76
Rock	2.67	.96	1.24
Pavement	0	1.31	.85
Litter	52.97	50.88	42.66
Cryptogams	6.70	3.27	1.95
Bare Ground	18.52	26.10	35.11

SOIL ANALYSIS DATA --
Management unit 14, Study no: 30, Study Name: Milk Ranch Point

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
14.3	50.7 (11.3)	6.7	58.0	23.4	18.6	1.5	3.4	108.8	0.6



PELLET GROUP DATA --
Management unit 14 , Study no: 30

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	29	44	21
Elk	2	-	3
Deer	5	12	1
Cattle	-	1	1

Days use per acre (ha)	
'99	'04
-	-
1 (2)	3 (7)
11 (27)	4 (8)
6 (15)	-

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 30

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
92	**3800**	3220	2600	1160	40	-	28	5	1	-	4	-/-
99	**980**	20	160	800	20	-	31	35	2	2	2	53/67
04	**1120**	-	260	820	40	20	39	4	4	-	0	47/58
Artemisia tridentata vaseyana												
92	**1520**	100	580	640	300	-	32	5	20	5	7	-/-
99	**1500**	20	160	1040	300	180	21	4	20	13	13	18/30
04	**1580**	1540	40	1140	400	360	6	0	25	9	9	20/29

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus												
92	**1600**	60	840	700	60	-	21	4	4	1	4	-/-
99	**920**	-	-	880	40	40	7	9	4	4	4	3/7
04	**1020**	-	20	940	60	-	20	12	6	2	2	5/10
Gutierrezia sarothrae												
92	**2160**	20	40	2120	-	-	0	0	-	-	.92	-/-
99	**740**	60	60	680	-	-	0	0	-	-	0	6/7
04	**2300**	240	1060	1240	-	-	0	0	-	-	0	8/9
Juniperus osteosperma												
92	**20**	-	20	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
92	**120**	140	80	40	-	-	0	0	-	-	0	-/-
99	**100**	20	60	40	-	-	0	20	-	-	0	-/-
04	**80**	60	40	40	-	20	0	0	-	-	0	-/-
Purshia tridentata												
92	**100**	-	20	60	20	-	40	60	20	-	0	-/-
99	**80**	-	20	60	-	-	25	25	0	-	0	13/33
04	**60**	-	-	60	-	-	33	33	0	-	0	12/25
Quercus gambelii												
92	**1620**	380	680	940	-	-	26	0	0	-	0	-/-
99	**1280**	80	600	680	-	100	0	0	0	-	0	47/39
04	**1240**	-	780	400	60	240	0	0	5	-	0	47/44
Symphoricarpos oreophilus												
92	**160**	-	140	-	20	-	0	0	13	13	13	-/-
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	20/17

Trend Study 14-31-04

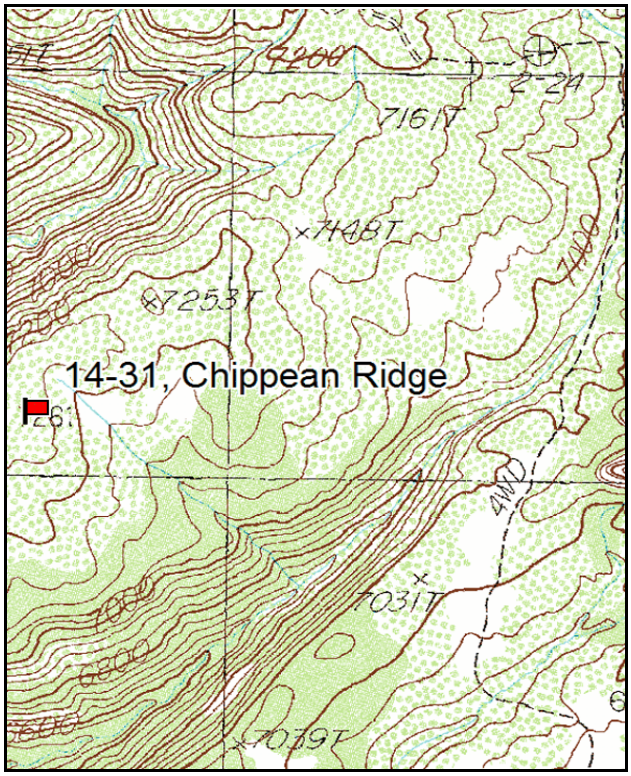
Study site name: Chippean Ridge . Vegetation type: Mixed Mountain Brush .

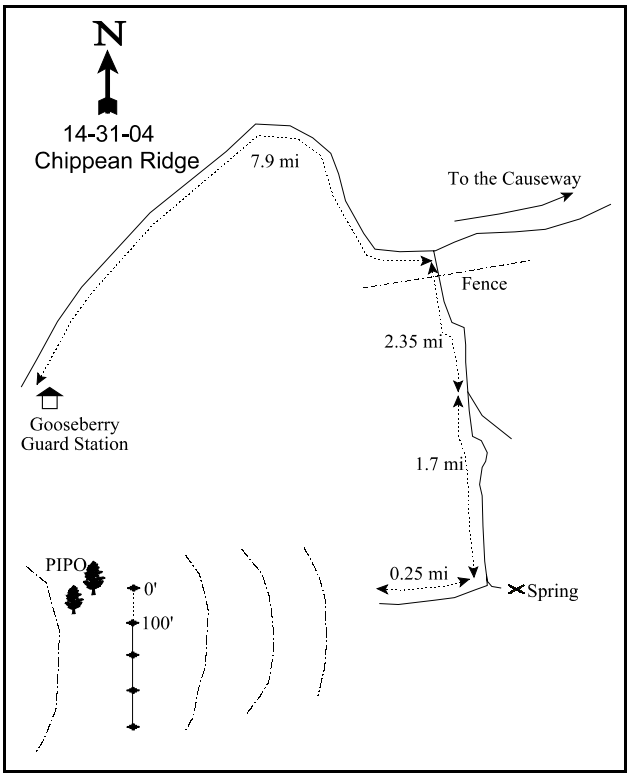
Compass bearing: frequency baseline 181 degrees magnetic.

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

LOCATION DESCRIPTION

From the Gooseberry Guard Station go north and east towards 'The Causeway' for 7.9 miles to a fork. Turn right off the main road passing through a gate/fence shortly after the turn. Continue 2.35 miles to a fork and bear right. Drive 1.7 miles to another fork and turn right on a very faint overgrown road (left road ends about a 100 ft or so near a spring). Continue on another 0.25 miles to the end of the road. Continue to follow the old road or trail west at a slight rise in elevation about 2/3 of a mile to the third ridge. There are two Ponderosa pines 30 ft apart which are near the ridge's northern apex. The 0 ft baseline stake is 50 ft away from the lowermost, larger Ponderosa pine at a bearing of 60° M. The baseline is marked with half high steel fence posts.





Map Name: Chippean Rocks

Diagrammatic Sketch

Township 34S , Range 20E , Section 36

GPS: NAD 27, UTM 12S 4182120 N, 616539 E

DISCUSSION

Chippean Ridge - Trend Study No. 14-31

The Chippean Ridge study was initiated in1992 because of elk use in this area during the winter and spring. It is a mountain brush community that is dominated by serviceberry and mountain big sagebrush on a 8% to 10% percent slope with a southern aspect. Elevation is approximately 7,200 feet. There are a few scattered ponderosa and pinyon pines throughout the study area, but further up the ridge, ponderosa and manzanita are the dominant species association. Point quarter data from 1999 estimated 29 juniper and 33 pinyon trees/acre. Average diameter of juniper is 8.5 inches, while that of pinyon is 5 inches.

The site is principally a elk winter/spring range. Several elk antler drops were found on site in 1992, but all appeared to be from the previous winter ('91). Pellet group data has only shown light use by elk. Pellet group data from 1999 estimated 7 deer days use/acre (17 ddu/ha), 24 elk days use/acre (59 edu/ha), and 4 cow days use/acre (10 cdu/ha). All cattle pats were from the previous year. Rabbit sign was abundant in 1999. Pellet group data from 2004 estimated 4 deer days use/acre (12 ddu/ha), 23 elk days use/acre (58 edu/ha), and 1 cow day use/acre (4 cdu/ha).

The soil on the site is deep and compacted with an estimated effective rooting depth of nearly 25 inches. It has a sandy clay loam texture with a neutral pH (7.2). Phosphorus is limited on the site at only 4.1 ppm. Values less than 10 ppm may limit normal plant growth and development. Parent material is sandstone and the soil is very sandy and loose on the surface. Rock is uncommon on the surface and within the profile. A compaction layer is present about 8 inches in depth. Starting at the 200 foot stake on the study site baseline, the compaction layer is impenetrable to the soil penetrometer making effective rooting depth measurements more shallow. There are small scattered areas without litter cover and only small amounts of vegetative cover, showing signs of soil movement and loss with increased amounts of rock present.

The shrub component is quite diverse with 13 species encountered on the sampling belts. Browse is dominated by mature serviceberry, mountain big sagebrush, and true mountain mahogany. Utah serviceberry density has been relatively stable since 1992, with most fluctuations due to differences in young plants sampled. Many young plants were sampled in 1992. Mature plants are very large and not all available for use. Use has been moderate. Mountain big sagebrush also had a very large number of young plants (55% of the population) sampled in 1992. It seems that not all of these plants made it to maturity. In 1999, density declined 32%. In 2004, percent decadence was up to 35% from 17% in 1999 and 22% of the population was classified as dying. Density was down another 21% in 2004 to 1,780 plants/acre with very few young plants in the population. Use was highest in 2004 with 81% showing signs of moderate use. Cover has remained stable for sagebrush.

The herbaceous understory is diverse with crested wheatgrass and smooth brome dominating the site. They made up 47% of the grass cover in 1999 and 72% in 2004. Needle-and-thread nested frequency declined significantly between 1999 and 2004. Bulbous bluegrass was common in 1992 and 1999, but it is a short lived perennial with a low forage value. It had cover of 7 and 5% in 1992 and 1999, but it declined in 2004 to less than 1% cover. Forbs are diverse but, all forbs combined produced only 3% cover in 1992, 5% in 1995 and 4% in 2004.

1992 APPARENT TREND ASSESSMENT

The trend for soils appears to be in a state of decline. There are numerous signs of soil movement and there is a large active gully on the lower end of the site. The browse trend appears to be improving because of good biotic potentials (proportion of young to the population) for the key species and excellent young form class ratios, both characteristics of a growing population. The herbaceous understory appears to be stable and in

good health with nine species of grasses and 18 species of forbs. The grasses dominate, making up 83% of the herbaceous understory cover. The Desirable Components Index (see methods) rated this site as good with a score of 86. Bulbous bluegrass was excluded from the perennial grass cover because it is a short lived perennial with low forage value.

winter range condition (DC Index) - 86 (good) Mountain brush type

1999 TREND ASSESSMENT

Trend for soil down slightly due to a slight decline in litter cover and an increase in percent cover of bare ground. Protective ground cover is not continuous and exposed bare ground shows some signs of erosion. Trend for the key browse species, serviceberry, mountain big sagebrush, and true mountain mahogany is considered stable. Density of serviceberry and mountain big sagebrush declined but this appears to be due to a reduction in young plants sampled. Utilization of the key species is moderate to heavy, yet vigor is good and percent decadence is low. Another positive trend indicator is the decline in density of broom snakeweed, an aggressive increaser, from 3,120 in 1992 to 1,000 plants/acre in 1999. Trend for the herbaceous understory is stable for grasses and up slightly for forbs. The most abundant grass is bulbous bluegrass which provides 38% of the grass cover. Intermediate wheatgrass and smooth brome are also abundant. Together they account for 47% of the grass cover. Forbs are diverse but no species is dominant. Several forb species have increased significantly in nested frequency since 1992. Overall trend for the herbaceous understory is considered up slightly. The DCI score decreased about 10 points to 76, but is still classified as good. The decrease is due to declines in the proportion of young preferred browse plants and a slight decrease in preferred browse cover.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - stable for grasses and up slightly for forbs, up slightly overall (4)
winter range condition (DC Index) - 76 (good) Mountain brush type

2004 TREND ASSESSMENT

Trend for soil is slightly down. The relative percent of bare ground increased from 24 to 32%. Litter cover only slightly decreased, but relative cryptogam cover decreased from 7 to 2%. There are some open areas with very little protective cover. The browse trend is overall stable. The most abundant species, Utah serviceberry, saw a slight increase in density. Vigor is good, use is light to moderate, but leader growth was poor. Mountain big sagebrush is slightly down. Density decreased 21% and decadence increased to 35%. There are very few young plants to replace dying plants. True mountain mahogany density was slightly lower, but vigor was excellent as annual leader growth was very long and abundant and the plants had abundant seed. The herbaceous understory trend is stable. Nested frequency of perennial grasses declined in 2004, but that was due to the decline of bulbous bluegrass. When bulbous bluegrass is excluded, the nested frequency of perennial grasses has been stable. The differences in cover can also be attributed to the decline of bulbous bluegrass, which is a short lived perennial that has a low forage value. The only perennial forb to decline significantly since 1999 is longleaf phlox. All other perennial forbs are stable. The DCI decreased to 67 which is classified as fair to good for a mountain brush community. The decrease is due to slight declines in preferred browse cover, the proportion of young preferred browse plants, increased decadence, and slight declines in herbaceous understory cover (excluding bulbous bluegrass).

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - stable for grasses and slightly down for forbs, stable overall (3)
winter range condition (DC Index) - 67 (fair to good) Mountain brush type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 31

Type	Species	Nested Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
G	Agropyron cristatum	72	64	76	4.77	2.73	3.55
G	Bouteloua gracilis	7	13	12	.30	.45	.31
G	Bromus inermis	143	132	113	2.80	3.42	2.09
G	Bromus tectorum (a)	2	-	-	.00	-	-
G	Carex spp.	4	1	-	.33	.03	-
G	Koeleria cristata	-	-	4	-	-	.00
G	Oryzopsis hymenoides	$_{a}$-	$_{a}$8	$_{b}$29	-	.15	.28
G	Poa bulbosa	$_{b}$165	$_{b}$175	$_{a}$29	6.51	5.01	.54
G	Poa fendleriana	13	8	16	.27	.06	.48
G	Sitanion hystrix	3	-	2	.00	-	.03
G	Stipa comata	$_{b}$74	$_{b}$61	$_{a}$31	1.29	1.23	.57
G	Vulpia octoflora (a)	-	6	-	-	.01	-
Total for Annual Grasses		2	6	0	0.00	0.00	0
Total for Perennial Grasses		481	462	312	16.29	13.09	7.88
Total for Grasses		483	468	312	16.29	13.10	7.88
F	Castilleja linariaefolia	6	4	-	.04	.04	-
F	Calochortus nuttallii	-	3	-	-	.00	-
F	Chaenactis douglasii	$_{b}$67	$_{a}$28	$_{a}$21	1.34	.34	.38
F	Cirsium spp.	-	1	2	-	.03	.03
F	Comandra pallida	$_{a}$35	$_{b}$64	$_{ab}$56	.14	1.09	.55
F	Collinsia parviflora (a)	-	4	-	-	.03	-
F	Cordylanthus spp. (a)	$_{a}$-	$_{a}$-	$_{b}$23	-	-	.32
F	Crepis acuminata	3	6	-	.00	.01	-
F	Epilobium brachycarpum (a)	-	3	-	-	.18	-
F	Eriogonum alatum	-	-	2	-	-	.03
F	Eriogonum racemosum	52	57	41	.84	.57	.27
F	Eriogonum umbellatum	5	16	5	.03	.17	.07
F	Heterotheca villosa	-	1	-	-	.03	-
F	Hymenoxys acaulis	$_{a}$9	$_{b}$26	$_{ab}$22	.10	.19	.15
F	Lesquerella rectipes	$_{b}$67	$_{b}$80	$_{a}$92	.26	.25	1.43

Type	Species	Nested Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
F	Lomatium spp.	$_{a}$3	$_{b}$34	$_{a}$2	.06	.58	.00
F	Lupinus sericeus	3	12	9	.03	.31	.09
F	Machaeranthera canescens	7	21	9	.01	.04	.05
F	Penstemon comarrhenus	$_{b}$17	$_{ab}$8	$_{a}$3	.06	.04	.03
F	Phlox longifolia	$_{a}$26	$_{b}$53	$_{a}$6	.10	.14	.07
F	Polygonum douglasii (a)	$_{b}$38	$_{a}$5	$_{a}$-	.11	.01	-
F	Senecio multilobatus	$_{a}$14	$_{b}$60	$_{b}$63	.12	.75	.82
F	Sphaeralcea coccinea	$_{b}$17	$_{a}$1	$_{a}$2	.06	.00	.00
F	Zigadenus paniculatus	-	3	-	.00	.03	-
Total for Annual Forbs		38	12	23	0.11	0.21	0.32
Total for Perennial Forbs		331	478	335	3.24	4.66	4.00
Total for Forbs		369	490	358	3.36	4.88	4.32

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

BROWSE TRENDS --
Management unit 14 , Study no: 31

Type	Species	Strip Frequency			Average Cover %		
		'92	'99	'04	'92	'99	'04
B	Amelanchier utahensis	25	24	28	11.52	8.10	7.34
B	Artemisia nova	0	0	5	-	-	.01
B	Arctostaphylos patula	2	4	3	2.96	4.88	5.66
B	Artemisia tridentata vaseyana	55	57	47	5.14	4.48	4.49
B	Cercocarpus montanus	11	14	11	4.82	4.77	5.21
B	Chrysothamnus depressus	14	8	11	.69	.23	.71
B	Coryphantha vivipara arizonica	0	1	0	.00	.00	-
B	Gutierrezia sarothrae	51	21	33	.98	.16	.93
B	Juniperus osteosperma	1	1	1	.03	.15	.18
B	Opuntia spp.	14	4	4	.06	.01	-
B	Pediocactus simpsonii	0	1	0	-	-	-
B	Pinus edulis	4	3	6	3.40	2.97	3.74
B	Purshia tridentata	1	0	1	.15	.00	.00
B	Symphoricarpos oreophilus	5	2	8	.15	.15	1.31
Total for Browse		183	140	158	29.93	25.94	29.62

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 31

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	2.00	13.18
Arctostaphylos patula	-	5.91
Artemisia tridentata vaseyana	-	6.78
Cercocarpus montanus	3.40	8.31
Chrysothamnus depressus	-	.18
Gutierrezia sarothrae	-	.90
Juniperus osteosperma	.80	-
Opuntia spp.	-	.20
Pinus edulis	4.59	5.61
Pinus ponderosa	-	.03
Purshia tridentata	-	.75
Quercus gambelii	1.00	1.00
Symphoricarpos oreophilus	-	1.83

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 31

Species	Average leader growth (in)
	'04
Amelanchier utahensis	1.9
Artemisia tridentata vaseyana	1.8
Cercocarpus montanus	4.3

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 31

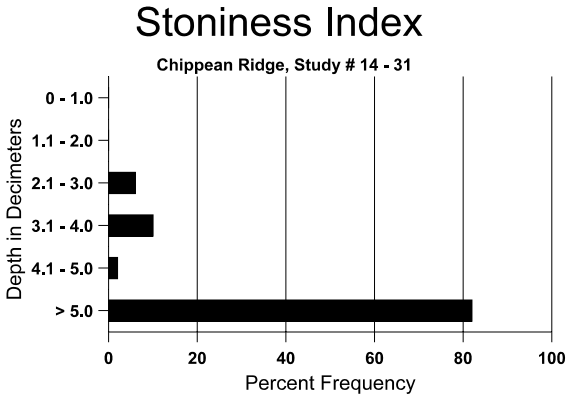
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	29	-	8.5	-
Pinus edulis	33	-	5.0	-
Quercus gambelii	20	-	2.0	-

BASIC COVER --
Management unit 14 , Study no: 31

Cover Type	Average Cover %		
	'92	'99	'04
Vegetation	41.22	40.61	43.33
Rock	.49	.26	1.17
Pavement	0	.12	.08
Litter	43.40	40.94	39.56
Cryptogams	6.87	8.56	2.98
Bare Ground	22.28	29.17	40.18

SOIL ANALYSIS DATA --
Management unit 14, Study no: 31, Study Name: Chippean Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
24.7	58.4 (15.1)	7.2	57.6	17.8	24.6	1.2	4.1	102.4	0.7



PELLET GROUP DATA --
Management unit 14 , Study no: 31

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	15	34	15
Elk	1	3	7
Deer	10	6	4
Cattle	-	2	-

Days use per acre (ha)	
'99	'04
-	-
24 (59)	23 (58)
7 (17)	5 (12)
4 (10)	2 (4)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 31

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
92	**1280**	340	700	580	-	-	41	5	0	-	0	-/-
99	**680**	180	180	500	-	-	6	56	0	-	0	64/87
04	**880**	-	260	580	40	-	32	9	5	2	2	59/71
Artemisia nova												
92	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**200**	-	-	40	160	-	70	20	80	40	40	11/21
Arctostaphylos patula												
92	**40**	-	-	40	-	-	0	0	-	-	0	-/-
99	**80**	-	20	60	-	-	0	0	-	-	0	44/143
04	**60**	-	-	60	-	-	0	0	-	-	0	30/89
Artemisia tridentata vaseyana												
92	**3300**	20	1800	1320	180	-	55	19	5	2	5	-/-
99	**2240**	40	220	1640	380	300	21	13	17	5	5	18/27
04	**1780**	-	100	1060	620	260	81	3	35	22	22	17/27
Cercocarpus montanus												
92	**240**	180	80	160	-	-	58	8	-	-	0	-/-
99	**320**	60	80	240	-	-	44	6	-	-	0	66/73
04	**240**	-	-	240	-	-	50	0	-	-	0	65/61
Chrysothamnus depressus												
92	**680**	20	240	440	-	-	21	0	0	-	0	-/-
99	**420**	-	20	340	60	-	0	10	14	14	14	7/15
04	**620**	-	-	540	80	-	6	0	13	3	6	7/12
Cowania mexicana stansburiana												
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	43/42
Coryphantha vivipara arizonica												
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	2/3
04	**0**	-	-	-	-	-	0	0	-	-	0	3/4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
92	**3120**	-	140	2960	20	-	0	0	1	.64	.64	-/-
99	**1000**	240	620	380	-	-	4	0	0	-	0	5/5
04	**2540**	-	20	2500	20	-	0	0	1	-	0	7/10
Juniperus osteosperma												
92	**20**	-	20	-	-	-	0	0	-	-	0	-/-
99	**20**	40	20	-	-	-	0	0	-	-	0	-/-
04	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
92	**400**	-	220	160	20	-	0	0	5	5	5	-/-
99	**140**	-	40	80	20	-	0	0	14	-	29	3/7
04	**80**	-	20	40	20	-	0	0	25	25	25	3/10
Pediocactus simpsonii												
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	3/5
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
92	**80**	-	20	60	-	-	0	0	-	-	0	-/-
99	**60**	40	20	40	-	-	0	0	-	-	0	-/-
04	**180**	40	140	40	-	-	0	0	-	-	0	-/-
Purshia tridentata												
92	**20**	-	20	-	-	-	100	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	-	40	-	-	0	100	-	-	0	18/42
Quercus gambelii												
92	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	20	-	-	-	-	0	0	-	-	0	28/25
04	**0**	-	-	-	-	-	0	0	-	-	0	34/22
Symphoricarpos oreophilus												
92	**160**	40	100	60	-	-	13	0	-	-	0	-/-
99	**40**	-	40	-	-	-	0	0	-	-	0	31/47
04	**480**	-	80	400	-	-	4	0	-	-	0	11/20

Trend Study14-32-04

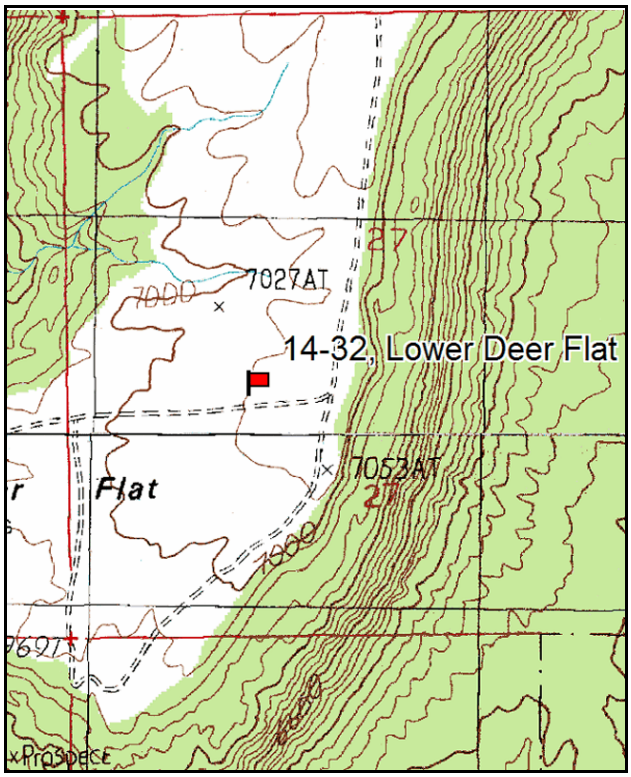
Study site name: Lower Deer Flat . Vegetation type: Sagebrush-Grass .

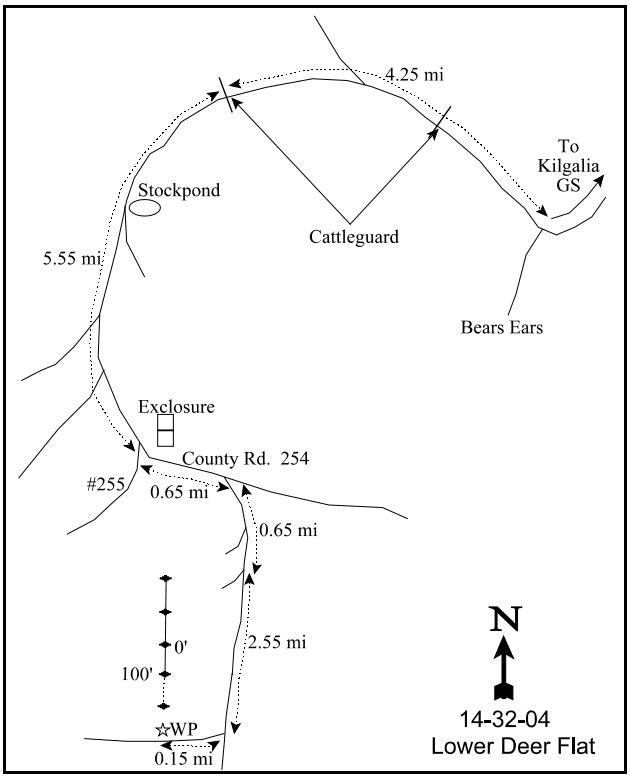
Compass bearing: frequency baseline 356 degrees magnetic.

Frequency belt placement: line 1(11 and 71 ft), line 2(34 ft), line 3(59 ft), line 4(95 feet).

LOCATION DESCRIPTION

At the intersection 2.45 miles southwest of the turnoff to Kigalia Guard Station and almost 2 miles northeast of the Bears Ears, turn west and proceed 2.0 miles to a cattleguard near a corral. Continue straight on this road, ignoring the turnoffs near the corral, for 1.75 miles to a fork. Stay left and continue 1.5 miles to a cattleguard at the FS/BLM boundary. After 2.4 more miles stay to the right at a fork under a stock pond. Continue 0.65 miles to another fork. Stay left. Proceed 0.6 more miles and stay left at the fork. Go 1.90 miles to an exclosure on the east side of the road. From the fork where county roads 254 and 255 split, go left on Road 254 for 0.65 miles to a fork. Turn right and go 0.35 miles to another fork. Stay left for 0.3 miles to another fork. Stay left for 2.55 miles to another fork. Turn right on a two-track for 0.15 miles to a witness post. The 0-foot stake is 19 paces at 342°M from the witness post.





Map name: Woodenshoe Butte Diagrammatic Sketch

Township 36S , Range 18E , Section 19 GPS: NAD 27, UTM 12S 4164541 N, 585402 E

DISCUSSION

Lower Deer Flat - Trend Study No. 14-32

The Lower Deer Flat trend study was established in 1994 to replace 14-17, Deer Flat. After the sagebrush at the original Deer Flat site was treated and seeded, deer no longer utilize the area in the winter in significant numbers. The Lower Deer Flat study site was established about 3 miles further south in an old chaining where deer winter in larger numbers. The study area has a 3% slope with a west aspect and an elevation of about 7,200 feet. Two pastures are used in a rotation system in which one pasture is grazed June 1 to Aug 15 one year then from Aug 16 to Oct 31 the next. The unit is allotted 400 cattle. Pellet group data from 1999 estimated 121 deer days use/acre (299 ddu/ha), 1 elk days use/acre (2 edu/ha), and 40 cow days use/acre (99 cdu/ha). Cattle were in the area when the site was monitored in 1999. Pellet group data from 2004 estimated 56 deer days use/acre, 9 elk, and 30 cow (139 ddu/ha, 23 edu/ha, and 73 cdu/ha).

The soil is a very compact loam with an effective rooting depth estimated at only a little over 12 inches. Soil depth measurements were limited by the compact soil, but there does not appear to be any rooting barriers in the soil profile. The soil has limited amounts of phosphorus and potassium at 4.5 and 51.2 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium may limit normal plant growth and development. Average soil temperature was very high in 1999 at 74.2°F at a depth of almost 13 inches. This condition gives winter annuals like cheatgrass a competitive advantage over cool season perennial grasses, forbs, and especially the establishment of sagebrush seedlings. Areas that were sprayed to kill sagebrush, about 1 mile east of the study site, are now dominated by cheatgrass. In 2004, soil temperature was lower, with an average temperature of 61.7°F at about 13 inches. There is quite a bit of bare ground exposed, but erosion is minimal due to the abundant herbaceous vegetation cover, chaining debris and lack of significant slope. Relative bare ground cover increased from 34% in 1999 to 44% in 2004.

The site supports a dense stand of Wyoming big sagebrush. In 1994, density was highest at 6,740 plants/acre and decadence was moderately low at 18%. Density then declined by 23% in 1999 to 5,160 plants/acre. Decadence was still low at 19% and 22% of the population was classified as young. In 2004, density declined by 5%, but decadence increased to 39% and only 7% of the population was classified as young. Sixteen percent of the population was considered to be dying in 2004. Cover has remained fairly constant since 1994 varying between 12 and 13%. Utilization was classified as mostly light in 1994, moderate to heavy in 1999, and moderate in 2004. Seed production was poor in 2004 and many plants were dropping leaves to conserve moisture. There are also a few heavily utilized fourwing saltbush scattered throughout the site.

Pinyon and juniper trees are found at a relatively low density considering the age of the chaining. Point quarter data from 1999 estimated 32 pinyon and 45 juniper trees/acre with an average diameter of 3.0 inches and 4.4 inches respectively. Twelve percent of the juniper trees sampled consisted of large knocked down trees (tipped over) that are still living. Tree density remained stable in 2004 with an estimated 32 pinyons and 48 junipers/acre. Average diameter was 3.4 inches for pinyon and 3.2 inches for juniper.

The herbaceous understory is dominated by crested wheatgrass which provided 73% of the grass cover in 1994 and 67% of the herbaceous cover. It increased significantly in nested frequency in 1999 and provided 88% of the grass cover and 83% of the herbaceous cover. It declined significantly in 2004 from 1999, but was still higher than values for 1994. In 2004, it provided 96% of the grass cover and 93% of the herbaceous cover. Other perennial grasses on this site include, Indian ricegrass, bottlebrush squirreltail, and needle-and-thread grass. Annual cheatgrass is also present, but not very abundant. It was a wetter year in 1999 and cheatgrass was more abundant than it was in 1994 and 2004. Forbs are rare and produce less than 1% cover. The only fairly common species include timber poisonvetch, longleaf phlox, and scarlet globemallow.

1994 APPARENT TREND ASSESSMENT

The soil trend appears to be stable due to abundant litter and herbaceous cover combined with the gentle terrain. The Wyoming big sagebrush population appears to be relatively stable. Percent decadence is low at 17% and recruitment is good. Vigor is poor on half of the population however, and about 7% of the population appear to be dying. Recruitment is good and there appears to be enough young plants to replace decadent and dying plants. The herbaceous understory appears to be in good condition with several moderately abundant grasses. Crested wheatgrass dominated the composition however, by providing 73% of the grass cover. Annual cheatgrass is also present but only in low abundance. Forbs are lacking. The Desirable Components Index (see methods) rating is good at 63 for a Wyoming big sagebrush community.

winter range condition (DC Index) - 63 (good) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil appears stable. Percent cover of bare ground has increased slightly but so has litter cover. There is little erosion occurring due to levelness of the terrain. Trend for Wyoming big sagebrush is down slightly. It is being heavily browsed and density has declined from 7,140 to 5,160 plants/acre. Vigor is improved however, with only 10% of the plants sampled displaying poor vigor, down from 50% in 1994. Percent decadence remains low at 19%. The heavy use with drought has caused low annual growth and poor seed production. No seedlings were found, but young plants are still abundant. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses and forbs both declined slightly, although the dominant grass, crested wheatgrass, has increased significantly in nested frequency. It currently provides 88% of the grass cover and 83% of the total herbaceous cover. Cheatgrass is found on the site in low abundance but it also has increased significantly in nested frequency. There is still several moderately abundant native perennial grasses present, yet forbs are lacking. The DCI score is rated as good to excellent (66). The sagebrush is abundant and healthy, while perennial grasses are also very abundant.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - stable (3)
winter range condition (DC Index) - 66 (good to excellent) Wyoming big sagebrush type

2004 TREND ASSESSMENT

The soil trend is slightly down. Relative bare ground cover increased from 34% to 44%, while litter decreased from 40% to 29%. An erosion index assessment rated erosion as stable despite the moderately high amount of bare ground, due to the slight slope and lack of connectivity of bare areas. The browse trend is down. Wyoming big sagebrush density declined only 5% since 1999, but decadence increased from 19 to 39% and 16% of the population was classified as dying. Young plants only made up 7'% of the population and seedlings were not very abundant. This is not enough plants to replace dying plants. Utilization did decline from moderate to heavy to just moderate. Cover has remained stable at this site since 1994 at about 12-13%. The herbaceous understory trend is slightly down. Nested frequency of perennial grasses decreased by about a fourth. Crested wheatgrass is the only abundant grass on the site and had nearly 16% cover in 2004. Cheatgrass did decline significantly since 1999, which is a positive thing, but will probably increase when precipitation is greater. Forbs are rare, but two of the most abundant forbs, timber poisonvetch and longleaf phlox declined significantly since 1999. The DCI score declined to good due to increased decadence and a lower proportion of young plants.

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 58 (good) Wyoming big sagebrush type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 32

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{a}$198	$_{c}$291	$_{b}$247	9.43	12.62	15.63
G	Agropyron intermedium	2	-	-	.00	-	-
G	Bouteloua gracilis	-	2	-	-	.01	-
G	Bromus tectorum (a)	$_{a}$35	$_{b}$103	$_{a}$61	.24	.81	.31
G	Oryzopsis hymenoides	$_{b}$58	$_{a}$23	$_{a}$1	.81	.19	.03
G	Poa fendleriana	$_{b}$12	$_{a}$-	$_{a}$-	.34	-	-
G	Sitanion hystrix	$_{b}$39	$_{b}$17	$_{a}$1	.71	.26	.03
G	Sporobolus cryptandrus	3	-	11	.00	-	.06
G	Stipa comata	$_{b}$94	$_{a}$41	$_{a}$16	1.44	.40	.14
Total for Annual Grasses		35	103	61	0.24	0.81	0.31
Total for Perennial Grasses		406	374	276	12.76	13.49	15.90
Total for Grasses		441	477	337	13.00	14.30	16.21
F	Astragalus convallarius	$_{b}$18	$_{b}$15	$_{a}$3	.67	.43	.18
F	Astragalus spp.	-	-	1	-	-	.00
F	Crepis acuminata	3	6	11	.00	.02	.07
F	Descurainia pinnata (a)	-	5	-	-	.00	-
F	Erigeron spp.	9	-	-	.01	-	-
F	Lappula occidentalis (a)	4	3	1	.01	.00	.03
F	Machaeranthera canescens	2	-	1	.00	-	.00
F	Microsteris gracilis (a)	-	1	-	-	.00	-
F	Orthocarpus spp. (a)	$_{b}$15	$_{a}$-	$_{a}$-	.04	-	-
F	Phlox longifolia	$_{ab}$91	$_{b}$105	$_{a}$75	.19	.32	.25
F	Sphaeralcea coccinea	29	18	20	.08	.08	.12
Total for Annual Forbs		19	9	1	0.05	0.01	0.03
Total for Perennial Forbs		152	144	111	0.97	0.86	0.64
Total for Forbs		171	153	112	1.03	0.87	0.67

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

BROWSE TRENDS --
Management unit 14 , Study no: 32

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemisia tridentata wyomingensis	87	80	84	12.77	11.80	13.08
B	Atriplex canescens	0	1	0	-	.38	-
B	Chrysothamnus viscidiflorus	1	3	2	-	.15	.15
B	Juniperus osteosperma	0	3	3	1.01	1.23	.53
B	Opuntia spp.	1	0	0	.00	-	-
B	Pinus edulis	-	-	-	.15	-	-
Total for Browse		89	87	89	13.94	13.57	13.77

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 32

Species	Percent Cover	
	'99	'04
Artemisia tridentata wyomingensis	-	13.56
Chrysothamnus viscidiflorus	-	.06
Juniperus osteosperma	.20	1.66

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 32

Species	Average leader growth (in)
	'04
Artemisia tridentata wyomingensis	1.4

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 32

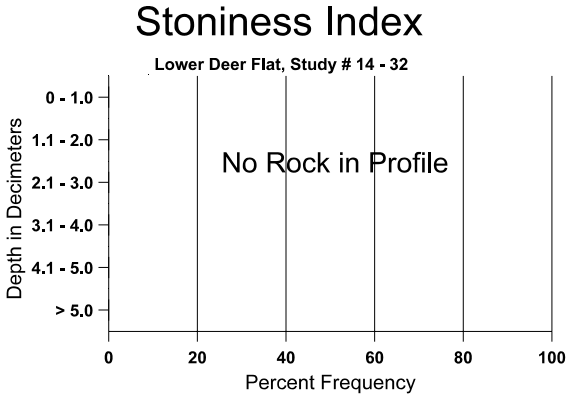
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	45	48	4.3	3.2
Pinus edulis	32	32	3.1	3.4

BASIC COVER --
Management unit 14 , Study no: 32

Cover Type	Average Cover %		
	'94	'99	'04
Vegetation	28.21	27.89	29.85
Rock	.15	0	0
Pavement	0	0	.01
Litter	41.73	43.37	32.42
Cryptogams	.22	.49	.69
Bare Ground	30.60	36.52	48.65

SOIL ANALYSIS DATA --
Management unit 14, Study no: 32, Study Name: Lower Deer Flat

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
12.4	61.7 (12.8)	7.1	46.0	29.4	24.6	1.4	4.5	51.2	0.6



PELLET GROUP DATA --
Management unit 14 , Study no: 32

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	30	50	24
Elk	1	1	5
Deer	59	61	45
Cattle	1	4	14

Days use per acre (ha)	
'99	'04
-	-
1 (2)	9 (23)
121 (299)	56 (139)
40 (99)	30 (73)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 32

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
94	**6740**	1060	560	4940	1240	40	4	.89	18	7	47	37/50
99	**5160**	-	1140	3060	960	120	41	42	19	2	10	20/28
04	**4920**	240	340	2640	1940	420	65	20	39	16	24	18/30
Atriplex canescens												
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**20**	-	-	-	20	-	0	100	100	100	100	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Chrysothamnus nauseosus												
94	**0**	-	-	-	-	-	0	0	-	-	0	142/9
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus												
94	**40**	-	-	20	20	-	0	0	50	50	50	8/13
99	**60**	-	-	20	40	-	0	0	67	33	33	12/18
04	**40**	-	-	20	20	-	0	0	50	50	50	9/13
Juniperus osteosperma												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	40	20	-	20	0	0	-	-	0	-/-
04	**60**	-	-	60	-	-	0	0	-	-	0	-/-
Opuntia spp.												
94	**20**	-	-	20	-	-	0	0	-	-	0	4/15
99	**0**	-	-	-	-	-	0	0	-	-	0	5/13
04	**0**	-	-	-	-	-	0	0	-	-	0	4/21

Trend Study14-34-04

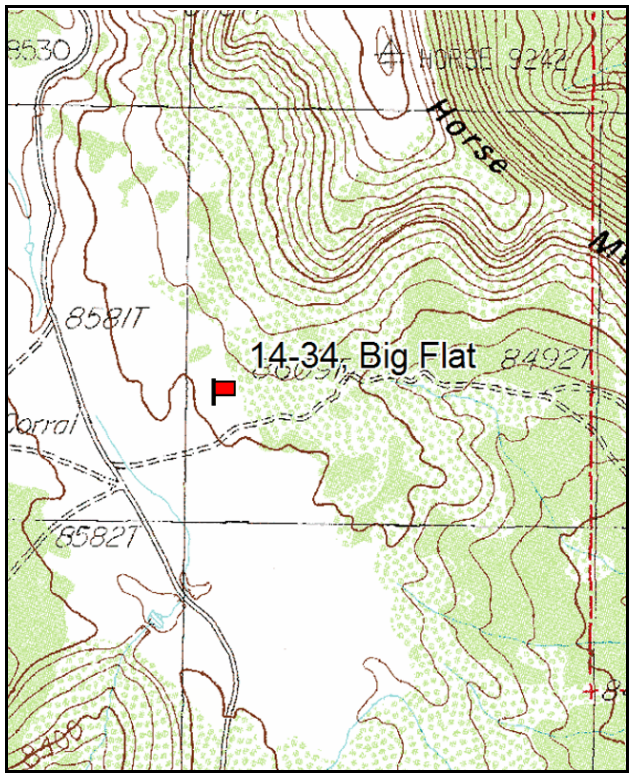
Study site name: Big Flat . Vegetation type: Mountain Big Sagebrush .

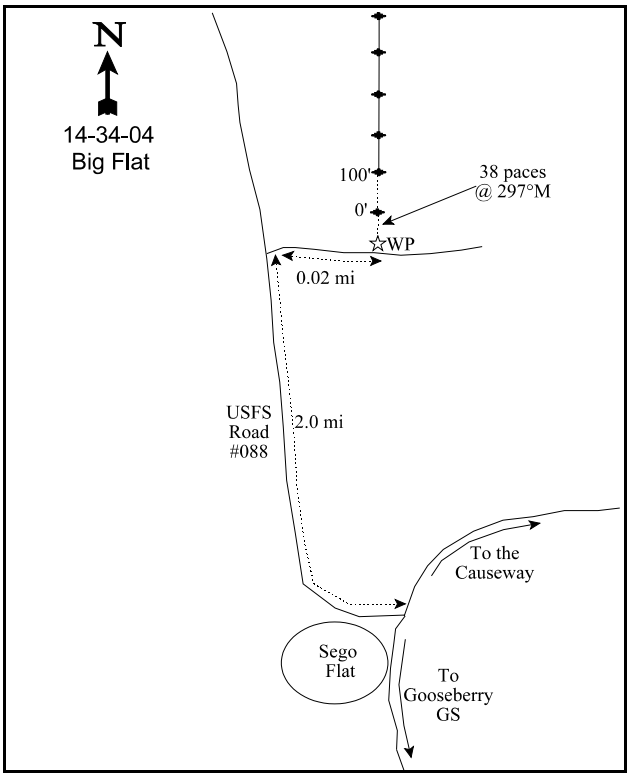
Compass bearing: frequency baseline 322 degrees magnetic.

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

LOCATION DESCRIPTION

From the Gooseberry Guard Station travel north about 1.2 miles to Sego Flat. From Sego Flat, stay left and travel 2.0 miles north. Take a right onto a faint road and drive 0.02 miles to a witness post on the left. The beginning of the frequency baseline is 38 paces away at 297°M. The 0-foot stake is marked with a browse tag #152.





Map name: Poison Canyon

Diagrammatic Sketch

Township 33S , Range 19E , Section Unsurveyed

GPS: NAD 27, UTM 12S 4191272 N, 607072 E

DISCUSSION

Big Flat - Trend Study No. 14-34

Big flat was established in 2004 to be a more representative summer range site that receives significant wildlife use. This study replaces North Long Point (14-21) and The Wilderness (14-26). Both of these studies were located in areas dominated by thick shrubs. North Long Point was an oak community and The Wilderness was a manzanita community. Big Flat receives more wildlife and livestock use and should be more sensitive to changes in the vegetation community. This study was located near a clipping study that this project has monitored to determine use of elk and cattle. Between 1999 and 2002 pellet group transects found an average of 29 elk days use/acre (72 edu/ha), 15 cow days use/acre (37 cdu/ha), and 9 deer days/use acre (21 ddu/ha). Production of available forage varied between 1,550 lbs/acre in 1999 and 251 lbs/acre in 2002. Total use was lowest in 1999 at 48% and highest in 2002 at 80%.

The transect is located in a mountain big sagebrush-grass community with a few oak clones intermixed. The elevation is 8,600 feet with a western aspect and a slope of 8-10%. There is a water impoundment about one-third of a mile to the south. The pellet group transect in 2004 estimated 16 deer days use/acre (40 ddu/ha), 32 elk days use/acre (79 edu/ha), and 26 cow days use/acre (64 cdu/ha).

The effective rooting depth is about 16 inches. The texture is clay loam with a neutral pH (6.8). The A horizon is about 4 inches thick and is dark brown. Below that is a sandy gravelly layer and below that a clay layer. There is very little rock in the profile or at the surface. Bare ground was higher than would be desired for a summer range, but an erosion condition class index rated erosion as stable in 2004.

Browse made up 47% of the total vegetation cover in 2004. Mountain big sagebrush is the most dominant browse species, but is not a key species at this elevation. It made up 96% of the total browse cover in 2004. Sagebrush cover was nearly 20%. Density was high at 8,020 plants/acre, with 43% of the population classified as young. Seedlings were also very abundant with 2,460/acre sampled. Decadence was very low at 4%. Use was light with 82% of the population showing light use. This population is healthy and may continue to expand with such a high proportion of young and seedlings. At this elevation less sagebrush and more grass and forb cover would be desired for summer range.

The herbaceous understory was dominated by two introduced grasses, smooth brome and Kentucky bluegrass. Each had about 6% cover in 2004. Together they made up 54% of the herbaceous understory cover and 99% of the total grass cover. Both are sod forming grasses that are resistant to grazing. Kentucky bluegrass increases under grazing pressure. Smooth brome is an aggressive introduced grass that has good forage value. Native grasses were quite rare here. Forbs were abundant with over 10% cover, but were dominated by species with little value such as ballhead sandwort, aster, trailing fleabane, and silvery lupine. Western yarrow was abundant and has fair value.

2004 APPARENT TREND ASSESSMENT

The trend for soil appears to be stable. Erosion is not currently a problem and vegetation cover is abundant to protect the soil. The browse trend appears to be up. Sagebrush is abundant, reproducing well, and healthy, although the amount of sagebrush is greater than would be desired on a summer range. The herbaceous understory trend appears to be stable. Grasses and forbs are abundant. Kentucky bluegrass and smooth brome can withstand grazing pressure and Kentucky bluegrass can increase under heavy grazing.

HERBACEOUS TRENDS --
Management unit 14 , Study no: 34

Type	Species	Nested Frequency '04	Average Cover % '04
G	Agropyron intermedium	13	.03
G	Bromus inermis	246	6.09
G	Carex spp.	4	.06
G	Poa pratensis	254	6.05
G	Sitanion hystrix	1	.00
Total for Annual Grasses		0	0
Total for Perennial Grasses		518	12.24
Total for Grasses		518	12.24
F	Achillea millefolium	86	2.13
F	Agoseris glauca	2	.00
F	Antennaria rosea	6	.06
F	Arenaria congesta	81	1.37
F	Artemisia ludoviciana	3	.01
F	Aster spp.	67	1.23
F	Collinsia parviflora (a)	9	.01
F	Crepis acuminata	3	.01
F	Cymopterus spp.	17	.14
F	Erigeron flagellaris	97	1.87
F	Eriogonum racemosum	26	.31
F	Heterotheca villosa	9	.54
F	Lathyrus spp.	6	.01
F	Lupinus argenteus	26	1.70
F	Lupinus polyphyllus	8	.16
F	Penstemon humilis	2	.03
F	Penstemon strictus	2	.03
F	Phlox longifolia	43	.33
F	Potentilla concinna	7	.15
F	Polygonum douglasii (a)	4	.01
F	Taraxacum officinale	2	.01
F	Tragopogon dubius	1	.00
F	Vicia americana	11	.02
Total for Annual Forbs		13	0.03
Total for Perennial Forbs		505	10.19
Total for Forbs		518	10.22

BROWSE TRENDS --
Management unit 14 , Study no: 34

Type	Species	Strip Frequency '04	Average Cover % '04
B	Artemisia tridentata vaseyana	88	19.36
B	Quercus gambelii	3	.00
B	Rosa woodsii	4	.03
B	Symphoricarpos oreophilus	16	.78
Total for Browse		111	20.18

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 34

Species	Percent Cover '04
Artemisia tridentata vaseyana	25.03
Quercus gambelii	1.39
Rosa woodsii	.13
Symphoricarpos oreophilus	2.33

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 34

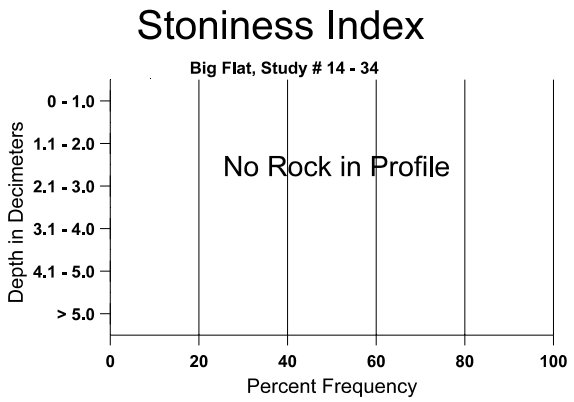
Species	Average leader growth (in) '04
Artemisia tridentata vaseyana	2.0

BASIC COVER --
Management unit 14 , Study no: 34

Cover Type	Average Cover % '04
Vegetation	45.00
Rock	.38
Pavement	.12
Litter	33.32
Cryptogams	.15
Bare Ground	33.60

SOIL ANALYSIS DATA --
Management unit 14, Study no: 34, Study Name: Big Flat

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
16.4	42.8 (16.9)	6.8	23.9	44.2	31.8	3.6	18.5	249.6	0.8



PELLET GROUP DATA --
Management unit 14 , Study no: 34

Type	Quadrat Frequency '04	Days use per acre (ha) '04
Elk	15	32 (79)
Deer	12	16 (40)
Cattle	10	26 (65)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 34

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
04	**8020**	2460	3420	4240	360	120	18	3	4	.49	.74	21/32
Ceanothus fendleri												
04	**0**	-	-	-	-	-	0	0	-	-	0	13/42
Mahonia repens												
04	**0**	-	-	-	-	-	0	0	-	-	0	4/8
Quercus gambelii												
04	**80**	-	40	40	-	-	50	0	-	-	0	13/16

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Rosa woodsii												
04	**120**	-	-	120	-	-	0	0	-	-	0	14/12
Symphoricarpos oreophilus												
04	**600**	-	100	500	-	-	17	0	-	-	0	15/25

Trend Study 14R-1-04

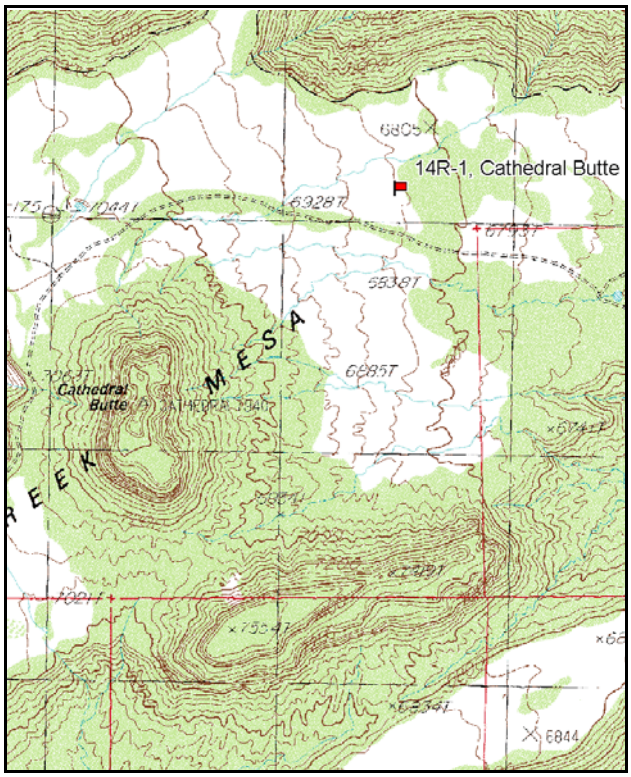
Study site name: Cathedral Butte . Vegetation type: Chained, Seeded PJ .

Compass bearing: frequency baseline 290 degrees magnetic.

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

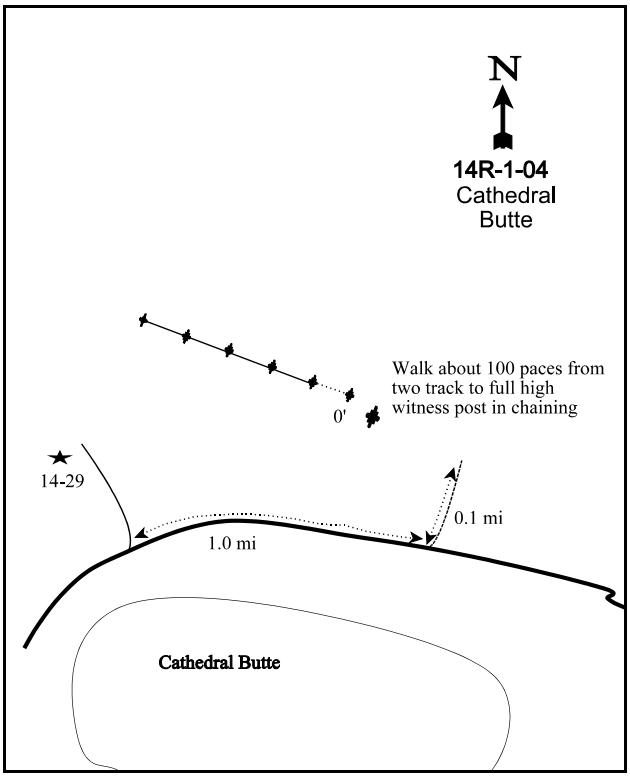
LOCATION DESCRIPTION

Travel to the north side of Cathedral Butte. As the road winds around the north side of the butte there is a junction to a small side road on the northwest side of the butte. This is the turnoff to the Salt Creek Mesa trend study (14-29). From this junction travel east on the main road 1.0 mile to another faint two track road heading north. Turn here and go 0.1 mile to a small opening in the trees. From here walk approximately 100 paces to the west into the chaining. There is a full high witness post a few feet from the 0-foot baseline stake. The baseline runs 290 degrees magnetic.



Map name: Cathedral Butte

Township 32S , Range 20E , Section Unsurveyed



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4202110 N 615488 E

DISCUSSION

Cathedral Butte - Trend Study No. 14R-1

The Cathedral Butte study was established in 2001 to gather pretreatment data for a prescribed burn project on the north side of Elk Ridge that took place in the fall of 2003. The Salt Creek Mesa project includes approximately 1,340 acres of BLM administered public lands and 280 acres of School & Institutional Trust Land Administration Lands (State of Utah). The fire treatment only burned spotty and only burned a few trees. This area is important winter range for big game and important for livestock use. This area has received increased attention in recent years as it lies in close proximity to Beef Basin. Most of the proposed prescribe burn area consists of old pinyon-juniper chainings, including the area where the study was placed and study 14-29 Salt Creek Mesa. The site lies on a gentle, northeast aspect at an elevation of 6,850 feet. A pellet group transect read parallel to the vegetation baseline in 2001 estimated 3 deer days use/acre (8 ddu/ha), 23 elk days use/acre (56 edu/ha), and 33 cow days use/acre (82 cdu/ha). In 2004, use was estimated at 3 deer days use/acre (8 ddu/ha), 15 elk days use/acre (38 edu/ha), and 19 cow days use/acre (47 cdu/ha).

Soils are sandy clay loam in texture with a soil reaction that is slightly alkaline (7.7 pH). Effective rooting depth was estimated at just over 14 inches. A stoniness profile index shows the majority of rock to be in the upper 12 inches of the profile. Phosphorus is low at 7.3 ppm, where values less than 10 ppm may be limiting to normal plant growth and development. Although vegetation and litter cover are moderately high, percent bare ground is also fairly high. An erosion condition class assessment determined soils as slightly eroding in 2001 and stable in 2004. Most evidence of erosion is due to excessive pedestaling around some of the vegetation.

Several important browse species are present in the area, however most occur in very low numbers on the site itself. Burning this site is a poor choice of treatment knowing that nearly all the important browse species on site are not tolerant of fire and the entire browse component had only 4% average cover in 2001 and 2004. Important winter forage species include fourwing saltbush, mountain big sagebrush, green ephedra, and bitterbrush. Fourwing saltbush had the highest cover and had an estimated density of 300 plants/acre in 2001 and increased to 440 in 2004. Twenty-seven percent of the population consisted of young plants in both 2001 and 2004. Between 2001 and 2004 mature plants increased from 120 to 260/acre. Decadence decreased from 33 to 14%. Use on fourwing saltbush was moderate in 2001 and light in 2004. Mountain big sagebrush density increased from 20 to 80 plants/acre. Bitterbrush have densities estimated at only 20 plants/acre. Use is moderate on mountain big sagebrush and heavy on bitterbrush. Ephedra density was estimated at 40 plants/acre in 2001with use being moderate to heavy. This increased to 60 plants/acre in 2004 with moderate use. In 2001, annual leader growth for fourwing saltbush was estimated at 4.8 inches. In 2004 it was 3.9 inches. In 2001, it was written that a prescribed fire would be detrimental to the usefulness of this site to wildlife, especially big game. Fire would likely eliminate much or all of the palatable browse on the site, but the fire did not carry across the site so the browse was not harmed.

Crested wheatgrass is by far the dominant species on this site. Crested wheatgrass had over 39% average cover and was sampled in 97% of the quadrats in the 2001. This declined significantly in 2004 to 18% cover and 73% of the quadrats. The only other grasses sampled were blue grama and sand dropseed in very low numbers. Forbs were sparse with only 5 species being sampled in 2001, but this was probably because the site was established in September of 2001. In July of 2004, 14 forbs were sampled, 5 of which were annuals. Seventy-one percent of the forb cover came from these annuals. Perennials only contributed to about 1% cover in both years.

2001 APPARENT TREND ASSESSMENT

Soils appear to be stable with only slight erosion occurring. Vegetation and litter are moderately high with most of the bare ground occurring in the interspaces between the individual crested wheatgrass plants. Browse is already limited on the site and would be further reduced following the proposed burn. A prescribed burn

will likely eliminate most or all of the palatable forage on the site, which would decrease the usefulness of this site to big game as a wintering area. Crested wheatgrass dominates the site and will likely continue to do so in the future. The Desirable Components Index (see methods) rating is poor at 35. The herbaceous understory is good, but this chaining lacks preferred browse that deer use for winter forage.

winter range condition (DC Index) - 35 (poor) Chaining (rated on mountain big sage scale)

2004 TREND ASSESSMENT

The soil trend is down. Relative bare ground cover increased from 31 to 50%, while vegetation declined from 39 to 22%. Litter declined slightly. Erosion does not currently appear to be a problem. The browse trend is slightly up, but still lacking in abundance. Fourwing saltbush density and cover is higher and decadence has declined. Mountain big sagebrush and ephedra density is also slightly up. Pinyon and juniper cover decreased after the fire. The herbaceous understory trend is down, due to the decrease in crested wheatgrass. Cover was less than half of what is was in 2001. Nested frequency declined significantly. There is no other significant species found on the site. The DCI rating is poor at 36. The herbaceous understory is good, but preferred browse is lacking for deer winter forage.

TREND ASSESSMENT
soil - down (1)
browse - slightly up, but sparse (4)
herbaceous understory - down and lacking diversity (1)
winter range condition (DC Index) - 36 (poor) Chaining (rated on mountain big sage scale)

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

Type	Species	Nested Frequency '01	Nested Frequency '04	Average Cover % '01	Average Cover % '04
G	Agropyron cristatum	b388	a208	39.51	17.92
G	Bouteloua gracilis	10	5	.06	.06
G	Sporobolus cryptandrus	-	5	-	.01
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		398	218	39.57	17.99
Total for Grasses		398	218	39.57	17.99
F	Artemisia dracunculus	-	1	-	.15
F	Astragalus spp.	4	3	.45	.15
F	Astragalus utahensis	-	1	-	.00
F	Chenopodium fremontii (a)	-	9	-	.21
F	Chenopodium leptophyllum(a)	-	5	-	.67
F	Descurainia pinnata (a)	a-	b17	-	1.03
F	Gilia spp. (a)	a-	b17	-	.52
F	Lappula occidentalis (a)	-	1	-	.03
F	Machaeranthera canescens	3	4	.15	.04
F	Medicago sativa	2	4	.07	.18

Type	Species	Nested Frequency '01	Nested Frequency '04	Average Cover % '01	Average Cover % '04
F	Petradoria pumila	3	3	.41	.41
F	Phlox austromontana	4	5	.06	.03
F	Senecio multilobatus	-	2	-	.00
F	Trifolium spp.	-	4	-	.00
Total for Annual Forbs		0	49	0	2.48
Total for Perennial Forbs		16	27	1.14	0.99
Total for Forbs		16	76	1.14	3.47

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

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

Type	Species	Strip Frequency '01	Strip Frequency '04	Average Cover % '01	Average Cover % '04
B	Artemisia tridentata vaseyana	1	1		
B	Atriplex canescens	15	15	1.56	2.76
B	Chrysothamnus nauseosus consimilis	2	0	-	-
B	Chrysothamnus viscidiflorus	-	-	-	.03
B	Ephedra viridis	2	1	.01	-
B	Gutierrezia sarothrae	25	5	1.14	-
B	Juniperus osteosperma	-	-	-	.38
B	Opuntia spp.	1	1	.01	.03
B	Pinus edulis	1	1	1.25	.38
B	Purshia tridentata	1	0	-	-
Total for Browse		48	24	3.99	3.58

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

Species	Percent Cover '01	Percent Cover '04
Atriplex canescens	-	2.21
Gutierrezia sarothrae	-	.06
Juniperus osteosperma	-	.70
Pinus edulis	2.40	.40

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

Species	Average leader growth (in) '04
Artemisia tridentata vaseyana	3.8
Atriplex canescens	3.9

POINT-QUARTER TREE DATA --
Management unit 14R, Study no: 1

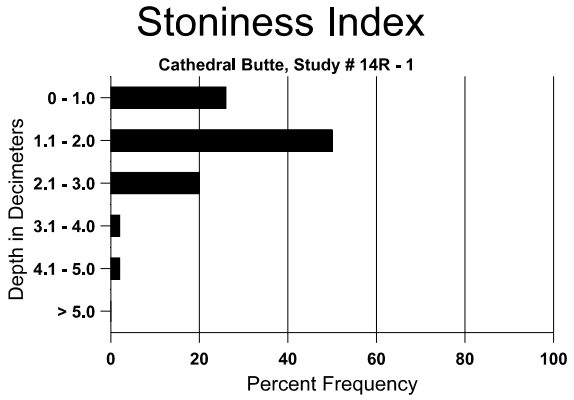
Species	Tress per Acre '04	Average diameter (in) '04
Juniperus osteosperma	30	4.5
Pinus edulis	28	3.5

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

Cover Type	Average Cover % '01	'04
Vegetation	46.50	24.42
Rock	0	.00
Pavement	.05	.01
Litter	34.80	29.75
Cryptogams	.69	1.13
Bare Ground	36.80	54.34

SOIL ANALYSIS DATA --
Management unit 14R, Study no: 01, Study Name: Cathedral Butte

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
14.2	60.3 (15.6)	7.7	57.9	23.4	18.6	2.3	7.3	89.6	0.6



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

Type	Quadrat Frequency		Days use per acre (ha)	
	'01	'04	'01	'04
Rabbit	30	17	-	-
Elk	27	18	23 (56)	15 (38)
Deer	12	2	3 (8)	3 (8)
Cattle	19	7	33 (82)	19 (47)

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

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
01	**20**	-	-	-	20	-	100	0	100	-	0	25/42
04	**80**	-	-	80	-	-	0	100	0	-	0	29/42
Atriplex canescens												
01	**300**	-	80	120	100	20	27	13	33	7	7	27/29
04	**440**	20	120	260	60	20	9	0	14	-	14	33/42
Chrysothamnus depressus												
01	**0**	-	-	-	-	-	0	0	-	-	0	4/9
04	**0**	-	-	-	-	-	0	0	-	-	0	10/16
Chrysothamnus nauseosus consimilis												
01	**40**	-	-	20	20	-	0	0	50	-	0	45/46
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Ephedra viridis												
01	**40**	-	20	20	-	-	50	50	-	-	0	18/10
04	**60**	-	60	-	-	-	100	0	-	-	0	-/-
Gutierrezia sarothrae												
01	**1560**	-	60	1500	-	-	0	0	-	-	0	8/13
04	**100**	20	40	60	-	60	0	0	-	-	0	8/13
Mahonia fremontii												
01	**0**	-	-	-	-	-	0	0	-	-	0	21/33
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
01	**20**	-	-	20	-	20	0	0	-	-	0	1/4
04	**40**	-	-	40	-	-	0	0	-	-	0	3/6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
01	**20**	-	-	20	-	-	0	0	0	-	0	-/-
04	**20**	-	-	-	20	20	0	0	100	-	0	-/-
Purshia tridentata												
01	**20**	-	-	-	20	-	0	100	100	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	20/36

SUMMARY

WILDLIFE MANAGEMENT UNIT 14 - SAN JUAN

Wildlife management unit 14 is composed of the old Elk Ridge Deer Herd unit #35 and the old Abajo Deer Herd Unit #36. In 2004, 10 trend study sites were read on the Abajo portion of the unit, 5 of which are winter range areas. These include, Alkali Point 14-1, Hart's Draw 14-9, Hart's Point 14-10, Shay Mesa 14-11, and Shingle Mill 14-12. Of these sites, 3 have declining soil trends. Browse trends are down or slightly down for each site except Shingle Mill, which is a higher elevation winter range. Browse trends for Wyoming big sagebrush sites are down, due to sagebrush die off and high decadency due to drought. The herbaceous trend on these sites is up on 2 sites, due to the decline of cheatgrass during drought conditions, but cheatgrass is still present. Cheatgrass abundance was extremely high in 1999 due to favorable precipitation conditions and was lower in 2004 due to drier conditions. It is expected that cheatgrass abundance would increase again with favorable precipitation patterns. Dry conditions have also impacted herbaceous trends negatively as many sites are down due to declines in perennial grasses and forbs. Shingle Mill is high enough that it has never had a cheatgrass problem, but had a major decline in perennial grasses.

The other six sites on this part of unit 14, consist of spring/fall or summer ranges. These include, Brushy Basin 14-2, Gold Queen Basin 14-3, Camp Jackson Reservoir 14-4, Jackson Ridge 14-5, Hart's Draw Reservoir 14-6, and Peter's Point 14-8. Camp Jackson Reservoir was not read in 2004. Soil trends are stable or slightly down for these sites. Browse trends are stable. Herbaceous trends are down for each site except Harts Draw Reservoir which is stable. Drought conditions have caused the decline of perennial grasses and forbs.

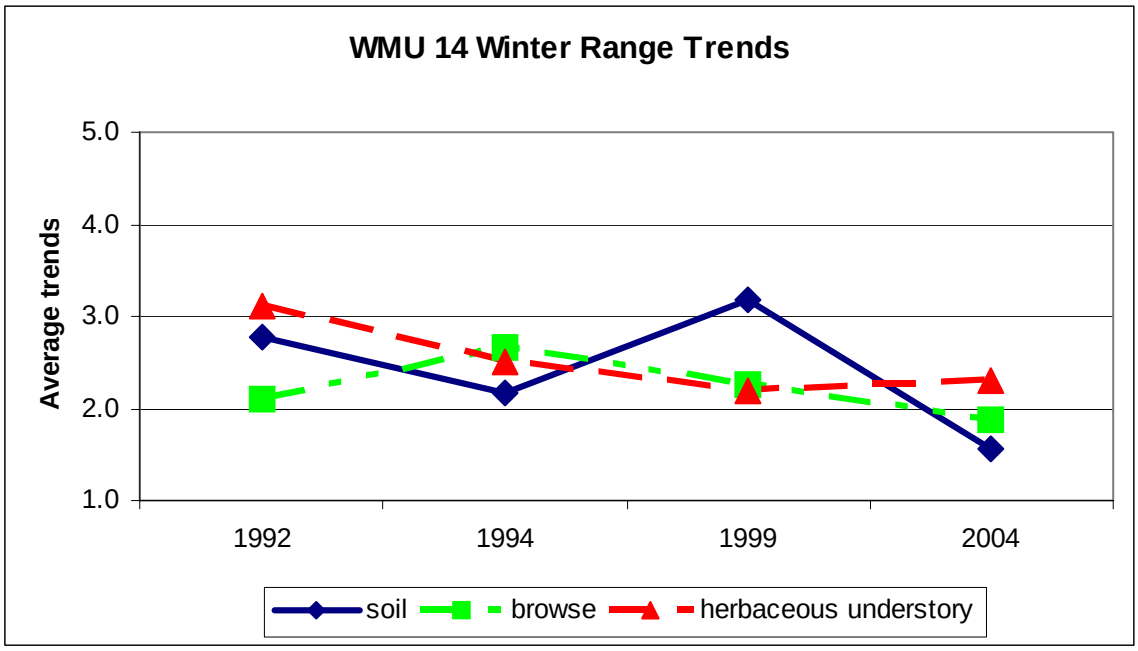
Seventeen trend study sites were read on the Elk Ridge portion of unit 14. Of these, 11 are winter range areas. Five are found on the southern end of the unit including, Black Mesa 14-13, Texas Flat 14-14, Harmony Flat 14-15, Lower Lost Park 14-16, and Lower Deer Flat 14-32. The other six occur on the northern portion of Elk Ridge. These include, Wild Cow Point 14-22, South Plain 14-23, Ruin Park 14-24, Salt Creek Mesa 14-29, Chippean Ridge 14-31, and Cathedral Butte 14R-1, which was established in 2001 to monitor a prescribed burn. All of these studies have declining soil trends except for Wild Cow Point, which is stable. Browse trends were down for 7 of the 11 sites, stable on 2 and slightly up for 2. The browse trends are down for all Wyoming big sagebrush sites on the unit. Sagebrush die off, extremely high decadency, and lack of reproduction have been caused by recent prolonged drought conditions. These areas are critical for winter deer use and heavy use on these areas could further harm these sagebrush populations. At Ruin Park in Beef Basin, all Wyoming big sagebrush has died. The 2 sites with upward trends were Salt Creek Mesa and Cathedral Butte which were burned in a prescribed fire. Palatable browse on these sites is not very abundant and was not affected by the burn, but pinyon and juniper has been reduced. Texas Flat had a stable browse trend. Chippean Ridge supports mountain browse species and is also stable. Herbaceous understory trends are down on 7 of the 11 sites. Both sites in Beef Basin, South Plain and Ruin Park, have upward herbaceous trends as cheatgrass has declined and perennial species have increased. Ruin Park had 21% cover of cheatgrass in 1999 which declined to 0% in 2004. Needle-and-thread has become the dominant species at Ruin Park. The higher elevation Chippean ridge has a stable herbaceous trend. All of the other sites except Black Mesa, which are at lower elevations, have declining trends due to the loss of perennial grasses and forbs due to drought.

Transitional ranges are sampled with 2 trend study sites, Mormon Pasture Point 14-27 and Milk Ranch Point 14-30. Trends at Mormon Pasture Point are stable for soil, slightly up for browse and slightly down for the herbaceous understory. At Milk Ranch Point soils are slightly down, browse is stable, and the herbaceous understory is down.

The 4 summer range trend studies include, Kigalia Point 14-18, Woodenshoe 14-19, Gooseberry 14-20, and the newly established Big Flat 14-34. North Long Point 14-21 and The Wilderness 14-26 were suspended. Woodenshoe burned in a prescribed fire in 2003 and all trends are down after the fire. The herbaceous understory and soil trends should improve after the area recovers from the fire. Trends at Kigalia Point were slightly up for soil and herbaceous as it has recovered from fire just prior to the 1999 reading. All trends at Gooseberry are stable. Browse on most of these sites is not the critical component. The herbaceous understory trends are more important.

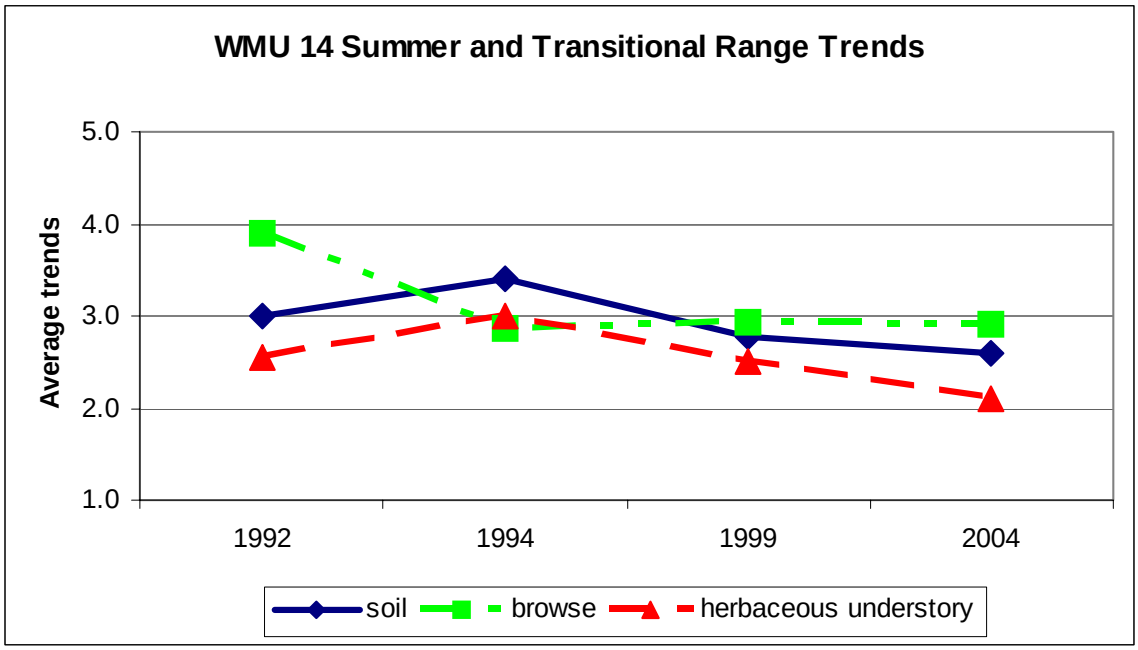
Average Winter Range Trends -- WMU 14 San Juan

	1992	1994	1999	2004
Soil	2.8	2.3	3.1	1.8
Browse	2.2	2.7	2.3	1.9
Herb	3.2	2.5	2.3	2.3
	9 sites	6 sites	16 sites	16 sites

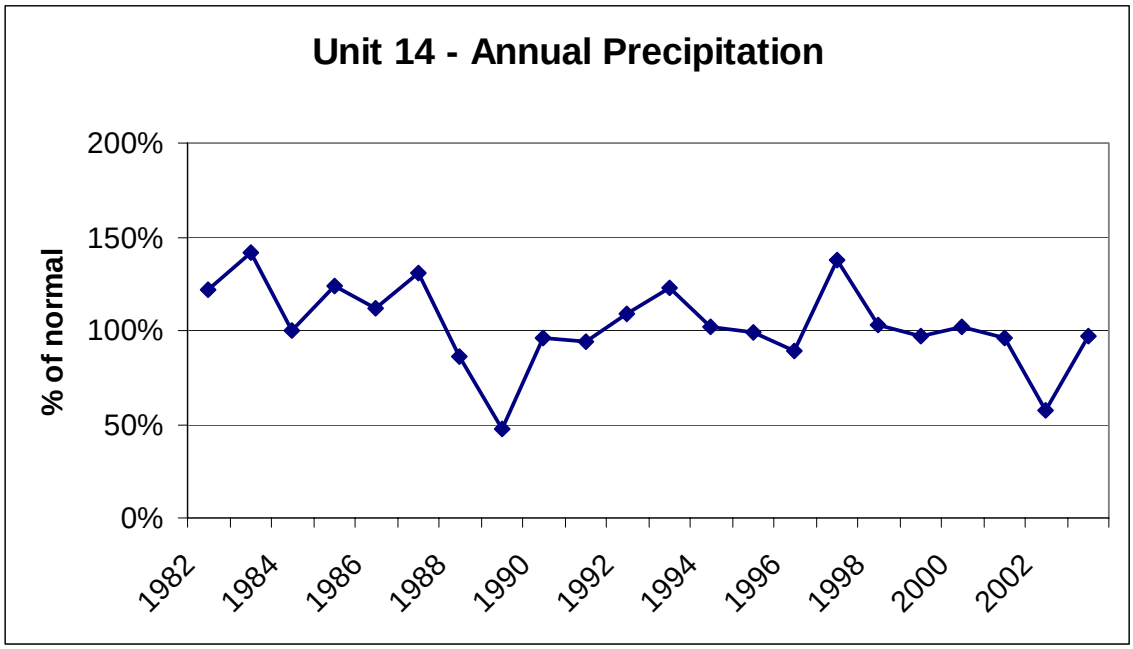


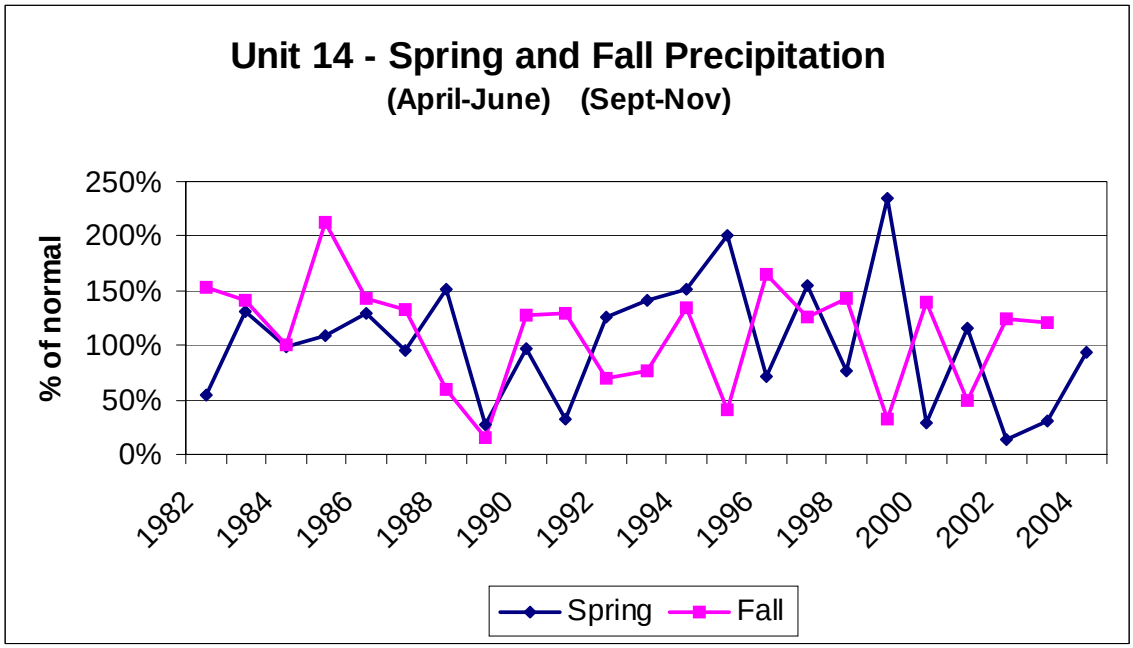
Average Summer/Transitional Range Trends -- WMU 14 San Juan

	1992	1994	1999	2004
Soil	3	3.6	2.8	2.6
Browse	3.9	2.9	2.9	2.9
Herb	2.6	3.1	2.6	2
	9 sites	7 sites	14 sites	9 sites



Precipitation graphs for Thousand Lake unit. Data is percent of normal precipitation averaged for 3 weather stations at Monticello, Blanding, and Natural Bridges National Monument (Utah Climate Summaries 2004).





TREND SUMMARY

	Category	1986	1992	1994	1999	2004
14-1 Alkali Point	soil	est	NR	1	4	1
	browse	est	NR	1	1	1
	herbaceous understory	est	NR	3	1	4
14-2 Brushy Basin	soil	est	NR	3	3	3
	browse	est	NR	3	5	3
	herbaceous understory	est	NR	2	2	1
14-3 Gold Queen Basin	soil	est	NR	4	3	3
	browse	est	NR	3	3	3
	herbaceous understory	est	NR	5	3	2
14-4 Camp Jackson Reservoir	soil	est	NR	3	3	susp
	browse	est	NR	3	3	susp
	herbaceous understory	est	NR	4	3	susp
14-5 Jackson Ridge	soil	est	NR	4	3	2
	browse	est	NR	4	3	3
	herbaceous understory	est	NR	4	2	2
14-6 Harts Draw Reservoir	soil	est	NR	5	3	3
	browse	est	NR	2	2	3
	herbaceous understory	est	NR	3	2	3
14-7 Shay Mountain	soil	est	NR	3	susp	susp
	browse	est	NR	3	susp	susp
	herbaceous understory	est	NR	1	susp	susp
14-8 Peter's Point	soil	est	NR	2	3	2
	browse	est	NR	2	3	3
	herbaceous understory	est	NR	2	3	2
14-9 Harts Draw	soil	est	NR	3	5	2
	browse	est	NR	2	2	1
	herbaceous understory	est	NR	3	2	2

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up,
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

	Category	1986	1992	1994	1999	2004
14-10 Harts Point	soil	est	NR	2	3	3
	browse	est	NR	2	4	2
	herbaceous understory	est	NR	3	2	4
14-11 Shay Mesa	soil	est	NR	1	3	1
	browse	est	NR	3	3	2
	herbaceous understory	est	NR	1	3	2
14-12 Shingle Mill	soil			est	3	3
	browse			est	3	3
	herbaceous understory			est	4	1
14-13 Black Mesa	soil	est	4	3	4	2
	browse	est	2	4	1	1
	herbaceous understory	est	5	4	1	3
14-14 Texas Flat	soil	est	3	3	3	1
	browse	est	1	4	3	3
	herbaceous understory	est	5	1	3	2
14-15 Harmony Flat	soil	est	3	NR	3	2
	browse	est	3	NR	2	1
	herbaceous understory	est	3	NR	3	1
14-16 Lower Lost Park	soil	est	3	NR	3	2
	browse	est	3	NR	1	1
	herbaceous understory	est	2	NR	2	1
14-17 Deer Flat	soil	est	3	NR	4	susp
	browse	est	5	NR	5	susp
	herbaceous understory	est	5	NR	4	susp
14-18 Kigalia Point	soil	est	3	NR	2	4
	browse	est	3	NR	1	3
	herbaceous understory	est	3	NR	2	4

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up,
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

	Category	1986	1992	1994	1999	2004
14-19 Woodenshoe	soil	est	3	NR	3	1
	browse	est	3	NR	3	1
	herbaceous understory	est	5	NR	2	1
14-20 Gooseberry	soil	est	3	NR	3	3
	browse	est	5	NR	2	3
	herbaceous understory	est	3	NR	3	3
14-21 North Long Point	soil	est	3	NR	4	susp
	browse	est	5	NR	2	susp
	herbaceous understory	est	2	NR	3	susp
14-22 Wild Cow Point	soil	est	3	NR	3	3
	browse	est	4	NR	3	1
	herbaceous understory	est	3	NR	2	2
14-23 South Plain	soil	est	3	NR	3	1
	browse	est	1	NR	1	1
	herbaceous understory	est	3	NR	1	4
14-24 Ruin Park	soil	est	3	NR	3	1
	browse	est	1	NR	1	1
	herbaceous understory	est	3	NR	1	4
14-25 Davis Pocket	soil	est	3	NR	susp	susp
	browse	est	5	NR	susp	susp
	herbaceous understory	est	2	NR	susp	susp
14-26 The Wilderness	soil	est	3	NR	2	susp
	browse	est	4	NR	2	susp
	herbaceous understory	est	1	NR	1	susp
14-27 Mormon Pasture Point	soil	est	4	NR	1	3
	browse	est	5	NR	4	4
	herbaceous understory	est	2	NR	2	2

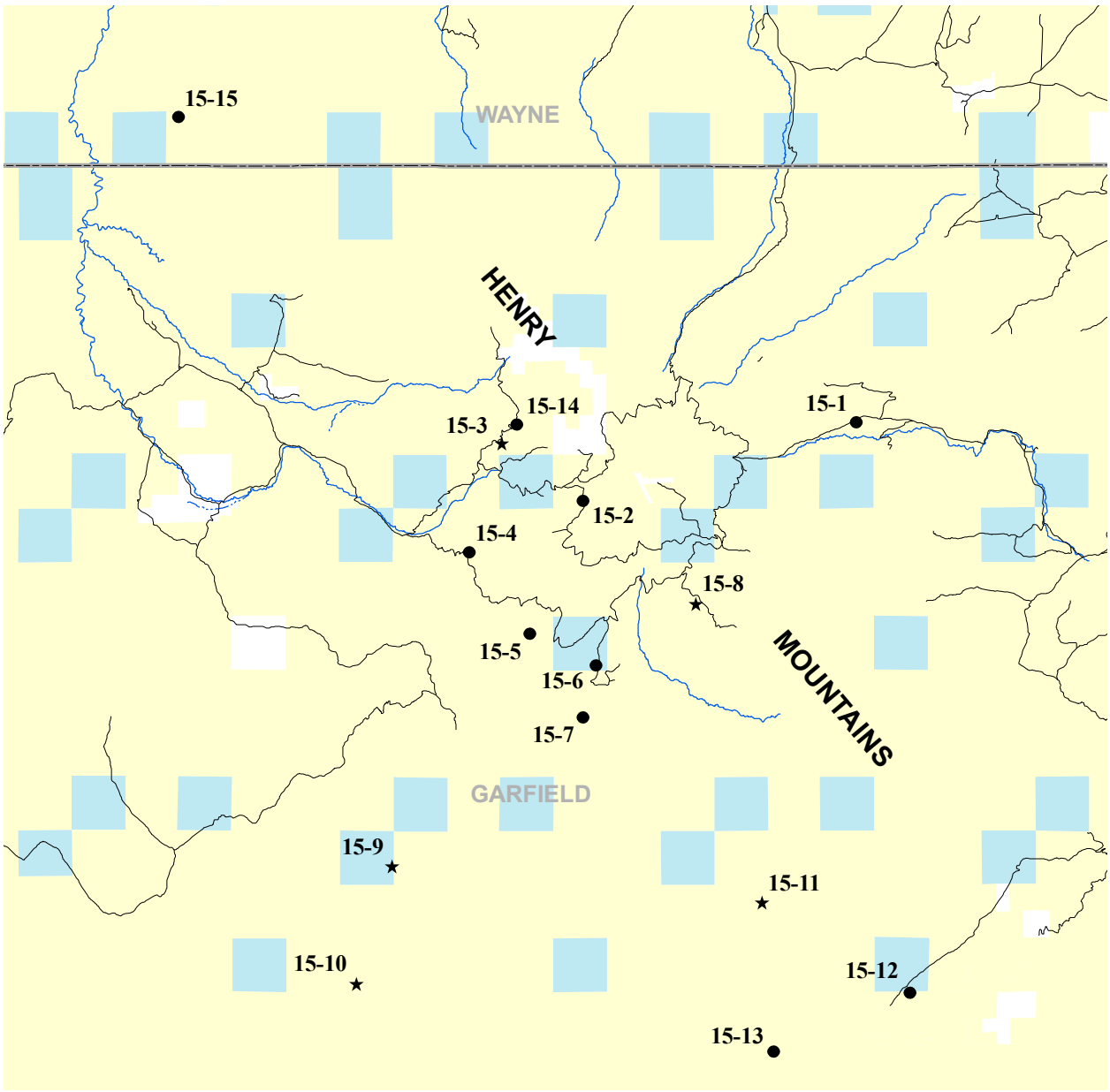
(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up,
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

	Category	1986	1992	1994	1999	2004
14-28 North Cottonwood	soil	est	NR	NR	3	susp
	browse	est	NR	NR	2	susp
	herbaceous understory	est	NR	NR	3	susp
14-29 Salt Creek Mesa	soil		est	NR	2	2
	browse		est	NR	2	4
	herbaceous understory		est	NR	2	1
14-30 Milk Ranch Point	soil		est	NR	2	2
	browse		est	NR	2	3
	herbaceous understory		est	NR	2	1
14-31 Chippean Ridge	soil		est	NR	2	2
	browse		est	NR	3	3
	herbaceous understory		est	NR	4	3
14-32 Lower Deer Flat	soil			est	3	2
	browse			est	2	1
	herbaceous understory			est	3	2
14-34 Big Flat	soil					est
	browse					est
	herbaceous understory					est

	Category	2001	2004
14R-1 Cathedral Butte	soil	est	1
	browse	est	4
	herbaceous understory	est	1

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up,
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

Management Unit 15

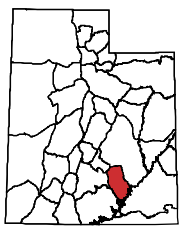


Map scale 1:200,000 (1 inch = 3.2 miles)

- Transect location
- Suspended site
- BLM
- State of Utah
- Private land
- Water body
- River or stream
- Intermittent stream
- Road

N

Unit Location



WILDLIFE MANAGEMENT UNIT 15 - HENRY MOUNTAINS

Boundary Description

Garfield and Wayne Counties - Boundary begins in Hanksville at the junction of SR-24 and SR-95; south on SR-95 to Lake Powell; south along the west shore of Lake Powell to SR-276 at Bullfrog; north along SR-276 from Bullfrog to Notom Road; north along this road to SR-24; east on SR-24 to Hanksville.

Herd Unit Description

RANGE AREA AND OWNERSHIP

	Summer Range		Winter Range	
Ownership	Area (acres)	%	Area (acres)	%
Bureau of Land Management	12,128	81	218,106	88
Private	788	5	4,115	2
State	2,050	14	25,424	10
Total	14,966		247,645	

1998 Utah Big Game Management Plan

The Henry Mountains lie between the waterpocket fold on the west and the canyon of the Colorado River to the east. The mountain peaks are the result of vertical intrusives of igneous rock that have penetrated from a broad basin into the sedimentary strata (Stokes 1986). The majority of the mountain rises gently upward to these peaks; which are (from north to south) Mt. Ellen (11,615 feet), Mt. Pennell (11,371 feet), Mt. Hillars (10,650 feet), Mt. Holmes (7,930 feet) and Mt. Ellsworth (8,235 feet).

A literature review done by Nelson (1965) on the history of ungulate use on the Henry Mountains reveals that livestock grazing began with cattle in 1878. Cattle numbers increased substantially in the 1890's. Sheep were introduced prior to 1890, but the large herds did not appear until after 1900. Livestock numbers increased sharply in response to World War I; by 1925, sheep had largely replaced cattle.

Big game utilizing the mountain consist of deer and bison. Occasional reports of elk sightings would indicate that perhaps a few descendants of a 1950 transplant (15 animals) may still be on the mountain or animals are coming from the eastern side of the Boulder Mountains.

Bison obtained from Yellowstone National Park were released near Robber's Roost Ranch north of the Dirty Devil River on the San Rafael Desert in 1941 (Nelson 1965). An additional release of five bulls was made in 1942 to replace those that scattered to the north. The bison left the San Rafael Desert in 1942 and most crossed the Dirty Devil River to the south and went onto the Burr Desert. Following a roundup and testing for brucellosis in 1963, the bison shifted their winter range from the Burr Desert to the foothills on the west side of the Henry Mountains. The bison continued to use the Henry Mountains during the other seasons. Bison have increased gradually since the initial transplant and have been hunted fairly consistently since 1960 (with the exception of 1964, 1965, 1972, and 1973). The population is currently managed for 285 adult and yearling animals post-season (BLM & DWR Cooperative Agreement).

Bison utilize 3,500 (48%) of the 7,204 AUM’s that have either been purchased or allocated for bison use. The population is currently managed for 400 adult and yearling bison post-season (BLM and DWR Cooperative Agreement). In 2004, only 268 adult bison and 67 bison calves were counted post season. The Utah Division of Wildlife Resources has recently purchased enough AUM’s for 600 bison and their calves.

The thirteen trend studies established in 1987 lie within the four livestock grazing allotments shown in Table below. These four allotments account for 80% of the forage allocation (AUMs) for bison under the preferred alternative presented in the 1984 Henry Mountain Grazing EIS. Actual use estimated prior to 1984, presented in the EIS, showed these same allotments providing 76% of the AUMs for the herd.

Information regarding livestock use for 1985 and 1986 (stocking rate, grazing season and season of use) is summarized for each of the allotments in Table 3. All of the summer allotments, except the Pennell permittee who has taken non-use, have been converted to cattle.

Since the 1960's, approximately 6,700 acres have been converted from pinyon-juniper woodland to a more productive grass-shrub type. The breakdown of acres treated in the four allotments is presented in Table 3. Treatments done in these allotments represent 80% of that done in the Resource Area. Young pinyon and juniper trees have reoccupied most of the treated areas through release and/or invasion and are beginning to impact forage production. The Henry Mountains Coordinated Resource Management Plan (HMCRMP) Environmental Assessment (EA) addresses the need to maintain these treated areas to reduce tree density. Approximately 4,300 acres have been scheduled for retreatment by means of either prescribed burning or roller-chopping. Approximately 8,300 acres are currently being proposed as new treatments. Excluded from consideration for range improvements are the several wilderness study areas that have been identified within the HMCRM area.

The key areas that were selected to be monitored are associated primarily with the pinyon-juniper chaining and revegetation treatments. The exceptions are other areas that are frequently used by bison and mule deer. The studies were located in areas where deer and/or bison "have demonstrated a definite pattern of use during normal climate conditions over a long period" (from Interagency Range Trend Study Guidelines, 1983).

Herd Unit Management Objectives

The deer herd management objectives for the unit are identified in the deer herd unit management plan (Inglet, 1983). The management plan identified six areas that are critical deer winter ranges; Apple Brush Bench, Eagle Bench, Horn Mountain, Coyote Bench, Cave Flat, and Sidehill Spring. According to Inglet (1983), deer herd numbers are well below carrying capacity and only light to moderate use is being made of these areas. The short-term management objective is to harvest 300 buck deer annually on a sustained yield basis (Jense, 1993). The long-term objective is to manage for maximum deer herd size and productivity while maintaining the herd within the carrying capacity of the range.

The Henry Mountain deer herd has been designated as a buck only trophy hunt area with antler restrictions since 1977. The harvests, between 1988 and 1993 have averaged 181 bucks/year with a hunter success rate of 27%. A high of 295 bucks were harvested during the 1990 season. Only 85 bucks were harvested during the 1992 season with only 181 bucks taken from the unit in 1993.

Data from pellet-group transects indicate a decline from a high of 59 deer days use/ha in 1988-89 and 1989-90 to a low of only 27 by 1993-94. During the 1996-1997 season, the last year data is available, deer days use/ha dropped again to less than 5 (Evans 1997). Likewise, fawn doe ratios have declined from a high of 71 fawns/100 does in 1988-89 to a low of only 40 during the 1994-95 season (Shields et al. 1995). Fawn/doe ratios increased again in 1997-98 to 64, and to 103 in 1998-99. The decline in the early part of the 1990's is likely due to the winter losses of 1992-1993 and the severe drought conditions which have occurred during this decade. The Henry Mountains management unit was closed to deer hunting beginning in 1996, but reopened in 2000.

The bison herd is healthy and increasing. Between 1988 and 1993, 212 bulls and 171 cow bison were harvested from the unit. The herd has been steadily increasing in number in spite of the prolonged drought conditions. By 1990, there were an estimated 559 animals. Due to severe drought conditions of that year, 103 cow permits were issued in order to reduce the herd. During the 1991-92 census, there were approximately 426 bison. That number remained fairly constant through 1994 when 474 bison were on the unit. The trend for calves/100 cows has averaged 33 from 1992-93 through 1996-97. The 1997-98 estimate was 25 calves/100 cows, and the 1998-99 estimate was 35 calves/100 cows. The current population was determined in 2004 at 268 adult bison and 67 calves counted during the post season.

FORAGE ALLOCATION, USE AND GRAZING PROGRAMS

	Allotments			
	Crescent Creek	Nasty Flat	Pennell	Steele Butte
Acres	9,703	17,341	63,254	83,443
Big Game Use (AUMs) Bison	65[1]	685	952	202
	(55)	(576)	(830)	(202)
Deer	81	71	205	112
Livestock Grazing	2 Allotment	None	3 Pasture Rotation	Study Area Rested
Active Preference (AUMs)	332	474	2,594	5,034
Average Licensed Use (AUMs)	333	468	1,960	2,672
Forage Available (SVIM)	187	399	2,560	1,874
Forage Available (Studies)	312	385	1,558	----
Grazing Period	6/1-9/15	6/1-9/30	6/1-10/31	10/10-5/31
Stocking Rate	111	120	530	Study Area Rested
Seeded Acres[2]	877	1,081	2,780	628

[1]AUMs determined to be available for bison shown in parentheses (BLM EIS 1983)
[2]Acres seeded prior to 1984

Trend Study 15-1-04

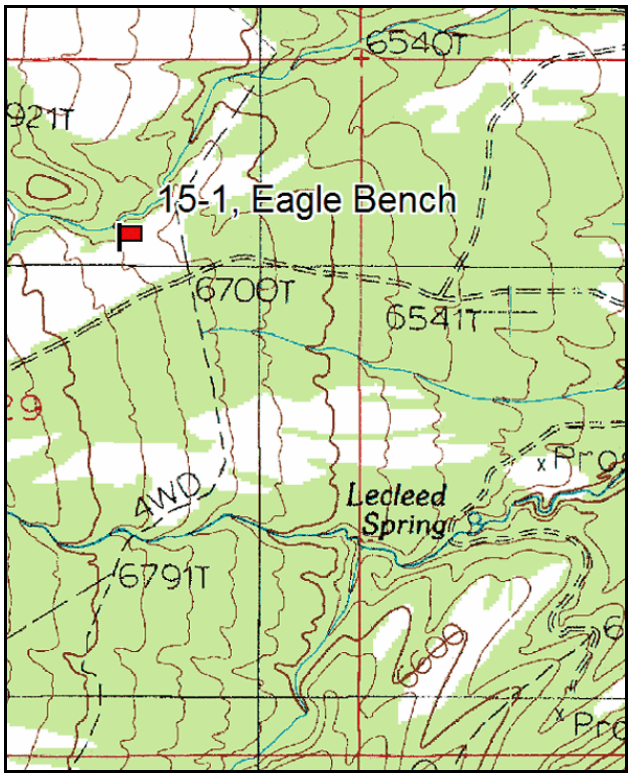
Study site name: Eagle Bench . Vegetation type: Chained, Seeded P-J .

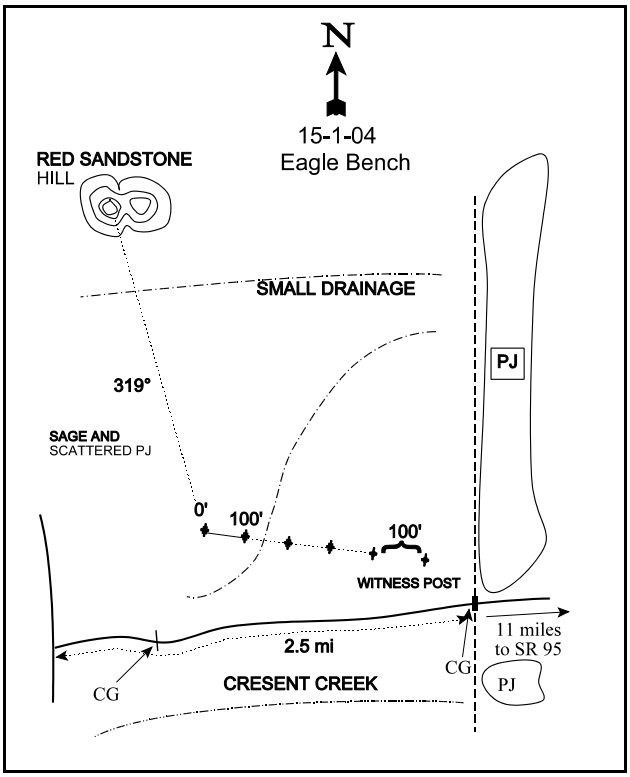
Compass bearing: frequency baseline 95 degrees magnetic.

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

LOCATION DESCRIPTION

This transect is located in the Crescent Creek chaining on the east side of the Henry Mountains. It can be reached from SR 95 (approximately 11 miles through Little Egypt then west up Crescent Creek) or from the west via Copper Ridge of Granite Ridges and down Crescent Creek. From the intersection in the north part of Section 36 (T 31S, R 10E), go 0.6 miles down Crescent Creek to a cattleguard. Continue 1.95 miles to another cattleguard on the east edge of a large chaining (near section marker T 31S, R 11E, Sec. 29). On the north side of the road (NW of the cattleguard) there is a witness post out in the chaining. The transect starts with the 0-foot end of the baseline stake 500 feet to the west-northwest (275°M) at a short fence post tagged #7138.





Map Name: Raggy Canyon

Diagrammatic Sketch

Township 31S , Range 11E , Section 29

GPS: NAD 27, UTM 12S 4215029 N, 524674 E

DISCUSSION

Eagle Bench - Trend Study 15-1

The Eagle Bench site is located in a pinyon-juniper woodland type that was chained and seeded in 1968. The area is located at an elevation of 6,640 feet and gently slopes to the northeast. Precipitation data from Hanksville indicates that about 50% of the moisture for this area comes in the form of summer thundershowers during the months of July through October. Mean annual precipitation for the study area is at least 12 inches. Wyoming big sagebrush is the dominant key browse species for deer in the area. Scattered pinyon and juniper have been slowly becoming reestablished within the chaining, most averaging five to six feet in height. In 1999, point-center quarter data indicated that there were 64 juniper trees/acre and 67 pinyon trees/acre, both with an average stem diameter of 3 inches. Approximately 33% of the junipers sampled were large trees which were knocked over during the chaining, but still living. When sampled in 2004, all the pinyon and juniper within the chaining appeared to have been cut down within the past year. The site is located in the Crescent Creek Allotment which is managed by the BLM. Water for livestock and wildlife is available in Crescent Creek which is almost one mile south of the study area. Pellet group data from 1999 indicated light use with <1 deer and 9 cow days use/acre (2 ddu/ha and 22 cdu/ha). Pellet group data from 2004 continued to show light use with 8 deer and 2 cow days use/acre (20 ddu/ha and 5 cdu/ha).

The soil is a loam with a neutral pH (6.6). Parent material appears to be mostly granite with some sandstone. There is a considerable amount of rock on the soil surface and throughout the soil profile. The soil is reddish-brown in color and fairly shallow with an estimated effective rooting depth of just over 9 inches. Organic matter is low and appears to be limited to the area directly beneath sagebrush plants. The erosion potential is only moderate even with the sandy soils and moderate slopes of the area. Some pedestaling around the base of blue grama and sagebrush indicates that a certain level of erosion is occurring, but does not appear to be excessive. A nearby drainage has abundant litter and sagebrush in the bottom to prevent appreciable erosive cutting.

Wyoming big sagebrush is the most abundant shrub species in the area with an estimated density of 6,866 plants/acre in 1987, 6,400 in 1994, and 6,340 in 1999. In 2004 the sagebrush density was estimated 5,280 plants/acre. The majority of the sagebrush consist of mature plants (79% in 1987, 90% in 1994, 84% in 1999, and 73% in 2004). Biotic potential (proportion of seedlings to the population) has progressively decreased since 1987. It has gone from 17% to less than 1% in 2004. Percent decadency, has been below 10% through the years, however, but increased to 27% in 2004. Sagebrush leader growth and seed production were poor (average of 1.2 inches) in 2004. The Wyoming big sagebrush stems were very dry and brittle, with yellow leaves in 2004. Leaves were yellow. Many individuals showed poor vigor due to the lack of moisture. Broom snakeweed density was 1,960 plants/acre in 1994 and increased with each sampling date to 2,620 plants/acre by 2004. Percent young has remained constant since 1999 at about 36%. The population density has increased by 21% since 1999. This would indicate an expanding population in the future. Other species having low densities that were sampled in 2004 include green ephedra (stable) and slenderbush eriogonum (decrease of 94% due to drought).

The warm season increaser Blue grama continues to be the dominant understory grass. Blue grama has maintained a fairly constant quadrat frequency for the last 10 years, around 44% to 42%. Crested wheatgrass has decreased steadily since 1987 from 22% quadrat frequency to 1% quadrat frequency in 2004. The summer precipitation pattern and grazing program favors blue grama. It is the only warm season grass growing on the site other than galleta grass which was only sampled in 3 of the 100 quadrats in 2004. Between 1999 and 2004, sum of nested frequencies for all cool season perennial grasses declined significantly. Cheatgrass also decreased significantly in 2004. It was found in 1 out of the 100 quadrats in 2004. Forbs are rare. Total herbaceous cover in 2004 was low at less than 5%.

1987 APPARENT TREND ASSESSMENT

In 1987, ground cover appeared fairly good at 81%, but a good portion of this was either rock or pavement (39%). The sagebrush canopy cover, which was not estimated in 1987, appears to be about 16%. Grass and forb composition is poor, together they only make up 20% of the vegetative cover.

1994 TREND ASSESSMENT

Protective ground cover has declined slightly since 1987. Bare ground has increased slightly, while litter has declined by almost 40%. Total vegetative cover was estimated at 24%, but only 6% of this cover was composed of herbaceous plants which are much better at holding soil in place. Trend for soil is stable to slightly down and in poor condition. The browse trend appears stable due to a healthy, stable population of Wyoming big sagebrush. However, recruitment is poor. The herbaceous understory is lacking on this site. Combined, grasses and forbs make up only 23% of the total ground cover. Nested frequencies of grasses declined, while those of forbs increased. However, this forb increase cannot compensate for the losses for the grasses because the forbs only make up 27% of the herbaceous cover. Some of the increase for forbs may be due to the larger sample size taken in 1994. Overall, nested frequencies of grasses and forbs declined, indicating a slightly downward trend for the herbaceous understory. The winter range condition index (DCI) is a relative measure of the condition for this Wyoming sagebrush range-type. The site index for this area was determined to be in good condition. Refer to the methods section for a description of the process for determining condition of this range site.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - slightly down and in poor condition (2)
winter range condition (DC Index) - 54 (good) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil appears stable with similar ground cover characteristics compared to 1994. Erosion appears minimal even with low herbaceous cover. Trend for browse appears stable for the key species Wyoming big sagebrush. Use is light to moderate, percent decadency relatively low at 9%, vigor is good, and recruitment appears adequate to maintain the current population. Herbaceous understory trend is slightly up. Sum of nested frequency for perennial grasses and forbs increased. The annual species component is insignificant for this community. The winter range condition index or desirable components index (DCI) is a relative measure of the condition for this Wyoming sagebrush range-type. It was determined for this site that it continues to be in good condition.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly up (4)
winter range condition (DC Index) - 57 (good) Wyoming big sagebrush type

2004 TREND ASSESSMENT

Trend for soil appears to be slightly improved with a decrease in bare soil and improved ratios of bare ground to protective cover. Erosion continues to be minimal even with low herbaceous cover. Even though minimal, through time (since 1987) percent rock cover has increased to now make up just over 40% of the ground cover. In 1987, it only made up 27% of the ground cover. Trend for the key browse (Wyoming big

sagebrush) appears to be going slightly downward because percent young (recruitment) has been decreasing steadily since 1987 (from 17% to <1%); percent decadence has been increasing since 1987 to where it is up to 27% currently; the percentage of plants classified as dying has increased 14%; the density has also decreased by 17% since 1999. Use is still considered light on 96% of the sagebrush plants. Herbaceous understory trend is slightly downward. Sum of nested frequency for both perennial grasses and forbs decreased. The annual species are still an insignificant component of the community. The winter range condition index or desirable components index (DCI) is a relative measure of the condition for this Wyoming sagebrush range-type. It was determined for this site that as described earlier in this paragraph, the index value has gone down to 44 (fair-good) because of losses in browse cover, increases in decadence, and decreases in percent young browse plants.

TREND ASSESSMENT
soil - slightly up (4)
browse - slightly down (2)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 44 (fair-good) Wyoming big sagebrush type

HERBACEOUS TRENDS --
Management unit 15 , Study no: 1

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{b}$39	$_{b}$34	$_{b}$31	$_{a}$3	2.40	.68	.00
G	Bouteloua gracilis	$_{b}$196	$_{a}$122	$_{a}$113	$_{a}$109	1.53	1.87	3.15
G	Bromus tectorum (a)	-	$_{a}$3	$_{b}$15	$_{a}$1	.00	.05	.00
G	Hilaria jamesii	-	5	-	4	.01	-	.06
G	Oryzopsis hymenoides	$_{ab}$19	$_{b}$27	$_{b}$24	$_{a}$5	.11	.31	.01
G	Sitanion hystrix	$_{b}$109	$_{a}$36	$_{b}$84	$_{a}$49	.34	1.34	.60
G	Stipa lettermani	-	3	-	-	.00	-	-
Total for Annual Grasses		0	3	15	1	0.00	0.05	0.00
Total for Perennial Grasses		363	227	252	170	4.40	4.21	3.83
Total for Grasses		363	230	267	171	4.41	4.26	3.84
F	Arabis spp.	$_{a}$-	$_{a}$1	$_{b}$9	$_{a}$-	.00	.05	-
F	Aster spp.	$_{a}$-	$_{b}$26	$_{a}$-	$_{a}$-	.05	-	-
F	Astragalus spp.	$_{a}$-	$_{a}$-	$_{b}$14	$_{b}$13	-	.05	.02
F	Castilleja linariaefolia	-	-	-	1	-	-	.03
F	Calochortus nuttallii	-	5	-	-	.01	-	-
F	Chaenactis douglasii	-	3	-	-	.00	-	-
F	Chenopodium fremontii (a)	-	-	-	2	-	-	.00
F	Chenopodium leptophyllum(a)	-	-	-	1	-	-	.00
F	Collinsia parviflora (a)	-	$_{a}$-	$_{a}$-	$_{b}$14	-	-	.03
F	Descurainia pinnata (a)	-	-	6	3	-	.01	.00
F	Erigeron spp.	-	6	-	-	.01	-	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Eriogonum spp.	-	-	1	2	-	.00	.00
F	Gayophytum ramosissimum(a)	-	-	-	2	-	-	.00
F	Gilia spp. (a)	-	$_{b}$22	$_{ab}$16	$_{a}$6	.05	.04	.01
F	Hymenoxys acaulis	2	-	-	-	-	-	-
F	Lappula occidentalis (a)	-	-	-	1	-	-	.00
F	Lesquerella kingii	$_{a}$-	$_{a}$8	$_{b}$41	$_{a}$5	.01	.22	.04
F	Lupinus spp.	-	-	-	8	-	-	.02
F	Phlox austromontana	-	-	3	-	-	.18	-
F	Phlox longifolia	$_{a}$6	$_{b}$56	$_{b}$59	$_{b}$51	1.33	.18	.11
F	Polygonum douglasii (a)	-	4	10	-	.00	.01	-
F	Ranunculus testiculatus (a)	-	-	1	-	-	.00	-
F	Senecio multilobatus	$_{ab}$16	$_{a}$7	$_{b}$31	$_{b}$33	.02	.24	.18
F	Townsendia incana	$_{a}$-	$_{ab}$6	$_{b}$13	$_{ab}$4	.16	.03	.01
F	Unknown forb-perennial	6	-	-	-	-	-	-
Total for Annual Forbs		0	26	33	29	0.05	0.07	0.07
Total for Perennial Forbs		30	118	171	117	1.61	0.95	0.43
Total for Forbs		30	144	204	146	1.67	1.03	0.50

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

BROWSE TRENDS --
Management unit 15 , Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	0	1	0	-	-	-
B	Artemisia tridentata wyomingensis	89	88	85	16.02	21.45	18.59
B	Ephedra viridis	0	1	1	-	-	-
B	Eriogonum microthecum	10	7	1	.06	.04	.00
B	Gutierrezia sarothrae	41	36	37	1.09	.28	1.24
B	Juniperus osteosperma	0	3	0	1.25	.63	-
B	Opuntia spp.	1	0	0	.00	-	-
B	Pinus edulis	0	5	0	1.87	2.24	-
Total for Browse		141	141	124	20.32	24.65	19.83

CANOPY COVER, LINE INTERCEPT --
Management unit 15 , Study no: 1

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	-	.01
Artemisia tridentata wyomingensis	-	25.36
Gutierrezia sarothrae	-	1.00
Juniperus osteosperma	1.20	-
Pinus edulis	.40	-

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 15 , Study no: 1

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

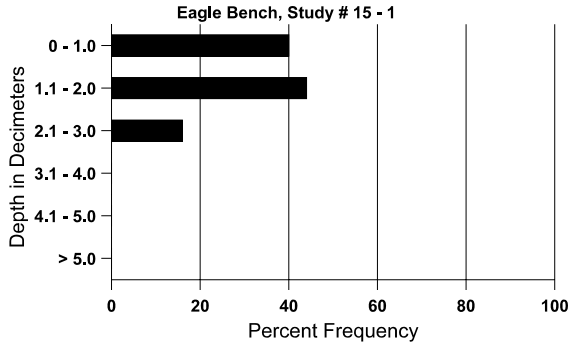
BASIC COVER --
Management unit 15 , Study no: 1

Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	4.25	23.65	29.71	24.62
Rock	23.25	22.56	23.79	26.83
Pavement	16.25	4.56	13.64	16.85
Litter	37.50	22.97	24.80	25.20
Cryptogams	0	.03	.07	.09
Bare Ground	18.75	20.02	21.97	15.07

SOIL ANALYSIS DATA --
Management unit 15, Study no: 1, Study Name: Eagle Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
9.4	75.3 (14.0)	6.6	51.3	28.2	20.6	2.4	14.5	96.0	0.6

Stoniness Index



PELLET GROUP DATA --
Management unit 15 , Study no: 1

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	10	12	8
Deer	-	1	3
Cattle	-	2	-

Days use per acre (ha)	
'99	'04
-	-
1 (2)	8 (20)
9 (22)	2 (5)

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 1

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	100	0	-	-	0	46/61
04	**0**	-	-	-	-	-	0	0	-	-	0	50/57
Artemisia tridentata wyomingensis												
87	**6866**	133	1200	5400	266	-	87	5	4	-	0	18/27
94	**6400**	240	440	5740	220	-	0	0	3	.62	4	17/26
99	**6340**	220	480	5300	560	120	39	5	9	.94	2	17/30
04	**5280**	400	20	3860	1400	480	4	0	27	14	14	16/29
Ephedra viridis												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	10/8
99	**20**	-	-	20	-	-	0	0	0	-	0	6/10
04	**20**	-	-	-	20	-	0	0	100	100	100	10/8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Eriogonum microthecum												
87	**266**	-	200	66	-	-	25	0	-	-	0	3/3
94	**360**	-	180	180	-	-	11	17	-	-	0	3/3
99	**320**	80	40	280	-	-	31	13	-	-	0	3/4
04	**20**	-	-	20	-	-	100	0	-	-	0	4/5
Gutierrezia sarothrae												
87	**2466**	66	200	2266	-	-	0	0	0	-	0	6/4
94	**1960**	80	160	1740	60	-	0	0	3	-	0	5/6
99	**2080**	380	740	1320	20	60	0	0	1	.96	.96	3/3
04	**2620**	-	940	1540	140	80	0	0	5	5	5	7/10
Juniperus osteosperma												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	20	60	-	-	40	0	0	-	-	0	-/-
04	**0**	-	-	-	-	20	0	0	-	-	0	-/-
Mahonia fremontii												
87	**0**	66	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	4/10
Pinus edulis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	60	40	60	-	20	0	0	-	-	0	-/-
04	**0**	-	-	-	-	60	0	0	-	-	0	-/-

Trend Study 15-2-04

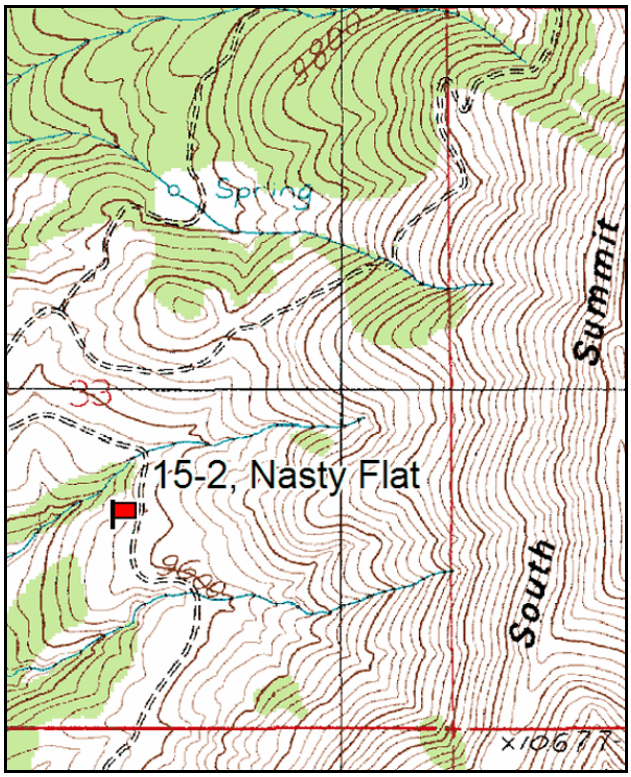
Study site name: Nasty Flat . Vegetation type: Quaking Aspen .

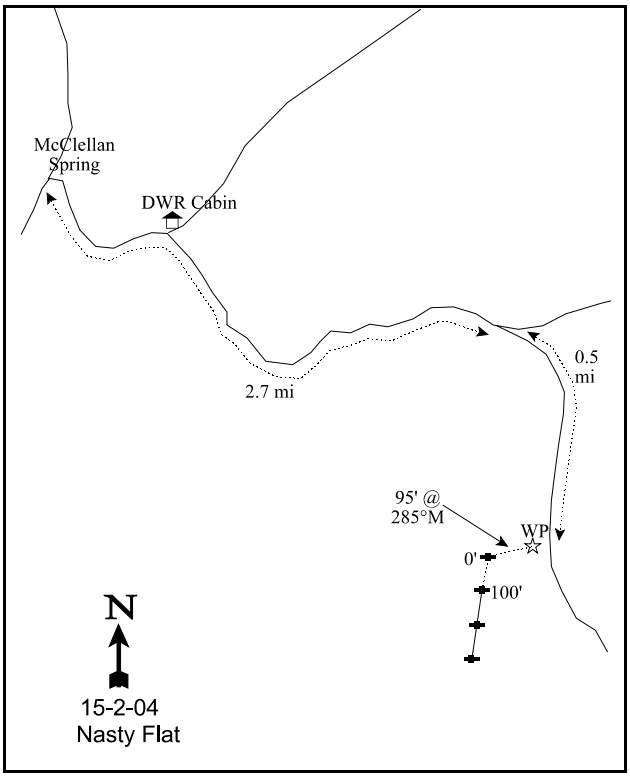
Compass bearing: frequency baseline 213 degrees magnetic.

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

LOCATION DESCRIPTION

From the McMillan (McClellan) Spring Campground (BLM), proceed east on the road past Willow Spring and the DWR cabin for 2.7 miles to a fork. Stay right and continue 0.5 miles. The transect is located in the patch of aspens below the road. A witness post is located on the right side of the road. From this fence post, walk 95 feet bearing 285° to the start of the baseline. The first stake is under the aspens, and tagged with a red browse tag, #7852.





Map Name: Mount Ellen

Diagrammatic Sketch

Township 31S , Range 10E , Section 33

GPS: NAD 27, UTM 12S 4212681 N, 516493 E

DISCUSSION

Nasty Flat - Trend Study No. 15-2

The Nasty Flat study samples an aspen stand in the Henry Mountains. The aspen type is not very extensive and does not occur often within this management unit. The site is located at an elevation of 9,500 ft on a moderately steep (33%), west facing slope. The site was selected to include an area of deer summer range which is more critical for deer than the winter range on the unit. This is a mature aspen stand with a considerable number of young aspen in the understory as well as a few conifers. When the baseline was lengthened in 1994, a more dense portion of the aspen was sampled. Total canopy cover was estimated at almost 84%. In 1999, the baseline was realigned to better sample aspen regeneration and animal use near the edge of the aspen clone. Pellet group data from 1999 indicated light animal use with 13 deer and 12 cow days use/acre (32 ddu/ha and 30 cdu/ha), however this site was read early in the season (June 9). A few bison pats from the previous fall were sampled as well. Pellet group data from 2004 shows that there continues to be light to moderate use in the area with 22 deer, 16 bison days use/acre, and 2 cow days use/acre (55 ddu/ha, 39 bdu/ha, and 5 cdu/ha). Differentiating between bison and cattle was difficult.

The soil is a loam with substantial amounts of organic matter in the surface horizon. Erosion is not a problem on the site due to the high litter cover provided from dead aspen leaves. Erosion control efforts have been undertaken by the BLM to limit erosion in nearby drainages with fabric check dams. Most of these have been effective in holding soil on the steep, eroded slopes of the area. The soil is moderately acidic (pH 5.9) with moderately deep soil with an estimated effective rooting depth of over 19 inches. Rock is uniformly scattered throughout the profile.

Aspen is the key browse species. During the 1987 reading, aspen density was estimated using three 1/200 acre density plots which estimated a total of 5,132 trees/acre. Ninety-four percent of the trees were young trees growing beneath the aspen canopy. About 64% of these young plants were moderately or heavily hedged (40-60% of the twigs are browsed). In 1994, point quarter data estimated the aspen density at 2,396 trees/acre with an average diameter of 2.4 inches. Aspen were mistakenly not counted in the shrubs strips and not classified for form class and vigor in 1994, so no comparisons can be made with the 1987 data. Point quarter data from 1999 estimated the aspen population to be 4,797 trees/acre. Much of the disparity in aspen density over sampling years is due to the realignment of the baseline in 1999. In 1999, the majority of the population was represented by young plants (75%). In 2004 young plants only represented 36% of the population and with few young plants density decreased to 1,511 trees/acre (point-quarter method). Most of the aspen population sampled in 1999 and 2004 showed light use and good vigor, with several of the smaller trees being used as antler rubs by deer. In 1999, aspen had an estimated canopy cover of 61% and this increased to 68% in 2004. Of note is the increase in those individuals classified as dying. In 1999 only 1% was classified as dying, but increased to 19% in 2004. This would indicate that the drought is starting to effect the higher elevation species.

Mountain big sagebrush was sampled more accurately in 1999 after the baseline was relocated closer to the edge of the aspen clone, but this species is not considered a key species as this site is a summer range. The population was estimated at 1,460 plants/acre in 1999. The population at that time was represented by mostly mature, lightly utilized plants that are low in stature (average height/crown of 12" x 20"). In 2004 density decreased by 26% and decadence has increased from 5% to 19%. The percent decadence is still within the reasonable range of a normal sagebrush community. However, the decrease in density and increase in those classified as dying are relatively high for a high elevation site. Limber pine and Douglas fir were also encountered in 1994 with densities of 111 and 65 trees/acre respectively. The majority of the limber pine were young as average diameter was estimated at only 1.5 inches. Douglas fir averaged 5.8 inches in diameter. In 1999, point quarter estimated Douglas fir at 105 trees/acre with a mean stem diameter of 3 inches, and an overhead canopy cover of 9%. Limber pine was estimated at 76 trees/acre with a mean stem diameter of 2

inches, and has a canopy cover of 2%. In 2004, there has been a noticeable increase in Douglas fir from 105 to 137/acre. Cover for Douglas fir has slightly increased from 9% to 10%. Limber pine has only seen a slight increase in density from 76 to 80/acre. Less abundant shrubs that were sampled include snowberry and Oregon grape.

The herbaceous understory is dominated by perennial species. *Stellaria jamesiana* and *Taraxacum officinale*, increaser species, continue to be the most abundant forbs, far exceeding the number of more desirable species. In 1999, these two species made up 73% of the forb cover, or 39% of the total herbaceous cover. In 2004, they made up 80% of the forb cover, or 38% of the total herbaceous cover. Nested and quadrat frequencies for these species remained similar to those in 1999. In 2004, the key grass species were mutton bluegrass and slender wheatgrass, which accounted for 88% of the grass cover (63% in 1999) or 46% of the total herbaceous cover (30% in 1999). From 1994 to 1999, mutton bluegrass significantly decreased in nested frequency, while it significantly increased in 2004 with its highest cover value. Slender wheatgrass and elk sedge significantly increased from 1994 to 1999, while both significantly decreased in 2004. This decrease was more than compensated for by the increase in mutton bluegrass in 2004. The site fits most closely with the description given by Mueggler & Campbell (1986) as a *Populus tremuloides/Symphoricarpos oreophilus/Carex geyeri* community type. They indicate that this type is often a climax type that may have some incidental conifers present, but are not expected to dominate the site.

1994 TREND ASSESSMENT

Protective ground cover is nearly 100% on the site, so erosion is minimal. Soil trend is stable. Aspen is the primary browse species on the site. During the 1994 reading, aspen was mistakenly not classified for form and vigor classes because it was a tree species so no comparisons can be made. Other browse on the site are few in number and are of little importance. The herbaceous understory is diverse and fairly abundant. Forbs are dominated by the increasers dandelion, and tuber starwort. Since 1987, sum of nested frequencies for grasses have declined, while those of forbs have increased. Overall, nested frequencies of grasses and forbs combined have remained similar to those of 1987.

TREND ASSESSMENT
soil - stable (3)
browse - stable, although the browse component is not as important on this summer range site (3)
herbaceous understory - stable (3)

1999 TREND ASSESSMENT

Trend for soil is stable due to abundant litter cover, and minimal bare ground present. Direct comparisons for browse are difficult as the baseline was relocated in 1999. Trend for the key browse (aspen) appears stable. Seventy-five percent of the population consists of young plants, use is mostly light, and vigor good. Cover and sum of nested frequencies of perennial grasses and forbs decreased from previous readings. However, this decrease, especially in forbs, is likely due to the relocation of the baseline. Once again, direct comparisons with earlier readings is difficult, but apparent trend appears stable.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

2004 TREND ASSESSMENT

Trend for soil is stable due to abundant litter cover and minimal bare ground present. The ratios of protective

ground cover to bare soil are very high. Usually values greater than 3.0 are good, yet these values are greater than 8.0. Trend for the key browse (aspen) appears to be down because of the following reasons: (1) the amount of cover it contributes to browse cover has gone from 25% down to 15%; (2) its density has decreased by 11%; (3) percent decadence has increased from 3% to 22%; (4) percent of population classified as dying has gone from 1% up to 19%; and (5) the increase in Douglas fir cover. All these point to a downward trend for aspen. Sum of nested frequencies for perennial grasses and forbs decreased slightly (-4%) from previous readings. However, cover for grasses and forbs increased by 60% (9% to 14%). The decrease in sum of nested frequency is from drought, however, the timing of precipitation allowed these individuals to produce more cover. Overall, trend for the herbaceous understory would be considered stable.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Management unit 15 , Study no: 2

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron trachycaulum	111	88	110	76	.41	1.14	.96
G	Bromus carinatus	-	-	-	2	-	-	.03
G	Bromus inermis	$_{b}$51	$_{a}$4	$_{a}$4	$_{a}$-	.03	.03	-
G	Carex geyeri	$_{a}$4	$_{a}$13	$_{b}$70	$_{a}$24	.26	1.02	.25
G	Festuca ovina	5	-	2	-	-	.00	-
G	Poa fendleriana	$_{c}$259	$_{c}$236	$_{a}$125	$_{b}$183	4.14	1.50	5.57
G	Sitanion hystrix	$_{b}$10	$_{a}$-	$_{ab}$10	$_{c}$40	-	.02	.55
G	Stipa lettermani	$_{a}$1	$_{b}$66	$_{b}$49	$_{a}$5	1.86	.42	.07
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		441	407	370	330	6.71	4.15	7.44
Total for Grasses		441	407	370	330	6.71	4.15	7.44
F	Achillea millefolium	-	-	3	2	-	.00	.00
F	Agoseris glauca	$_{a}$-	$_{ab}$6	$_{ab}$3	$_{b}$11	.01	.00	.05
F	Allium spp.	-	-	4	2	-	.06	.00
F	Androsace septentrionalis (a)	-	3	7	3	.00	.01	.00
F	Arabis drummondi	13	16	19	4	.09	.09	.01
F	Astragalus spp.	$_{a}$-	$_{b}$69	$_{a}$-	$_{a}$-	1.47	-	-
F	Calochortus nuttallii	4	-	4	-	-	.01	-
F	Chenopodium fremontii (a)	-	5	-	7	.01	-	.02
F	Cymopterus lemmonii	3	-	4	4	-	.01	.04
F	Descurainia pinnata (a)	4	-	-	-	-	-	-
F	Erigeron eatonii	$_{a}$15	$_{a}$27	$_{b}$66	$_{b}$62	.09	.54	.50
F	Erigeron spp.	4	-	-	-	-	-	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Fritillaria atropurpurea	-	-	4	-	-	.01	-
F	Lychnis drummondii	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$14	-	-	.03
F	Penstemon watsonii	41	21	39	20	.17	.34	.52
F	Phlox longifolia	22	16	25	22	.09	.11	.07
F	Physalis spp.	-	3	-	-	.00	-	-
F	Polygonum douglasii (a)	-	$_{a}$-	$_{a}$-	$_{b}$49	-	-	.09
F	Sedum lanceolatum	1	-	6	3	-	.06	.01
F	Senecio spp.	$_{b}$13	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Stellaria jamesiana	$_{b}$282	$_{b}$277	$_{a}$172	$_{a}$184	2.97	1.07	3.04
F	Taraxacum officinale	$_{b}$187	$_{b}$187	$_{ab}$141	$_{a}$110	5.84	2.45	2.48
F	Unknown forb-perennial	$_{b}$23	$_{a}$-	$_{a}$-	$_{a}$3	-	-	.00
F	Vicia spp.	3	-	-	-	-	-	-
F	Viola spp.	$_{a}$-	$_{b}$52	$_{a}$-	$_{a}$-	1.12	-	-
Total for Annual Forbs		4	8	7	59	0.01	0.00	0.11
Total for Perennial Forbs		611	674	490	441	11.88	4.78	6.78
Total for Forbs		615	682	497	500	11.90	4.79	6.90

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

BROWSE TRENDS --
Management unit 15 , Study no: 2

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemisia tridentata vaseyana	12	37	27	.16	1.01	1.26
B	Juniperus communis	1	0	3	1.00	-	-
B	Mahonia repens	0	1	0	-	-	-
B	Pinus flexilis	0	3	3	.46	.56	.41
B	Populus tremuloides	0	66	62	2.21	1.58	1.45
B	Pseudotsuga menziesii	0	18	20	.85	3.06	6.50
B	Ribes velutinum velutinum	1	0	0	.21	-	-
B	Symphoricarpos oreophilus	4	4	6	.30	.15	.30
Total for Browse		18	129	121	5.21	6.38	9.93

CANOPY COVER, LINE INTERCEPT --
Management unit 15 , Study no: 2

Species	Percent Cover	
	'99	'04
Artemisia tridentata vaseyana	-	1.66
Juniperus communis	-	.18
Pinus flexilis	2.00	.53
Populus tremuloides	61.40	67.84
Pseudotsuga menziesii	9.39	10.28
Symphoricarpos oreophilus	-	.86

POINT-QUARTER TREE DATA --
Management unit 15 , Study no: 2

Species	Trees per Acre	
	'99	'04
Pinus flexilis	76	80
Populus tremuloides	4797	1512
Pseudotsuga menziesii	105	137

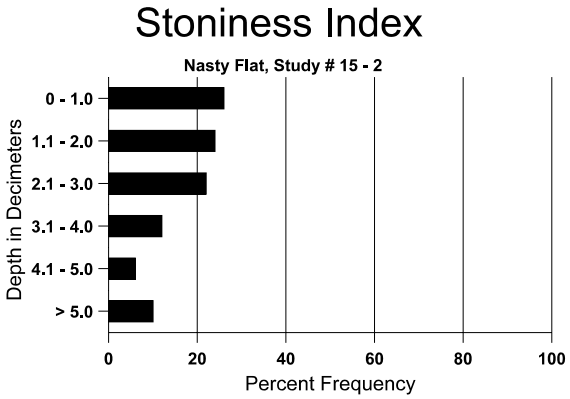
Average diameter (in)	
'99	'04
2	2.1
1.3	3.8
2.9	4

BASIC COVER --
Management unit 15 , Study no: 2

Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	4.50	24.53	15.80	24.68
Rock	1.00	.66	6.27	5.71
Pavement	0	.03	.02	.46
Litter	93.75	77.49	82.88	75.55
Cryptogams	0	0	.03	0
Bare Ground	.75	1.26	1.17	4.59

SOIL ANALYSIS DATA --
Management unit 15, Study no: 2, Study Name: Nasty Flat

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
19.2	50.7 (15.4)	5.9	49.3	30.2	20.6	5.4	31.3	204.8	0.5



PELLET GROUP DATA --
Management unit 15 , Study no: 2

Type	Quadrat Frequency		
	'94	'99	'04
Grouse	-	-	1
Elk	2	-	-
Deer	3	5	11
Cattle	-	1	4
Bison	-	-	-

Days use per acre (ha)	
'99	'04
-	-
-	-
13 (32)	22 (55)
12 (30)	2 (5)
3 (7)	16 (39)

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 2

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**300**	-	140	140	20	-	0	0	7	7	7	8/11
99	**1460**	60	360	1020	80	180	0	0	5	5	5	12/20
04	**1080**	-	40	840	200	120	17	4	19	9	9	11/19
Juniperus communis												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**20**	-	-	20	-	-	0	0	0	-	0	14/73
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**60**	-	-	40	20	-	0	0	33	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Mahonia repens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	-	-	100	-	-	0	0	-	-	0	3/17
04	**0**	-	-	-	-	-	0	0	-	-	0	7/8
Pinus flexilis												
87	**66**	66	66	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	20	40	20	-	-	0	0	-	-	0	-/-
04	**60**	-	40	20	-	-	0	0	-	-	0	-/-
Populus tremuloides												
87	**5132**	600	4800	266	66	-	39	22	1	-	0	393/157
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**2840**	-	2140	620	80	800	0	0	3	.70	3	-/-
04	**2540**	-	920	1060	560	220	24	6	22	19	19	-/-
Pseudotsuga menziesii												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**500**	60	440	60	-	-	0	0	-	-	0	-/-
04	**460**	60	280	180	-	-	0	0	-	-	0	-/-
Ribes velutinum velutinum												
87	**66**	-	66	-	-	-	100	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	15/48
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
87	**133**	-	-	133	-	-	0	100	-	-	0	14/16
94	**80**	-	20	60	-	-	0	0	-	-	0	19/28
99	**220**	-	180	40	-	-	0	0	-	-	0	20/30
04	**220**	-	20	200	-	-	0	0	-	-	0	19/25

Trend Study 15-4-04

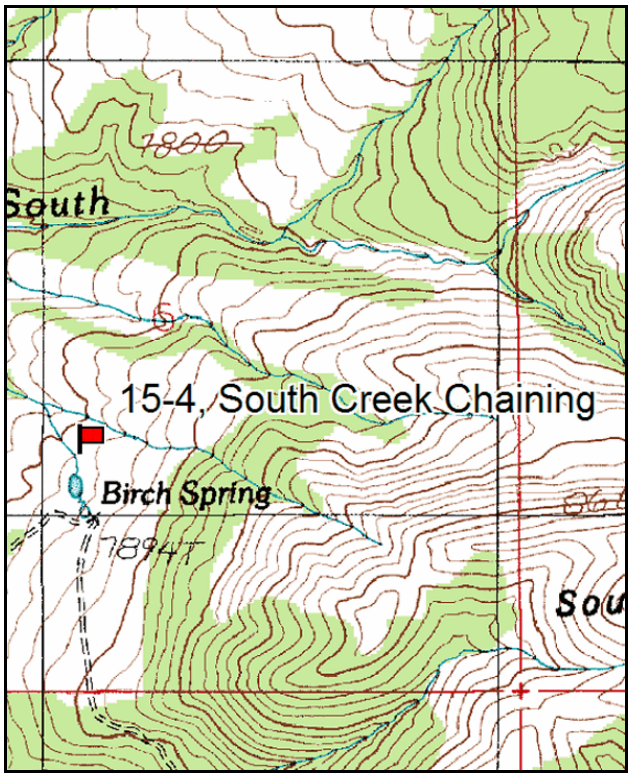
Study site name: South Creek Chaining . Vegetation type: Chained, Seeded P-J .

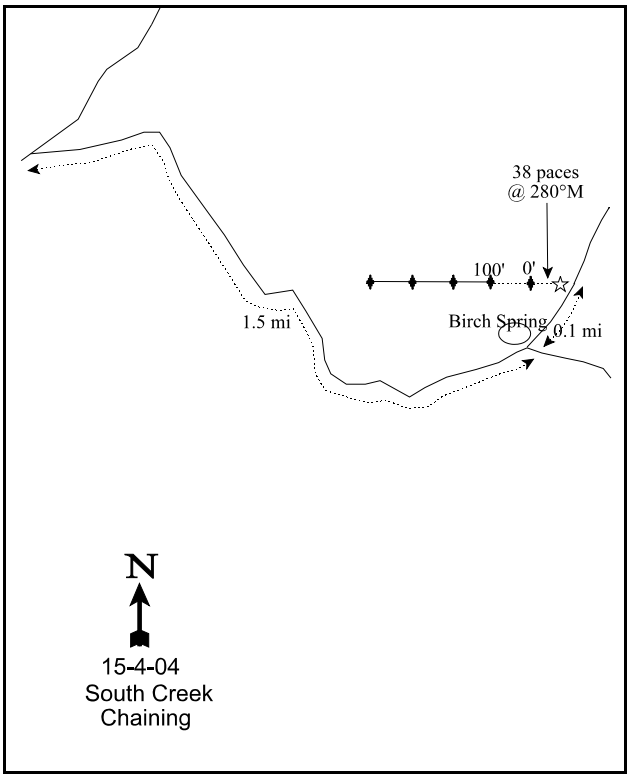
Compass bearing: frequency baseline 285 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the Willow Creek and South Creek Roads, (T32S, R9F, Sec.1) travel 1.5 miles west-southwest to a fork by Birch Spring. Turn left and go 0.1 miles past the fenced spring, and down a faint road. A witness post (tall green fence post) is located in the P-J just west of the road. The transect starts 38 paces away at a bearing of 280°M from the witness post.





Map Name: Mount Ellen

Diagrammatic Sketch

Township 32S , Range 10E , Section 6

GPS: NAD 27, UTM 12S 4211133 N, 513082 E

DISCUSSION

South Creek Chaining - Trend Study No. 15-4

The South Creek chaining study is located in the pinyon-juniper foothills on the west slope of the Henry Mountains at an elevation of 7,800 feet. It samples a portion of the South Creek pinyon-juniper project that was completed in the mid-1960's. The study is on a 5% slope that has a northern exposure. Water is available for livestock and wildlife at Birch Spring a few hundred yards to the south. The site is within the Nasty Flat Cattle Allotment and a key area for bison and mule deer. Pellet group data also indicates a high amount of rabbit use. The 1999 pellet group transect estimated a moderate level of use on the site with 13 deer, 7 bison days use/acre, and 39 cow days use/acre (32 ddu/ha, 16 bdu/ha, and 96 cdu/ha). Pellet group data from 2004 estimated moderate use by livestock with 41 cow days use/acre (100 cdu/ha), light use by bison (9 bdu/acre - 23 bdu/ha) and deer (5 ddu/acre -13 ddu/ha). Human use of the area, which could negatively impact wildlife, is minimal. A road skirts the lower edge of the chaining, but it is not heavily traveled. Undulating topography and adequate escape cover buffer wildlife from human disturbances near the road.

The soil on the site is a dark brown loam of granitic origin, with a neutral pH (6.9). The soil surface is rocky as is the profile, especially the upper 2 decimeters. Penetrometer readings estimated the effective rooting depth to be just over 12 inches. The steeper slopes of the area show pedestaling around grasses and shrubs from overland water flow. However, the more gentle slopes show minimal erosion occurring. There is a relatively high amount of rock, pavement, and bare ground on the site, but gentle slopes and fairly continuous vegetative cover limit erosion on the site.

Mountain big sagebrush and green rubber rabbitbrush continue to be the most abundant browse species on the site. Sagebrush is the key browse for this site. The population density has increased substantially from 33 plants/acre in 1987 to 5,400 plants/acre in 2004. The percentage of young plants was highest in 1999 when they made up 38% of the population. There were 4,560 seedlings/acre estimated in 1999. In 2004 there were 10,460 seedlings/acre, which could result in the further increases of sagebrush if a high proportion of these can persist on the site. Mature sagebrush plants have greatly increased from 1,680/acre in 1999 to 4,360/acre in 2004. The population appears healthy with most plants (58%) showing moderate to heavy use, good vigor, with less than 20 decadent plants sampled/acre. Green rubber rabbitbrush also greatly increased in density from 1987 to 1999, but decreased 40% in 2004 from 3,220 plants/acre to 1,940 plants/acre. Much of the young age class of 1999 died off. This population appears to be decreasing with competition from mountain big sagebrush. This is characteristic of increaser shrub, as they are usually not very competitive with other longer lived shrubs like sagebrush.

Pinyon and juniper trees were hand cut prior to the 2004 reading. Utah serviceberry, snowberry, and true mountain mahogany are also occur on the site, but none are very abundant with density varying from 20 to 100 plants/acre and providing less than 1% cover for all species combined. Serviceberry and mahogany are heavily utilized due to their infrequent occurrence and preference by browsing animals. The transect is located near the edge of the chaining, where shrub utilization would be expected to exceed that observed for shrubs found toward the interior of the chaining. Serviceberry and mahogany are not classified as key species due to their very low numbers.

Crested wheatgrass and alfalfa provide the bulk of the herbaceous forage found in the chaining. These species provide early spring green-up and fall regrowth for wildlife use. Both species have continued to receive heavy utilization each sampling date since the trend study was established in June of 1987. Very heavy use was noted by crested wheatgrass and alfalfa in 2004. Alfalfa still makes up about two-thirds of the perennial forb cover, even though the annual component has been increasing since 1987. One thing that should be noted is that quadrat frequency for alfalfa has shown a continuous drop since 1987 (from 47% to 21%). This species is decreasing most likely as the result of the drought and/or continued heavy use. In 2004, crested wheatgrass

provided 95% of the grass cover, 76% of the herbaceous cover, and 40% of the total vegetative cover. Other grasses and forbs are diverse, but provide little cover and are insignificant.

1994 TREND ASSESSMENT

Protective ground cover has increased on this site indicating a slightly upward soil trend. The decrease in percent litter cover can be partially explained by the fact that the chaining had not been heavily utilized in 1994, which increased total vegetative cover and reduced the amount of visible litter. Browse trend is mixed. Preferred browse have increased slightly in density and shows light hedging. Conversely, green rubber rabbitbrush has increased significantly. Overall, the browse trend is slightly down, but if the seedlings of mountain big sagebrush become established, this could change dramatically. The herbaceous understory is dominated by crested wheatgrass and alfalfa. These two species make up 90% of the herbaceous cover. Nested frequency of crested wheatgrass has increased, while that of alfalfa has declined significantly. The decline in alfalfa would be expected with the prolonged drought. Nested and quadrat frequencies of grasses have declined slightly, while those of forbs increased significantly. Combined nested frequencies of grasses and forbs have remained stable.

TREND ASSESSMENT
soil - slightly up (4)
browse - slightly down because of the significant increase in green rabbitbrush density (2)
herbaceous understory - stable (3)
winter range condition (DC index) - 74 (good) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soil is stable. Relative percent cover of bare ground, rock and pavement remained almost unchanged. The proportion of protective ground cover and bare soil has shown no change. Overall trend for browse is slightly down. Trend for sagebrush is up with the increase in density and good recruitment. However, green rubber rabbitbrush density has also greatly increased and recruitment is high, offsetting the upward trend for sagebrush. Green rubber rabbitbrush makes up 52% of the browse cover. Trend for herbaceous understory is stable. Sum of nested frequency for perennial species overall stayed nearly the same with grasses slightly increasing, and forbs slightly decreasing. Crested wheatgrass and alfalfa still dominate the understory. Both are vigorous and provide good forage for wildlife and livestock. Annual species continue to play an insignificant role in the community.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down an increase in mountain big sagebrush being more than offset by the increase in rubber rabbitbrush (2)
herbaceous understory - stable (3)
winter range condition (DC index) - 83 (excellent) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

Trend for soil is slightly down because of the increase in relative cover for bare soil mostly because of the loss of almost half of the crested wheatgrass cover. Overall trend for browse is up. Trend for sagebrush is up with the increase in density (2,700 to 5,400 plants/acre) and good recruitment (19% young). Sagebrush cover has increased by 106%. Conversely, green rubber rabbitbrush density has decreased by 40%, while recruitment (percent young) has also decreased by 79%. This indicates a change in trend to a more preferred browse species which shows 58% of the plants with moderate to heavy use, yet they show excellent vigor. Trend for herbaceous understory is slightly down with a major loss of the most dominant grass cover, crested

wheatgrass, which declined from 21% in 1999 to 11% cover. Alfalfa, the major forb, has also decreased. This all points to losses mostly because of drought. Annual cover has increased since 1999 and are are beginning to play a more significant role in the community.

TREND ASSESSMENT

soil - slightly down (2)

browse - up (5), with increases in mountain big sagebrush and decreases in green rubber rabbitbrush

herbaceous understory - slightly down (2)

winter range condition (DC index) - 65 (fair-good) Mountain big sagebrush/chaining type, declined mostly because of the losses to the herbaceous species.

HERBACEOUS TRENDS --
Management unit 15 , Study no: 4

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{b}$293	$_{b}$294	$_{b}$294	$_{a}$245	22.07	20.97	11.25
G	Agropyron smithii	$_{ab}$5	$_{a}$-	$_{b}$13	$_{ab}$7	-	.77	.06
G	Bromus tectorum (a)	-	$_{a}$24	$_{b}$57	$_{b}$58	.26	.63	.43
G	Poa fendleriana	3	1	2	-	.00	.15	-
G	Sitanion hystrix	$_{b}$42	$_{a}$4	$_{a}$-	$_{a}$3	.01	-	.06
Total for Annual Grasses		0	24	57	58	0.26	0.62	0.43
Total for Perennial Grasses		343	299	309	255	22.08	21.89	11.37
Total for Grasses		343	323	366	313	22.35	22.52	11.80
F	Arabis spp.	-	-	2	-	-	.00	-
F	Artemisia ludoviciana	3	1	6	5	.00	.06	.01
F	Astragulus henrimontanensis	7	5	6	3	.01	.04	.06
F	Casella bursa-pastoris	-	-	3	-	-	.00	-
F	Chenopodium album (a)	-	3	-	-	.01	-	-
F	Chaenactis douglasii	-	-	2	3	-	.00	.00
F	Cirsium vulgare	9	-	-	-	-	-	-
F	Cryptantha spp.	-	2	-	-	.00	-	-
F	Descurainia pinnata (a)	-	$_{b}$33	$_{a}$9	$_{ab}$18	.10	.04	.04
F	Erigeron spp.	-	-	1	-	-	.03	-
F	Eriogonum racemosum	-	-	-	2	-	-	.00
F	Gayophytum ramosissimum(a)	-	$_{a}$-	$_{a}$-	$_{b}$10	-	-	.05
F	Hymenoxys acaulis	-	3	2	-	.00	.00	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{b}$64	$_{c}$157	-	.38	1.61
F	Lesquerella kingii	$_{b}$18	$_{c}$54	$_{bc}$42	$_{a}$-	.36	.25	-
F	Lomatium spp.	$_{a}$-	$_{b}$16	$_{a}$-	$_{ab}$3	.43	-	.04
F	Malcolmia africana	-	-	3	9	-	.38	.33
F	Machaeranthera canescens	1	-	6	8	-	.18	.19

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Medicago sativa	$_{b}$110	$_{a}$73	$_{a}$71	$_{a}$50	6.50	4.38	1.94
F	Microsteris gracilis (a)	-	-	-	2	-	-	.00
F	Phlox longifolia	$_{a}$-	$_{b}$13	$_{a}$-	$_{ab}$10	.03	-	.07
F	Polygonum douglasii (a)	-	$_{a}$57	$_{a}$41	$_{b}$240	.51	.11	1.37
F	Ranunculus testiculatus (a)	-	-	-	5	-	-	.01
F	Sisymbrium altissimum (a)	-	-	2	-	-	.00	-
F	Sphaeralcea coccinea	$_{b}$35	$_{ab}$20	$_{a}$17	$_{a}$12	.14	.11	.27
F	Taraxacum officinale	$_{b}$27	$_{a}$3	$_{b}$21	$_{a}$-	.00	.38	-
F	Unknown forb-perennial	6	-	-	-	-	-	-
Total for Annual Forbs		0	93	116	432	0.62	0.54	3.10
Total for Perennial Forbs		216	190	182	105	7.49	5.84	2.93
Total for Forbs		216	283	298	537	8.11	6.38	6.04

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

BROWSE TRENDS --
Management unit 15 , Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	2	1	2	-	-	-
B	Artemisia tridentata vaseyana	7	33	47	1.30	3.87	7.98
B	Cercocarpus montanus	0	1	1	-	-	-
B	Chrysothamnus depressus	0	0	1	-	-	-
B	Chrysothamnus nauseosus graveolens	37	44	48	1.46	5.48	4.89
B	Juniperus osteosperma	0	0	1	.85	.15	.38
B	Pinus edulis	0	3	1	1.74	.85	-
B	Symphoricarpos oreophilus	2	2	4	-	.18	.15
Total for Browse		48	84	105	5.36	10.55	13.40

CANOPY COVER, LINE INTERCEPT --
Management unit 15 , Study no: 4

Species	Percent Cover	
	'99	'04
Artemisia tridentata vaseyana	-	9.60
Cercocarpus montanus	-	.16
Chrysothamnus nauseosus graveolens	-	6.93
Juniperus osteosperma	1.39	.11
Pinus edulis	1.00	.60

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 15 , Study no: 4

Species	Average leader growth (in)
	'04
Amelanchier utahensis	6.6
Artemisia tridentata vaseyana	2.5

POINT-QUARTER TREE DATA --
Management unit 15 , Study no: 4

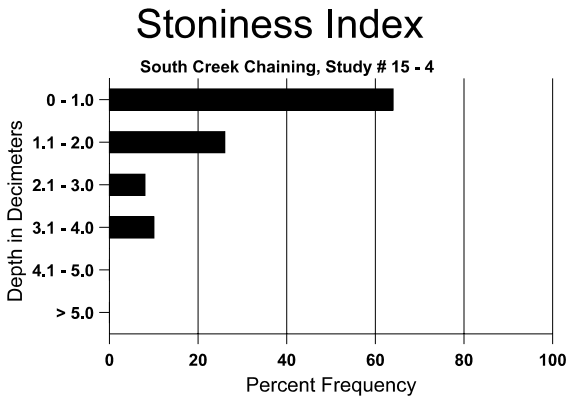
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	25	-	5.8	-
Pinus edulis	47	-	4.9	-

BASIC COVER --
Management unit 15 , Study no: 4

Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	7.25	39.24	38.48	32.77
Rock	12.25	13.10	18.34	14.31
Pavement	9.75	3.17	6.53	6.56
Litter	49.75	22.01	28.75	33.16
Cryptogams	0	.03	.04	0
Bare Ground	21.00	10.62	18.14	28.37

SOIL ANALYSIS DATA --
Management unit 15, Study no: 4, Study Name: South Creek Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
12.4	65.0 (12.6)	6.9	45.6	27.8	26.6	3.7	19.7	156.8	0.7



PELLET GROUP DATA --
Management unit 15 , Study no: 4

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	31	39	15
Deer	6	4	2
Cattle	-	22	9
Buffalo	12	-	2

Days use per acre (ha)	
'99	'04
-	-
13 (32)	5 (13)
39 (96)	41 (100)
7 (16)	9 (23)

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**66**	-	66	-	-	-	0	100	-	-	0	-/-
94	**40**	100	-	40	-	-	0	100	-	-	0	34/55
99	**20**	-	-	20	-	-	0	100	-	-	0	17/30
04	**40**	-	-	40	-	-	0	100	-	-	0	35/56
Artemisia tridentata vaseyana												
87	**33**	-	33	-	-	-	0	100	0	-	0	-/-
94	**160**	6120	60	100	-	-	0	0	0	-	0	16/28
99	**2740**	4560	1060	1680	-	-	9	0	0	-	0	14/22
04	**5400**	30460	1020	4360	20	-	27	31	0	-	0	13/23

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
87	**66**	-	-	66	-	-	0	100	-	-	0	8/12
94	**0**	-	-	-	-	-	0	0	-	-	0	9/22
99	**20**	-	-	20	-	-	0	100	-	-	0	9/27
04	**20**	-	-	20	-	-	0	100	-	-	0	22/33
Chrysothamnus depressus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Chrysothamnus nauseosus graveolens												
87	**33**	-	-	33	-	-	100	0	0	-	0	43/33
94	**1340**	3880	760	540	40	-	22	4	3	-	1	22/24
99	**3220**	1000	1860	1300	60	20	25	4	2	-	0	25/27
04	**1940**	6120	240	1520	180	40	0	1	9	-	0	25/27
Juniperus osteosperma												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**0**	-	-	-	-	100	0	0	0	-	0	-/-
04	**20**	20	-	-	20	-	0	0	100	-	100	-/-
Pinus edulis												
87	**166**	-	66	100	-	-	0	0	-	-	0	64/55
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	20	40	-	-	0	0	-	-	0	-/-
04	**20**	20	-	20	-	20	0	0	-	-	0	-/-
Ribes cereum cereum												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	20	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	68/68
04	**0**	-	-	-	-	-	0	0	-	-	0	62/74
Rosa woodsii												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	13/9
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	37/19

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus												
87	**166**	33	100	66	-	-	0	100	-	-	0	13/24
94	**40**	-	40	-	-	-	0	0	-	-	0	18/33
99	**40**	-	20	20	-	-	0	0	-	-	0	13/21
04	**100**	-	60	40	-	-	0	0	-	-	0	17/31

Trend Study 15-5-04

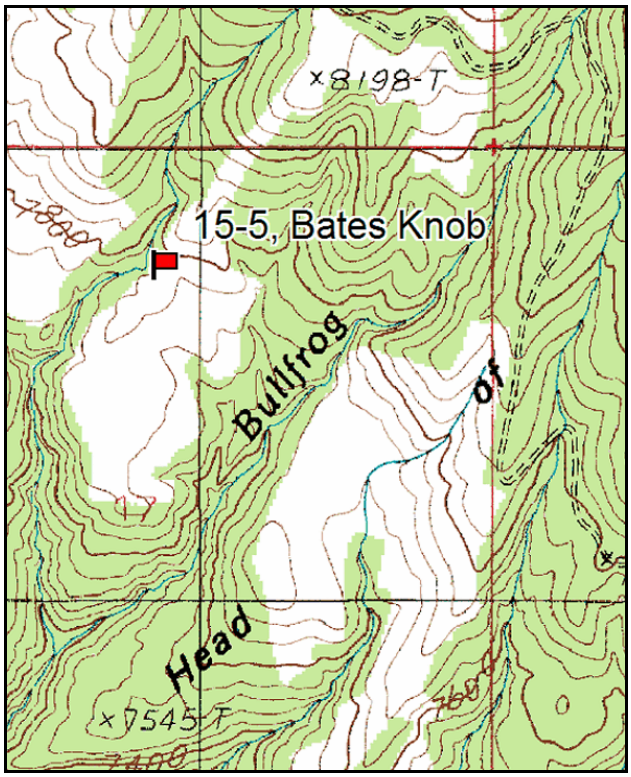
Study site name: Bates Knob . Vegetation type: Chained, Seeded P-J .

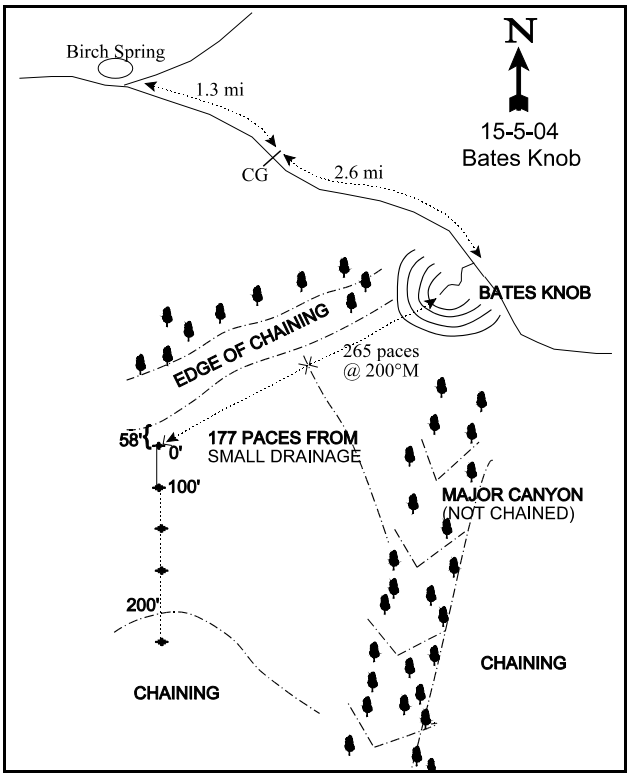
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From Birch Spring (see transect 15-4-99), continue southwest on main road for 1.3 miles to a cattleguard. From the cattleguard, go 2.6 miles to a minor road which forks off to the right and goes up on top of a small hill (Bates Knob) overlooking a chaining. From the hilltop, walk down through a chained strip, over a small wash and through the chaining to the baseline stake, about 600 (265 paces) yards bearing 220°M. The transect is marked by 1 ½-foot tall fenceposts. The first baseline stake has a red browse tag, #7421, attached.





Map Name: Mount Ellen

Diagrammatic Sketch

Township 32S , Range 10E , Section 17

GPS: NAD 27, UTM 12S 4208706 N, 514898 E

DISCUSSION

Bates Knob - Trend Study No. 15-5

The Bates Knob study was set up to monitor range trend on a pinyon-juniper chaining located on the north end of the Pennell Allotment at an elevation of 7,700 feet. The site is on a slope that varies from 1-7% with an aspect that is generally to the southwest. Heavy rain fell on the site the week previous to sampling in 1999. Water is available seasonally in Buck Canyon, which is just south of the study site. The site is considered a key use area for bison. Seventy-five head of bison were observed near the site while data was being collected in July of 1987. Numerous bison were again observed directly on the site, as well as to the east when read in June of 1999. The study is one-fourth mile from the road and receives minimal use by people. Most of the chaining is not visible from the road, so anyone traveling on the road would probably not be aware of bison using the chaining. Pellet group quadrat frequency in 1994 and 1999 showed a high quadrat frequency for rabbit pellets, but was much lower in 2004. Pellet group data taken in 1999 estimated moderate to heavy use with 38 cow days use/acre (94 cdu/ha), 26 bison days use/acre (64 bdu/ha) and 3 deer days use/acre (7 ddu/ha). Pellet group data from 2004 indicated decreased use for cattle and bison with an estimated 6 cows days use/acre and 20 bison days use/acre (14 cdu/ha and 48 bdu/ha), but a slight increase for deer with 7 deer days use/acre (18 ddu/ha).

The soils at the site are a light colored, sandy clay loam of granitic origin. The pH is neutral at 7.1. The soil profile is rocky throughout, but not as much on the surface. The estimated effective rooting depth is about 15 inches. There is an organic layer present near the surface, but it is not common to the entire site. There is some noticeable trailing by animals through some areas. There was a acceptable amount of bare soil present in 1999 (19%), but in 2004 bare soil increased to 27% with the drought and significant losses to grass cover. The erosion index is still rated as stable. Evidence of any noticeable erosion is minimal at the present time. Downed trees left by the chaining are also piled in depressions to help limit erosion. Litter also protects plants from over utilization. Organic matter is built up in some places, due mostly to the chaining debris.

Preferred shrubs besides mountain big sagebrush are rare. Green rubber rabbitbrush, an increaser, density was estimated at 366 plants/acre in 1987. It increased dramatically by 1994 to 6,100 plants/acre. In 2004, the green rubber rabbitbrush population was mostly mature (72%) with an estimated density of 2,300 plants/acre. This was a 62% decrease since 1994. This subspecies has a large growth form and shows little or no use. In 2004, recruitment (percentage of young in population) was the lower than any previous reading at 19%. The number of seedlings through the years has been extremely variable, from as few as 80 to a high of 20,320 seedling/acre and was quite high in 2004 at 12,280 seedling/acre.

Mountain big sagebrush density has increased substantially since 1987. The population was estimated at only 66 plants/acre in 1987, increasing to 1,780 in 1994, and 4,740 plants/acre by 1999. However in 2004, the density was estimated at 3,320 plants/acre, a decrease of 30%. In 1999, 50% of the population were young plants, but due to dry conditions many of these plants probably died. The number of seedlings has varied greatly since 1987. In 2004, 3,160 seedlings/acre were counted. Recruitment has also been quite variable, from only 33 plants/acre in 1987 to a high of 2,260 plants/acre in 1999. In 2004, 360 young plants/acre were estimated. This kind of variability is common for shrubs, and not critical for a moderately long-lived shrub. Percent decadency has remained low over all years. The amount of moderate use on sagebrush had increased to 42% of population in 1999 and decreased to 31% in 2004. All plants showed only light use in 1994. The age class structure of sagebrush along with few decadent or dead plants and continuing good recruitment would indicate a continued increase of this species in the future with normal precipitation.

Pinyon and juniper trees were not particularly abundant in this area with an estimated 16 pinyon and 20 juniper trees/acre from point-quarter data in 1999. In 2004, point-quarter data showed an increase for both species with 34 pinyon and 32 juniper trees/acre with an average diameter of 4.2 inches for pinyon and 5.6

inches for juniper. It would be advisable to have a project to use chainsaws to thin or remove these trees before they start effecting understory production.

Crested wheatgrass and a rhizomatous alfalfa are the two key herbaceous species for this site. These species experienced heavy utilization prior to the sampling date of July of 1987. By 1994, both alfalfa and crested wheatgrass declined significantly in their sum of nested frequency values. In 1999, both species had similar abundance to the 1994 reading, with sum of nested frequency slightly increasing for both. Both species were heavily utilized by the time the site was read in June 1999. In 2004, both species had dropped in abundance (decreased sum of nested values) to the lowest values that had been recorded for this site. The drought has had an effect on most of the herbaceous species. Cheatgrass, an annual brome, increased significantly in sum of nested frequency value between 1994 and 1999, but was still relatively low in abundance. It had almost disappeared by 2004 due to drought. Cheatgrass could return with proper timing of precipitation and could increase to greater abundance, especially if other herbaceous species continue to decrease. Other forbs on the site are diverse, but most are infrequent. Total forb cover was only about 2% in 2004 and three-fourths of this was from alfalfa. Many annual species are present in the understory, but most are small and insignificant at this time.

1994 TREND ASSESSMENT

Soil conditions are similar to those of 1987. Due to the gentle topography, erosion is not a problem. Browse have increased dramatically (mostly due to the increaser green rubber rabbitbrush) on the site since the last reading. This increase however, could effect negatively the desirable herbaceous species, crested wheatgrass and alfalfa. Currently, the most numerous browse on the site is an unpalatable increaser green rubber rabbitbrush. Trend for browse on this chaining is considered down due to the increase of undesirable shrubs. The herbaceous understory also shows a downward trend. Sum of nested frequencies of perennial grasses and perennial forbs have declined.

TREND ASSESSMENT
soil - stable (3)
browse - down due to increase in unpalatable shrubs (1)
herbaceous understory - down (1)
winter range condition (DC index) - 60 (fair) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soils appears stable as ground cover characteristics are similar to 1994 conditions. Vegetation and litter remain at similar levels as does bare ground. Erosion is minimal even with high traffic from livestock and bison. Trend for the key browse, mountain big sagebrush, is up. Density has increased since 1994 with good recruitment. Very few decadent or dead plants exist with most plants classified with good vigor. The less palatable green rubber rabbitbrush has decreased slightly in numbers, but is still very similar to what it was previously. Overall, trend for browse is slightly up. The herbaceous understory shows a stable trend, although the species composition is limited to only crested wheatgrass and alfalfa, the key species. They have increased slightly in sum of nested frequency. The annual cheatgrass increased significantly, but still is at low enough levels that it is not a major concern.

TREND ASSESSMENT
soil - stable (3)
browse - up slightly (4)
herbaceous understory - stable (3)
winter range condition (DC index) - 65 (fair-good) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

Trend for soil appears to be downward because of the major increase in bare soil. This was caused by decreases in litter cover and vegetation cover, mostly from the loss of herbaceous cover. Erosion is minimal even with the relatively high traffic from livestock and bison. Trend for the key browse, mountain big sagebrush, would be considered stable. Density has decreased slightly since 1999, however, the majority of this loss was from the young age class which almost made up 50% of the population. This was discussed in more detail in the introductory text for the Bates Knoll site. The losses to the young age class were more than compensated for by the increase in cover which increased by 54%. Very few decadent (4%) or dead plants (<1%) exist on site, with mostly >99% showing good vigor. The less palatable green rubber rabbitbrush has continued to decrease with a 61% decrease in density since 1999. The herbaceous understory shows a downward trend, with significant losses to crested wheatgrass and declines for alfalfa which even now makes up 91% of the herbaceous species cover. The annual cheatgrass component decreased significantly, and still at very low levels of abundance.

TREND ASSESSMENT
soil - down (1)
browse - stable (3)
herbaceous understory - down (1)
winter range condition (DC index) - 41 (poor) Mountain big sagebrush/chaining type, decreased index value mostly because of losses to the herbaceous understory

HERBACEOUS TRENDS --
Management unit 15 , Study no: 5

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{c}$300	$_{b}$253	$_{bc}$269	$_{a}$153	10.38	11.92	4.75
G	Agropyron intermedium	3	-	-	-	-	-	-
G	Bouteloua gracilis	-	1	2	-	.00	.03	-
G	Bromus tectorum (a)	-	$_{b}$41	$_{c}$112	$_{a}$7	.71	2.20	.02
G	Oryzopsis hymenoides	1	-	-	-	-	-	-
G	Sitanion hystrix	$_{b}$24	$_{a}$8	$_{a}$5	$_{a}$5	.04	.04	.01
G	Sporobolus cryptandrus	1	1	2	-	.00	.00	-
Total for Annual Grasses		0	41	112	7	0.71	2.20	0.01
Total for Perennial Grasses		329	263	278	158	10.44	12.00	4.76
Total for Grasses		329	304	390	165	11.15	14.20	4.78
F	Arabis spp.	-	3	4	-	.00	.01	-
F	Artemisia ludoviciana	$_{b}$38	$_{a}$2	$_{a}$-	$_{a}$-	.03	-	.03
F	Aster spp.	-	1	-	-	.00	-	-
F	Astragalus spp.	-	5	2	5	.04	.00	.03
F	Astragalus utahensis	-	4	1	6	.01	.00	.03
F	Chenopodium album (a)	-	10	-	-	.02	-	-
F	Chaenactis douglasii	3	1	3	-	.00	.01	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{a}$-	$_{b}$15	-	-	.09
F	Cymopterus purpureus	-	2	-	-	.00	-	-
F	Descurainia pinnata (a)	-	$_{b}$47	$_{a}$24	$_{a}$3	.25	.07	.01
F	Eriogonum alatum	$_{b}$26	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Gayophytum ramosissimum(a)	-	$_{ab}$18	$_{a}$1	$_{b}$32	.03	.00	.09
F	Hymenoxys acaulis	9	-	-	2	-	-	.00
F	Lappula occidentalis (a)	-	$_{b}$88	$_{a}$15	$_{a}$26	.77	.03	.13
F	Lesquerella kingii	$_{b}$21	$_{b}$26	$_{b}$43	$_{a}$-	.09	.30	-
F	Machaeranthera canescens	4	8	2	-	.01	.01	.00
F	Medicago sativa	$_{b}$109	$_{a}$30	$_{a}$49	$_{a}$23	2.13	1.48	1.62
F	Penstemon spp.	-	-	3	3	-	.00	.06
F	Petradoria pumila	-	-	6	-	-	.09	-
F	Phlox longifolia	-	2	5	6	.03	.01	.06
F	Polygonum douglasii (a)	-	$_{b}$49	$_{a}$1	$_{a}$7	.25	.00	.02
F	Senecio multilobatus	-	3	-	2	.03	-	.03
F	Sisymbrium altissimum (a)	-	$_{b}$21	$_{ab}$7	$_{a}$-	.24	.04	-
F	Tragopogon dubius	1	1	-	3	.00	-	.00
F	Unknown forb-perennial	9	-	-	-	-	-	-
Total for Annual Forbs		0	233	48	83	1.57	0.15	0.35
Total for Perennial Forbs		220	88	118	50	2.41	1.93	1.89
Total for Forbs		220	321	166	133	3.99	2.09	2.24

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

BROWSE TRENDS --
Management unit 15 , Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemesia carruthii	6	5	5	-	.06	.18
B	Artemisia tridentata vaseyana	20	34	29	1.77	3.59	5.52
B	Chrysothamnus nauseosus graveolens	73	78	56	5.67	7.78	7.45
B	Chrysothamnus viscidiflorus viscidiflorus	3	1	0	.17	-	-
B	Gutierrezia sarothrae	13	29	22	.00	.64	.66
B	Juniperus osteosperma	0	1	0	-	.38	.38
B	Pinus edulis	0	4	4	1.79	1.79	3.51
Total for Browse		115	152	116	9.42	14.25	17.72

CANOPY COVER, LINE INTERCEPT --
Management unit 15 , Study no: 5

Species	Percent Cover	
	'99	'04
Artemesia carruthii	-	.15
Artemisia tridentata vaseyana	-	7.66
Chrysothamnus nauseosus graveolens	-	9.21
Gutierrezia sarothrae	-	.20
Pinus edulis	1.00	3.58

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 15 , Study no: 5

Species	Average leader growth (in)
	'04
Artemisia tridentata vaseyana	2.7

POINT-QUARTER TREE DATA --
Management unit 15 , Study no: 5

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	20	32
Pinus edulis	16	34

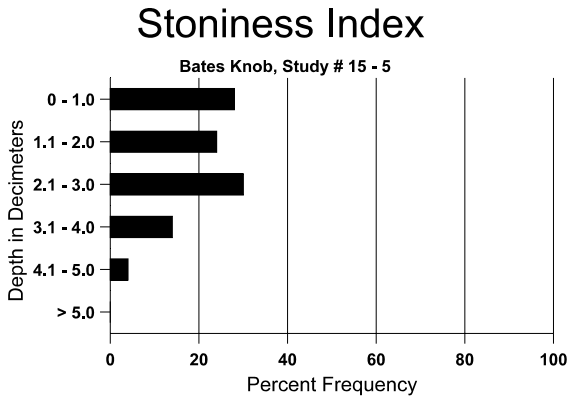
Average diameter (in)	
'99	'04
5.3	5.6
3.8	4.2

BASIC COVER --
Management unit 15 , Study no: 5

Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	6.00	25.36	28.06	23.93
Rock	5.25	5.65	7.41	7.75
Pavement	5.50	.68	1.61	2.55
Litter	57.50	39.38	47.73	31.77
Cryptogams	0	0	.21	.04
Bare Ground	25.75	18.68	19.11	27.37

SOIL ANALYSIS DATA --
Management unit 15, Study no: 5, Study Name: Bates Knob

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.0	56.7 (14.4)	7.1	46.0	25.4	28.6	2.8	16.9	121.6	0.7



PELLET GROUP DATA --
Management unit 15 , Study no: 5

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	14	20	2
Deer	3	8	3
Cattle	-	-	2
Buffalo	14	10	3

Days use per acre (ha)	
'99	'04
-	-
3 (7)	7 (18)
38 (94)	6 (14)
26 (64)	20 (48)

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	47/23
Artemesia carruthii												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**740**	20	80	660	-	-	0	0	0	-	0	5/9
99	**860**	260	660	180	20	-	0	0	2	2	2	2/3
04	**240**	-	40	200	-	-	0	0	0	-	0	7/8
Artemisia tridentata vaseyana												
87	**66**	-	33	-	33	-	50	0	50	-	50	-/-
94	**1780**	4480	1180	600	-	-	0	0	0	-	0	14/20
99	**4740**	220	2260	2380	100	20	42	2	2	-	0	9/15
04	**3320**	3160	360	2820	140	40	31	6	4	.60	.60	18/29
Chrysothamnus nauseosus graveolens												
87	**366**	300	200	166	-	-	9	0	0	-	0	26/37
94	**6100**	20320	3200	2460	440	-	15	.32	7	4	7	22/28
99	**5860**	80	1240	4360	260	-	47	13	4	.68	.68	27/29
04	**2300**	12280	440	1660	200	160	0	0	9	3	3	27/34
Chrysothamnus viscidiflorus viscidiflorus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**80**	440	-	80	-	-	0	0	-	-	0	5/6
99	**20**	-	-	20	-	-	0	0	-	-	0	6/10
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
87	**200**	-	-	200	-	-	0	0	0	-	0	8/5
94	**400**	20	180	220	-	-	10	0	0	-	0	20/31
99	**1620**	80	180	1380	60	40	0	0	4	2	2	7/9
04	**860**	60	40	740	80	20	0	0	9	9	9	9/10
Juniperus osteosperma												
87	**33**	-	33	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	20	-	-	20	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia spp.												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
87	**33**	-	33	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**80**	-	-	80	-	20	0	0	-	-	0	-/-
04	**140**	-	40	100	-	-	0	0	-	-	0	-/-
Sambucus cerulea												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	53/79

Trend Study 15-6-04

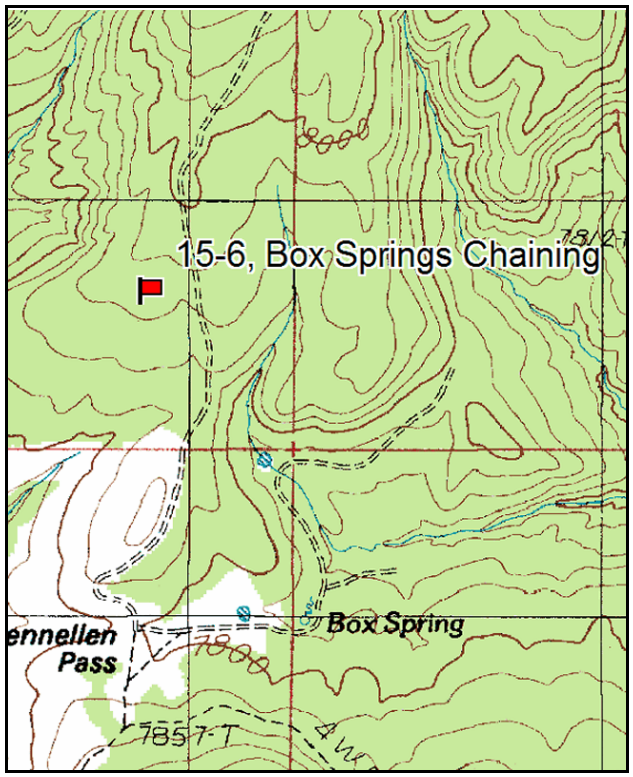
Study site name: Box Springs Chaining . Vegetation type: Chained, Seeded P-J .

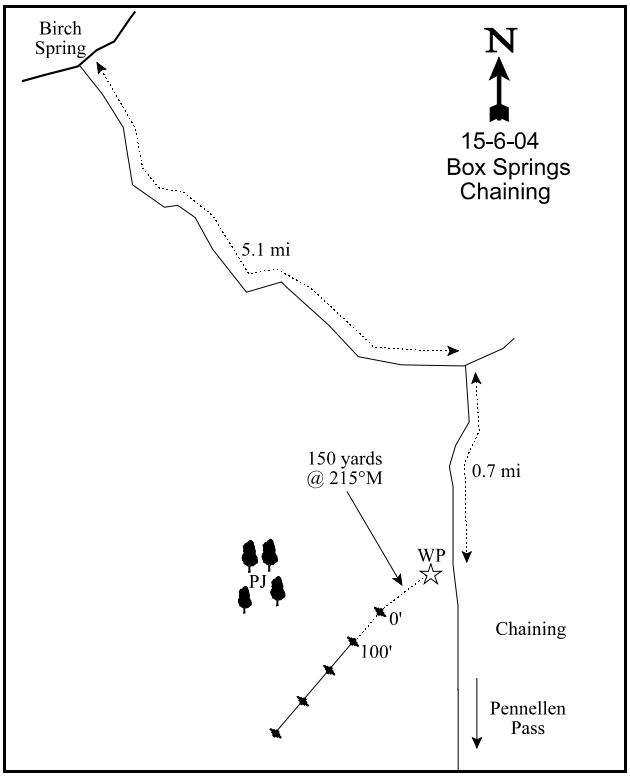
Compass bearing: frequency baseline 204 degrees magnetic.

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

LOCATION DESCRIPTION

From Birch Spring (T32S, R10E, Sec. 6), proceed southeast for 5.1 miles to a major intersection. Turn right (south) towards Pennellen Pass, and go 0.7 miles. A witness post on the right side of the road marks the transect location in the chaining. The 0-foot baseline stake, a 2-foot tall fence post, is approximately 150 yards from the road and is marked by a red browse tag, #7134. This study runs approximately southwest but since it follows the line of a study established in dense P-J before the chaining.





Map Name: Mount Ellen Diagrammatic Sketch

Township 32S , Range 10E , Section 16 GPS: NAD 27, UTM 12S 4207744 N, 516879 E

DISCUSSION

Box Springs Chaining - Trend Study No. 15-6

The Box Springs Chaining study monitors range trend on state land that was chained and seeded in 1984. Prior to the chaining, the site supported a dense stand of tall, mature pinyon with a few juniper. The site elevation is 7,900 feet which slopes gently to the south. Water is available for livestock and wildlife at Box Springs which is located about one-fourth mile southeast of the study. The state land is included within the Pennell Allotment (BLM) grazing program and is leased by the Division of Wildlife Resources. The chaining is a key use area for buffalo, which utilize the area mostly during the late spring and summer. A road crosses the chaining and is about one-fourth mile from the study site. Human use is light, with the exception of deer and buffalo hunts, and occasional use made by sightseers and livestock permittees. Pellet group data collected in 1999 indicated light use by wildlife and moderate use by livestock. This data showed 5 deer days use/acre (13 ddu/ha) and 38 cow days use/acre (95 cdu/ha). Buffalo use was estimated at 15 buffalo days use/acre (37 bdu/ha). Nearly all of the cow pats were from the last fall, while the deer and buffalo are mostly from the spring and winter. In 2004, the pellet group data showed 7 deer days use/acre (17 ddu/ha) and only 4 cow days use/acre (9 cdu/ha). The lower use by cows is probably reflective of the drought. Buffalo use was similar to previous use at 20 buffalo days use/acre (48 bdu/ha).

Soil texture is a gravelly, sandy clay loam with a neutral pH (7.3). Rocks and small boulders are abundant on the soil surface and throughout the upper 2 decimeters of the profile. The soil is fairly deep with an estimated effective rooting depth of nearly 16 inches. The soil surface is well protected by rock, vegetation, and litter cover. There is a slight decrease in relative cover for bare soil in 1999, coupled with an increase in pavement. In 2004, there was a moderate increase in relative percent bare soil. There is evidence of light erosion with surface soil movement and minor pedestaling being noted around bunch grasses. The ratio of protective ground cover to bare soil had decreased by 2004.

Pinyon and juniper not removed by the chaining treatment were estimated at 233 and 100 trees per acre, respectively during the 1987 reading. Point-quarter data from the 1994 and 1999 readings give a much better estimate with a significantly larger sample size. The densities for pinyon and juniper were on average estimated at 78 and 45 trees/acre respectively in both 1994 and 1999. Point-quarter data from 2004 indicates a noticeable increase in pinyon density at 94 trees/acre and slight increase in juniper at 50 trees/acre. Basal diameter of pinyon was estimated at 3.5 inches in 1999 and 3.4 in 2004. Juniper was just over three inches in 1999 and increased to 5 inches by 2004. Thirty-nine percent of the juniper and 10% of the pinyon sampled in 1999 were knocked-down trees from the chaining. Pinyon and juniper provided 66% of the browse cover in 1999 and 68% in 2004. Canopy cover for pinyon and juniper was 10% in 2004. At this level tree dominance begins to negatively effect the herbaceous understory (Tausch and West 1994). This area would be a good one to use thinning measures on, probably thinning by utilizing chainsaws.

Broom snakeweed had an estimated density of 800 plants/acre in 1994, which decreased to 620 plants/acre in 1999, and 640 plants/acre in 2004. Cover is low and this species appears to be stabile with a mostly mature age class. Bitterbrush planted by seed dribblers during the chaining, initially established at 266 seedlings/acre in 1987. By 1994, there was an estimated 120 mature bitterbrush plants/acre and density has remained stable since. Utilization has varied from light to heavy, yet vigor has been good. There is no apparent recruitment for bitterbrush, with no seedling or young plants being sampled since 1994. These plants have a decumbent growth form. Mountain big sagebrush is also present on the site, but infrequent. Density has been stable, but cover had increased to nearly 2% by 2004. Height and crown measurements have increased from 25 x 33 inches in 1999 to 33 x 48 inches in 2004.

Intermediate wheatgrass, Fairway crested wheatgrass, and sheep fescue are the predominant seeded grasses. Utilization was light on these species when the site was read in June 1999. By 2004, the effects of the drought

were showing its effects. Both intermediate wheatgrass and sheep fescue decreased substantially in cover and nested frequency, while the more drought tolerant crested wheatgrass increased in cover and nested frequency. However, overall total cover from grasses decreased slightly from 23.4% to 20.7%. Other less abundant seeded grasses include: smooth brome, orchard grass, and Great Basin wildrye. Alfalfa was the most abundant forb in 1987 with a quadrat frequency of 31%. This alfalfa is a rhizomatous variety and was expected to increase on this site, but with drought conditions and heavy use was not found on the site in 2004. Small burnet, another seeded forb, was also fairly common during the 1987 reading, but was found very infrequently in subsequent readings and not at all in 2004.

1994 TREND ASSESSMENT

Due to the gentle terrain and abundant herbaceous vegetation, erosion is not a problem on this site. Ground cover characteristics in 1994 are similar to those of 1987 indicating a stable soil trend. Shrubs are not an important aspect on this site, for it should be noted that all together, they only contribute a little more than 10% of the total vegetative cover. Broom snakeweed is the most abundant shrub on the site, but its numbers are still low at 800 plants/acre with a biotic potential of only about 3%. An estimated 120 young and mature antelope bitterbrush were found growing on the site. Trend for preferred browse is stable, but insignificant. The herbaceous understory is abundant, making up 87% of the vegetative cover. The composition has changed however, as sum nested frequencies of grasses have increased while those of forbs have declined by 63%. Seeded forbs, alfalfa and small burnet, which used to be the dominant forbs on the chaining, have declined significantly. Combined nested frequencies of grasses and forbs have declined slightly indicating a stable to slightly declining trend with the continuing drought.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC index) - 31 (v. poor) Mountain big sagebrush/chaining type, this rated poorly because of the lack of a preferred shrub component

1999 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics to 1994. The proportion of protective ground cover to bare ground remains sufficient to minimize erosion. Browse trend for bitterbrush is stable even with mostly heavy use and lack of recruitment. This is because there are no decadent plants or plants with poor vigor, and it is a relatively long-lived species. The key species (preferred) all together, only make up one-third of the browse cover, and total browse cover only makes up less than 20% of the total vegetative cover. The majority of the browse cover on this site is actually contributed by pinyon and juniper. Herbaceous understory trend is stable. Intermediate, crested wheatgrass, and sheep fescue have remained at similar levels to the previous reading. Perennial grass sum of nested frequency slightly increased in 1999. Sum of nested frequency for forbs also increased, although the forbs are insignificant on this site with the loss of the two preferred species, alfalfa and small burnet. Total forb cover is less than one percent.

TREND ASSESSMENT
soil- stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC index) - 34 (v. poor) Mountain big sagebrush/chaining type, this rated poorly because of the lack of a preferred shrub component

2004 TREND ASSESSMENT

Trend for soil is slightly downward at this time because of the large increase in relative cover for bare soil. It has increased by 90% since 1999 (9% to 17%). The ratio of protective ground cover to bare soil has also decreased from 3.2:1 to 2.7:1. Browse trend for bitterbrush and mountain big sagebrush remains stable, even with lack of recruitment for bitterbrush. There are no decadent plants or plants with poor vigor, and these shrubs are long-lived species. The preferred browse all together, only make up about one-third of the browse cover. The majority of the browse cover on this site is actually contributed by pinyon and juniper which now makes up 68% of the browse cover. Pinyon-juniper now have cover of 10%, which can negatively effect the understory species. It would be a good idea to plan a thinning treatment with chainsaws, before the herbaceous understory in negatively affected. Herbaceous understory trend is slightly down with the drought. Intermediate wheatgrass and sheep fescue have decreased in abundance with noticeably smaller nested frequency values. Crested wheatgrass has increased in cover during this drought. Perennial grass sum of nested frequency has slightly decreased since 2004. Sum of nested frequency for forbs has basically crashed because of the drought, but was not very high during earlier readings. Total forb cover is less than one-tenth of one percent.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - slightly down (2)
winter range condition (DC index) - 53 (fair) Mountain big sagebrush/chaining type, this is rated higher because of the increase in the preferred shrub component even though there was a slight loss in herbaceous cover since 1999.

HERBACEOUS TRENDS --
Management unit 15 , Study no: 6

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	167	187	186	204	6.28	6.65	10.50
G	Agropyron intermedium	$_{b}$227	$_{b}$216	$_{ab}$198	$_{a}$163	7.56	6.84	4.85
G	Bromus inermis	$_{b}$78	$_{b}$94	$_{b}$97	$_{a}$37	2.31	2.99	.72
G	Dactylis glomerata	$_{b}$39	$_{a}$21	$_{a}$10	$_{a}$3	1.59	.07	.15
G	Elymus cinereus	-	5	6	7	.18	.33	.18
G	Festuca ovina	$_{a}$62	$_{b}$101	$_{b}$139	$_{b}$121	5.35	6.50	4.24
G	Sitanion hystrix	1	-	2	-	-	.00	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		574	624	638	535	23.30	23.39	20.67
Total for Grasses		574	624	638	535	23.30	23.39	20.67
F	Arabis spp.	6	7	4	1	.01	.01	.00
F	Astragalus cicer	1	7	6	1	.04	.12	.00
F	Aster spp.	-	3	-	-	.00	-	-
F	Chaenactis douglasii	-	6	3	-	.04	.06	-
F	Descurainia pinnata (a)	-	-	3	-	-	.00	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Hymenoxys acaulis	-	1	1	-	.00	.00	-
F	Ipomopsis aggregata	-	-	3	-	-	.00	-
F	Lappula occidentalis (a)	-	2	-	-	.00	-	-
F	Lesquerella kingii	$_{bc}$19	$_{ab}$8	$_{c}$36	$_{a}$-	.01	.16	-
F	Machaeranthera canescens	-	3	3	-	.03	.03	-
F	Medicago sativa	$_{b}$66	$_{a}$1	$_{a}$1	$_{a}$-	.03	.00	-
F	Onobrychis viciaefolia	-	5	-	-	.09	-	-
F	Penstemon palmeri	1	-	-	-	-	-	-
F	Polygonum douglasii (a)	-	2	-	3	.00	-	.00
F	Sanguisorba minor	$_{b}$32	$_{a}$3	$_{a}$1	$_{a}$-	.19	.00	-
Total for Annual Forbs		0	4	3	3	0.00	0.00	0.00
Total for Perennial Forbs		125	44	58	2	0.47	0.40	0.00
Total for Forbs		125	48	61	5	0.48	0.40	0.01

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

BROWSE TRENDS --
Management unit 15 , Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemisia tridentata vaseyana	4	2	3	.18	1.28	1.97
B	Echinocereus spp.	0	1	0	-	.00	-
B	Gutierrezia sarothrae	7	7	7	.18	.06	.33
B	Juniperus osteosperma	0	4	6	3.15	2.34	4.30
B	Opuntia spp.	0	0	1	-	-	-
B	Pinus edulis	0	4	5	.06	1.32	2.65
B	Purshia tridentata	6	5	4	.15	.56	.93
B	Sclerocactus	0	0	1	-	-	-
Total for Browse		17	23	27	3.73	5.58	10.19

CANOPY COVER, LINE INTERCEPT --
Management unit 15 , Study no: 6

Species	Percent Cover '04
Artemisia tridentata vaseyana	2.01
Gutierrezia sarothrae	.40
Juniperus osteosperma	3.18
Pinus edulis	6.76
Purshia tridentata	1.01

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 15 , Study no: 6

Species	Average leader growth (in) '04
Artemisia tridentata vaseyana	2.3
Purshia tridentata	2.6

POINT-QUARTER TREE DATA --
Management unit 15 , Study no: 6

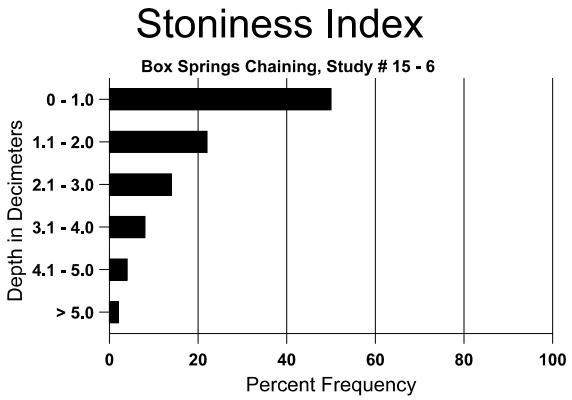
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	45	50	3.2	5.1
Pinus edulis	82	94	3.5	3.4

BASIC COVER --
Management unit 15 , Study no: 6

Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	11.25	26.25	32.29	32.18
Rock	1.50	5.50	5.53	5.85
Pavement	.50	1.02	6.64	5.84
Litter	73.25	50.34	59.68	48.47
Cryptogams	0	0	.03	0
Bare Ground	13.50	11.39	10.23	19.49

SOIL ANALYSIS DATA --
Management unit 15, Study no: 6, Study Name: Box Springs Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.8	48.0 (16.4)	7.3	48.0	23.4	28.6	3.7	13.1	137.6	1.0



PELLET GROUP DATA --
Management unit 15 , Study no: 6

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	6	34	15
Deer	1	12	3
Cattle	-	6	1
Buffalo	7	4	3

Days use per acre (ha)	
'99	'04
-	-
5 (13)	7 (17)
38 (95)	4 (9)
15 (37)	20 (48)

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**80**	-	-	80	-	-	0	0	-	-	0	18/20
99	**40**	-	-	40	-	-	50	0	-	-	0	25/33
04	**80**	20	20	60	-	-	25	0	-	-	0	33/48
Chrysothamnus nauseosus graveolens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	40/18
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	61/58
Echinocereus spp.												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	20	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
87	**100**	-	-	100	-	-	0	0	0	-	0	10/6
94	**800**	20	320	480	-	-	0	0	0	-	0	7/8
99	**620**	120	180	320	120	20	0	0	19	19	19	4/5
04	**640**	-	-	620	20	-	0	0	3	-	0	7/9
Juniperus osteosperma												
87	**66**	33	66	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**80**	-	60	20	-	-	0	0	-	-	0	-/-
04	**120**	-	20	100	-	-	0	0	-	-	0	-/-
Opuntia spp.												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	-	40	-	-	0	0	-	-	0	3/8
Pinus edulis												
87	**233**	33	200	33	-	-	0	0	-	-	0	169/79
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**80**	20	40	40	-	-	0	0	-	-	0	-/-
04	**100**	-	20	80	-	20	0	0	-	-	0	-/-
Purshia tridentata												
87	**0**	266	-	-	-	-	0	0	0	-	0	-/-
94	**120**	-	40	80	-	-	67	0	0	-	0	4/9
99	**100**	-	-	100	-	-	0	80	0	-	0	4/17
04	**120**	-	-	60	60	-	0	33	50	-	0	6/23
Sclerocactus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	1/2

Trend Study 15-7-04

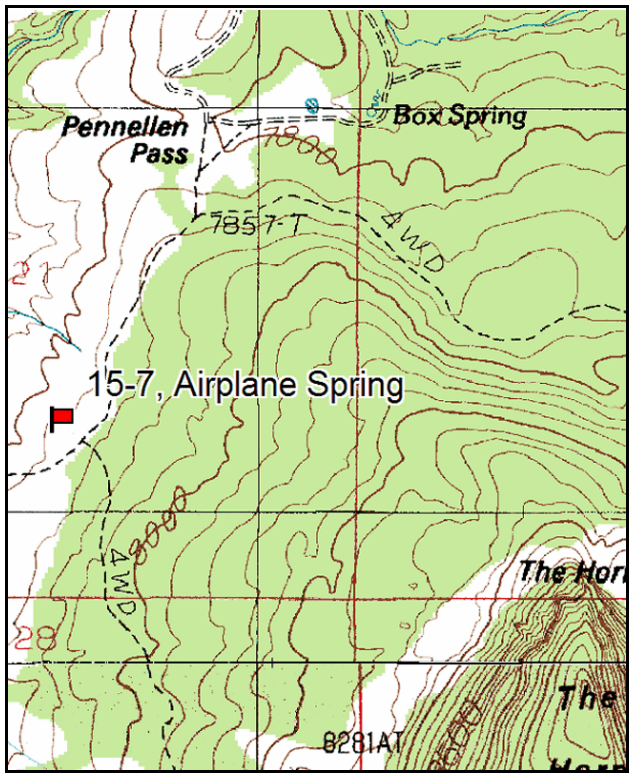
Study site name: Airplane Spring . Vegetation type: Chained, Seeded P-J .

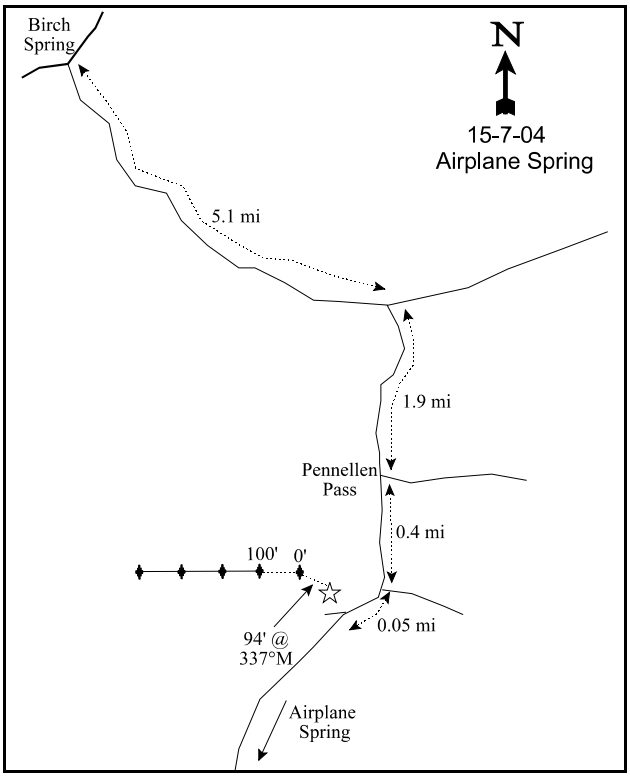
Compass bearing: frequency baseline 263 degrees magnetic.

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

LOCATION DESCRIPTION

From Birch Spring (T32S, R10E, Sec. 6), travel southeast for 5.1 miles. Turn right, go 1.9 miles past Box Springs to a major intersection at Pennellen Pass. Bear right, and go 0.4 miles to another intersection. Bear right towards Airplane Spring, but go only about 0.05 miles (200 feet) to a pullout on the right. A witness post is located 117 feet off the main road. The first baseline stake is 94 feet northwest (at 337° M) of the witness post. The transect stakes are 2-foot tall fence posts, the first one is marked with browse tag #7174.





Map Name: Mount Ellen Diagrammatic Sketch

Township 32S , Range 10E , Section 21 GPS: NAD 27, UTM 12S 4206189 N, 516487 E

DISCUSSION

Airplane Spring - Trend Study No. 15-7

The Airplane Spring study site is located within a chaining at an elevation of 7,700 feet. The slope is variable over the site, ranging from 11-18%. The aspect is west to southwest. This chaining project was completed during the mid-1960's. The Bulldog fire, which burned in 2003, burned the area just west of this site, but not directly on the study area. This portion of the chaining is in the Pennell Allotment and is a key area for bison and deer. The nearest water source is Airplane Spring which is one-half mile downslope from the site. The study site is within a few hundred feet of the road that links Airplane Springs with Box Springs. Use of the road would be expected to be light except during the hunting seasons. Rabbit use was high in 1999 with 61% of the quadrats containing rabbit pellets. Use from wildlife was low with 4 deer days use/acre (10 ddu/ha) estimated in 1999, and only 1 bison day use/acre (2 bdu/ha). Livestock use was moderate with an estimated 20 cow days use/acre (49 cdu/ha) in 1999. In 2004 cow use decreased to 6 cow days use/acre (14 cdu/ha). For wildlife, deer use increased to 13 deer days use/acre (33 ddu/ha) and bison use was estimated at 20 bison days use/acre (48 bdu/ha).

The soil is a reddish brown, clay loam with a neutral pH (7.0). The site is very rocky both on the soil surface and throughout the profile. Soil depth is moderately shallow due to the rockiness of the site, with an effective rooting depth estimated at just over 11 inches. Erosion was minimal in 2004 due to extreme rockiness and lack of soil on the surface. However, accumulation of soils on the lower end of the slope from the rocky uphill slopes shows that erosion has occurred in the past. Some areas have fairly good litter cover and an organic matter accumulation in the surface horizon, especially beneath the shrubs. The erosion index was determined as stable in 2004.

In 1999, point-quarter estimated the density of pinyon at 80 trees/acre with an average basal diameter of nearly 4 inches. Juniper density was estimated at 60 trees/acre with a basal diameter of nearly 4 inches. Both species combined had a canopy cover of 8% in 1999. In 2004, point-quarter estimates where almost unchanged except for basal diameters which increased slightly. Canopy cover increased to 16%. When pinyon-juniper canopy cover approaches and exceeds 15%, herbaceous cover will typically decline by half. At 25%, herbaceous cover will rarely exceed 1-2% (Tausch and West 1994). Maintenance of this chaining, by reducing pinyon and juniper cover should be a priority to maintain a healthy herbaceous understory.

The study is near the edge of the chaining and approaching the ecotone between the pinyon-juniper and mountain brush types resulting in a diverse mix of browse, but the majority of the species are found infrequently. Species which characterize the mountain brush type that occur in the chaining are Gambel oak, true mountain mahogany, Utah serviceberry, and snowberry. These browse species and the herbaceous understory make this area ideal habitat for mule deer. The majority of the most preferred shrubs showed signs of moderate to heavy hedging since the 1987 reading. Black sagebrush is the most abundant shrub on the site, with an estimated 1,665 plants/acre in 1987, 3,520 in 1994, 5,100 in 1999, and 5,940 by 2004. The change from 1994 to 1999 was from large increases in percent young and mature plants. Due to the age class distribution, this species continued expanding. In 2004, black sagebrush density increased to 5,940 plants/acre Use remains light and only 3% of the population show signs of poor vigor.

Serviceberry and mountain mahogany are also important preferred browse on the site. All were heavily utilized in 1987, but use has moderated with an increase in density for both species. Use is moderate to heavy for mahogany and serviceberry, but vigor has been good and decadence very low. Broom snakeweed is present at the site, but the density is quite low for this species with an estimated 1,000 plants/acre in 1999, which decreased to 780 plants/acre in 2004. These kind of fluctuations are common for this increaser species in association with drought and wet cycles. Bitterbrush is present on the site but was not sampled.

The most abundant grasses on the site are seeded species. Crested wheatgrass nested frequency decreased between 1987 and 1994, increased in 1999, then decreased again in 2004. Herbaceous production is very dependant on late winter and spring moisture. Crested wheatgrass provided 95% of the grass cover in 1999 and 98% of the grass cover in 2004. Crested wheatgrass is becoming more abundant because it is more drought tolerant than the other species on this site. Intermediate wheatgrass has continued to decrease since 1987, and was only sampled in 4% of the quadrats in 2004. This would be expected with continuing drought. Both species were observed as only lightly utilized in 1999 and 2004. Native grasses have practically disappeared from the understory with a sum of nested frequency for all species together of 21 in 1999 and only 11 in 2004. Forbs in the understory are diverse, but infrequent with only 1.4% cover in 1999 and only 0.8% cover in 2004. The key species, alfalfa, was numerous in 1987, but like other sites in this unit, this species has declined significantly due to drought. Alfalfa was heavily utilized prior to July 1987, but still appeared vigorous. In 1999, alfalfa showed moderate to heavy use, some used down to the ground. Alfalfa was found in 19% of quadrats in 1987, but was only found in 3% in 2004.

1994 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1987. The abundant herbaceous vegetative cover, combined with the gently slope helps to prevent erosion. Trend for soil is stable. Key browse on the site consist of black sagebrush, serviceberry, mountain mahogany, bitterbrush, and snowberry. All have increased in density, show low rates of decadency, and are less heavily utilized than they were in 1987. Trend for browse is up. Herbaceous plants appear to be declining on this site perhaps due to the increased dominance of shrubs and trees in conjunction with extended drought. Sum of nested frequencies for perennial grasses and forbs have declined by 31% indicating a downward trend.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - down (1)
winter range condition (DC index) - 51 (fair) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Soils continue to show a stable trend. The proportion of protective ground cover (vegetation and litter) to bare ground slightly increased from 1994 to 1999. Erosion continues to be minimal due to the abundance of rock and herbaceous cover. Trend for browse is slightly up and improving. The key species black sagebrush, serviceberry, and true mountain mahogany provide half of the browse cover. Densities for all these species are stable or increasing, vigor is improving, and percent decadency is low. Herbaceous understory trend is stable. The key species, crested wheatgrass, increased in nested frequency and cover. Sum of nested frequency for all perennial grasses combined slightly declined, but nested frequency for perennial forbs slightly increased. Annuals are almost non-existent in the understory.

TREND ASSESSMENT
soil- stable (3)
browse- slightly up (4)
herbaceous understory- stable (3)
winter range condition (DC index) - 68 (good) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

Soils continue to show a stable trend. The proportion of protective ground cover (vegetation and litter) to bare ground slightly decreased from 1999 to 2004. Erosion continues to be minimal due to the abundance of rock,

litter, and herbaceous cover. Trend for browse is considered stable. The key species black sagebrush increased, serviceberry decreased slightly, and true mountain mahogany also decreased slightly. Overall, these key preferred species still provide about 45% of the browse cover. All these species have good vigor and percent decadency is very low. Herbaceous understory trend is slightly down because of the decline of crested wheatgrass, which decreased significantly in nested frequency and cover. Sum of nested frequency for all perennial grasses combined declined by almost 20%. The drought has had a noticeable effect on the herbaceous species. Annuals still remain almost non-existent in the understory. Perennial forb cover and nested frequency is about half of what it was in 1999, which was poor then.

TREND ASSESSMENT
soil- stable (3)
browse- stable (3)
herbaceous understory- slightly down (2)
winter range condition (DC index) - 63 (fair-good) Mountain big sagebrush/chaining type

HERBACEOUS TRENDS --
Management unit 15 , Study no: 7

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{c}$306	$_{ab}$234	$_{bc}$264	$_{a}$233	11.67	19.07	14.83
G	Agropyron intermedium	$_{c}$122	$_{b}$58	$_{a}$28	$_{a}$7	1.04	.64	.04
G	Bouteloua gracilis	1	5	-	1	.01	-	.03
G	Bromus tectorum (a)	-	6	-	3	.01	-	.01
G	Festuca ovina	$_{ab}$2	$_{a}$-	$_{b}$8	$_{ab}$4	-	.24	.04
G	Oryzopsis hymenoides	-	-	2	-	-	.03	-
G	Poa fendleriana	$_{a}$-	$_{b}$19	$_{ab}$10	$_{a}$3	.15	.10	.03
G	Sitanion hystrix	$_{c}$73	$_{b}$28	$_{a}$1	$_{ab}$7	.15	.01	.07
Total for Annual Grasses		0	6	0	3	0.00	0	0.01
Total for Perennial Grasses		504	344	313	255	13.03	20.11	15.05
Total for Grasses		504	350	313	258	13.05	20.11	15.07
F	Arabis spp.	-	-	11	-	-	.02	-
F	Aster spp.	-	4	-	-	.01	-	-
F	Astragalus spp.	3	-	2	3	-	.03	.00
F	Astragalus utahensis	-	-	-	1	-	-	.00
F	Castilleja linariaefolia	-	-	-	-	-	-	.00
F	Castilleja spp.	-	-	4	-	-	.03	-
F	Chenopodium fremontii (a)	-	-	-	5	-	-	.04
F	Cymopterus spp.	-	3	-	-	.01	-	-
F	Erigeron eatonii	$_{b}$27	$_{b}$29	$_{ab}$15	$_{a}$6	.29	.09	.01
F	Eriogonum umbellatum	-	3	2	9	.03	.03	.06
F	Gayophytum ramosissimum(a)	-	$_{b}$12	$_{a}$-	$_{b}$19	.02	-	.04
F	Hedysarum boreale	-	2	-	-	.03	-	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Hymenoxys acaulis	14	8	10	5	.02	.05	.01
F	Hymenoxys richardsonii	-	-	6	2	-	.01	.03
F	Lappula occidentalis (a)	-	$_{b}$19	$_{a}$5	$_{ab}$18	.05	.02	.06
F	Lesquerella kingii	$_{a}$2	$_{a}$4	$_{b}$19	$_{a}$-	.01	.06	-
F	Medicago sativa	$_{b}$49	$_{a}$9	$_{a}$19	$_{a}$6	.90	.96	.45
F	Orthocarpus spp. (a)	3	-	-	-	-	-	-
F	Penstemon spp.	$_{a}$-	$_{ab}$9	$_{ab}$1	$_{b}$9	.01	.00	.13
F	Phlox longifolia	$_{a}$-	$_{ab}$10	$_{b}$9	$_{ab}$3	.02	.05	.00
F	Polygonum douglasii (a)	-	7	1	12	.01	.00	.03
F	Schoencrambe linifolia	$_{b}$15	$_{a}$3	$_{a}$-	$_{a}$-	.00	-	-
F	Sphaeralcea coccinea	3	7	7	4	.33	.07	.07
F	Tragopogon dubius	3	-	-	-	-	-	-
F	Unknown forb-perennial	1	-	-	-	-	-	-
Total for Annual Forbs		3	38	6	54	0.08	0.02	0.18
Total for Perennial Forbs		117	91	105	48	1.68	1.44	0.79
Total for Forbs		120	129	111	102	1.77	1.46	0.97

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

BROWSE TRENDS --
Management unit 15 , Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	9	6	4	1.11	1.01	.06
B	Artemisia nova	41	54	55	3.51	6.68	6.87
B	Artemisia tridentata vaseyana	3	0	0	.38	-	.15
B	Cercocarpus montanus	9	11	12	1.62	1.25	2.03
B	Chrysothamnus depressus	4	10	4	.15	.03	.03
B	Chrysothamnus nauseosus graveolens	2	3	2	.00	.00	-
B	Chrysothamnus viscidiflorus viscidiflorus	4	5	2	.03	.00	.03
B	Gutierrezia sarothrae	14	12	13	.38	.21	.41
B	Juniperus osteosperma	0	5	4	1.25	2.00	2.36
B	Opuntia spp.	2	1	1	.00	-	-
B	Pinus edulis	0	6	7	4.11	6.48	8.69
B	Purshia tridentata	1	1	0	.15	.00	-
B	Quercus gambelii	0	1	0	-	-	-
B	Ribes leptanthum	0	1	1	-	.03	.30
B	Sclerocactus	0	1	1	-	.03	-
B	Symphoricarpos oreophilus	2	2	2	.16	.03	.03
Total for Browse		91	119	108	12.90	17.80	20.98

CANOPY COVER, LINE INTERCEPT --
Management unit 15 , Study no: 7

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	.20	1.14
Artemisia nova	-	7.13
Artemisia tridentata vaseyana	-	.23
Cercocarpus montanus	.40	2.54
Chrysothamnus viscidiflorus viscidiflorus	-	.21
Gutierrezia sarothrae	-	.71
Juniperus osteosperma	1.00	2.26
Pinus edulis	7.19	13.26
Ribes leptanthum	-	1.39
Symphoricarpos oreophilus	-	.85

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 15 , Study no: 7

Species	Average leader growth (in)
	'04
Amelanchier utahensis	2.2
Artemisia nova	1.7
Cercocarpus montanus	3.1

POINT-QUARTER TREE DATA --
Management unit 15 , Study no: 7

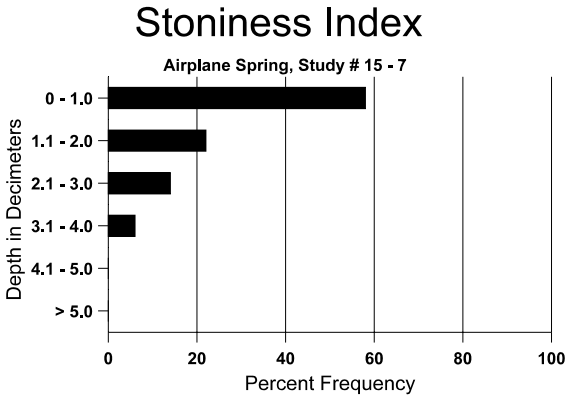
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	60	57	3.9	4.5
Pinus edulis	80	78	3.9	4.2

BASIC COVER --
Management unit 15 , Study no: 7

Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	6.50	28.12	37.69	36.76
Rock	19.50	22.58	28.07	25.61
Pavement	4.25	2.94	9.41	7.90
Litter	57.50	33.31	28.98	32.45
Cryptogams	.50	.18	.25	.12
Bare Ground	11.75	11.27	12.93	14.67

SOIL ANALYSIS DATA --
Management unit 15, Study no: 7, Study Name: Airplane Spring

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
11.2	50.4 (13.2)	7.0	44.0	27.4	28.6	5.2	17.7	156.8	0.7



PELLET GROUP DATA --
Management unit 15 , Study no: 7

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	18	61	14
Deer	8	12	19
Cattle	-	5	-
Buffalo	-	1	1

Days use per acre (ha)	
'99	'04
-	-
4 (10)	13 (33)
20 (49)	6 (14)
1 (2)	20 (48)

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**166**	-	33	133	-	-	0	100	0	-	0	33/22
94	**220**	-	20	180	20	-	27	9	9	9	9	46/58
99	**220**	20	20	200	-	-	36	9	0	-	0	57/56
04	**100**	-	-	100	-	-	0	100	0	-	0	59/57
Artemisia nova												
87	**1665**	4033	1066	566	33	-	8	2	2	1	2	14/21
94	**3520**	3400	700	2380	440	-	0	0	13	2	18	11/17
99	**5100**	5440	1780	2800	520	100	15	9	10	.39	.39	12/24
04	**5940**	100	780	4620	540	280	0	0	9	3	3	10/17
Artemisia tridentata vaseyana												
87	**133**	133	100	33	-	-	0	0	-	-	0	17/13
94	**60**	300	20	40	-	-	0	0	-	-	0	16/26
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	21/34
Cercocarpus montanus												
87	**66**	-	-	66	-	-	50	50	0	-	0	21/30
94	**180**	-	-	180	-	-	22	44	0	-	0	31/28
99	**340**	-	80	240	20	-	6	47	6	-	0	42/38
04	**240**	100	-	240	-	-	17	83	0	-	0	35/41
Chrysothamnus depressus												
87	**432**	33	366	33	33	-	85	0	8	-	0	4/10
94	**100**	-	-	100	-	-	0	0	0	-	0	6/14
99	**280**	-	-	200	80	-	36	50	29	7	7	3/6
04	**140**	-	-	140	-	-	57	29	0	-	0	6/8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus graveolens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**40**	40	-	40	-	-	50	50	-	-	50	20/28
99	**60**	-	-	60	-	20	0	0	-	-	0	26/30
04	**40**	-	20	20	-	-	0	0	-	-	0	35/42
Chrysothamnus viscidiflorus viscidiflorus												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**180**	-	-	140	40	-	0	0	22	-	0	3/6
99	**140**	-	40	80	20	-	0	0	14	-	0	9/12
04	**40**	-	-	40	-	-	0	0	0	-	0	11/16
Eriogonum microthecum												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	5/13
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
87	**1399**	-	833	566	-	-	0	0	0	-	0	10/8
94	**660**	100	200	400	60	-	0	0	9	9	9	6/7
99	**1000**	260	480	480	40	60	0	0	4	2	2	6/8
04	**780**	-	40	740	-	20	0	0	0	-	0	7/8
Juniperus osteosperma												
87	**100**	33	100	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	-	80	20	-	40	0	0	-	-	0	-/-
04	**80**	-	20	60	-	-	0	0	-	-	0	-/-
Opuntia spp.												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**40**	-	20	20	-	-	0	0	-	-	0	0/1
99	**20**	-	-	20	-	-	0	0	-	-	0	4/4
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Pinus edulis												
87	**100**	-	100	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**160**	-	20	140	-	20	0	0	-	-	0	-/-
04	**160**	-	40	120	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**20**	-	-	-	20	-	0	100	100	-	0	6/24
99	**20**	-	-	20	-	-	0	100	0	-	0	74/76
04	**0**	-	-	-	-	-	0	0	0	-	0	12/28
Quercus gambelii												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**160**	120	80	60	20	20	0	0	13	-	0	18/22
04	**0**	-	-	-	-	-	0	0	0	-	0	12/24
Ribes leptanthum												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	60/96
99	**20**	-	-	20	-	-	0	0	-	-	0	64/67
04	**20**	-	-	20	-	-	0	0	-	-	0	56/66
Sclerocactus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	3/3
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
87	**566**	66	300	233	33	-	24	47	6	-	0	21/20
94	**40**	40	20	20	-	-	50	0	0	-	0	10/21
99	**40**	-	20	20	-	-	0	0	0	-	0	28/66
04	**40**	-	-	40	-	-	50	0	0	-	0	21/50

Trend Study 15-12-04

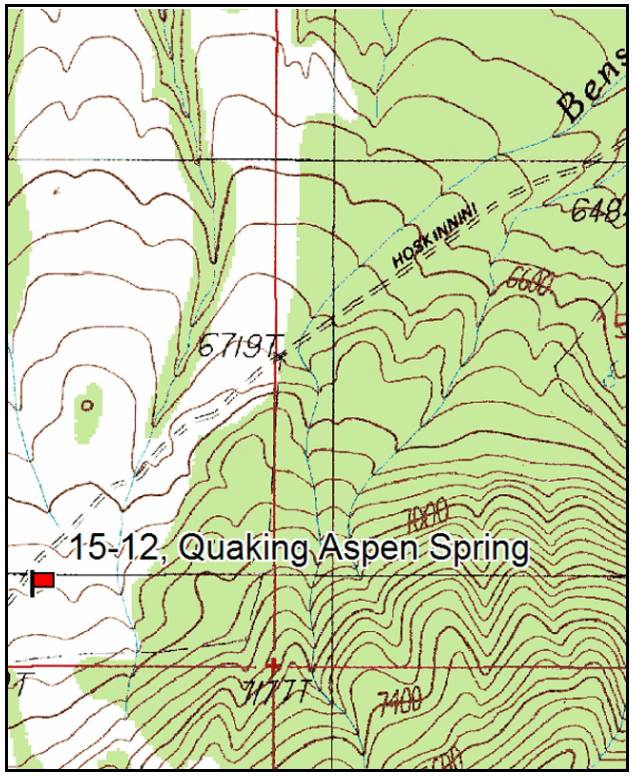
Study site name: Quaking Aspen Spring . Vegetation type: Chained, Seeded P-J .

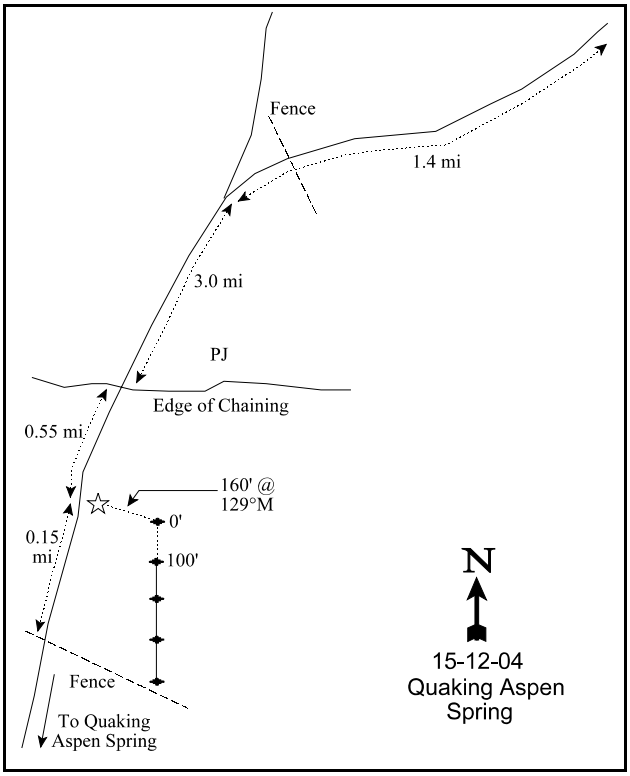
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of highways 95 and 276, go 4.7 miles south down SR 276 to a gravel road. Turn right and travel 3.1 miles to an abandoned cabin near the creek. Continue 0.6 miles to a fork. Stay right, cross the creek and go 0.8 miles to some mining cabins. Keep left on the main road. Continue 1.2 miles to a fence. Continue 0.2 miles to a fork. Take the left fork towards Quaking Aspen Spring. Go 3 miles to the edge of a chaining. Continue 0.55 miles to a witness post on the left side of the road. The 0-foot baseline stake, a 1 ½ foot tall fence post, is 160 feet southeast of witness post and is marked by a red browse tag #7135.
Alternate route- From study number 15-13, go 2.2 miles to a fork. Stay left and continue 1.6 miles to another fork. Stay left again and go 1.2 miles (you will go through Stanton Pass and pass Quaking Aspen Spring) passing through a fence to a witness post on the right.





Map Name: Cass Creek Peak

Diagrammatic Sketch

Township 33S , Range 11E , Section 21

GPS: NAD 27, UTM 12S 4197939 N, 526282 E

DISCUSSION

Quaking Aspen Spring - Trend Study No. 15-12

The Quaking Aspen Spring study is located in the foothills on the north slope of Mt. Hillars and about 2/3 of a mile from Quaking Aspen Spring. The site is at an elevation of 6,900 ft and located on a bench that slopes to the northwest with a slope of 8%. The area has historically been a pinyon-juniper vegetation type. It was chained years ago and trees were regaining their dominance of the area, until the Bulldog fire of 2003 burned all trees and browse on the site. The area was chained and seeded after the fire for fire rehabilitation. Water is available for wildlife and livestock at Quaking Aspen Spring and Quaking Aspen Creek. This is thought to be a key use area for mule deer which use the area year-round. Pellet group data from 1999 indicated light use by wildlife and livestock with an estimated 18 deer and 3 cow days use/acre (44 ddu/ha and 7 cdu/ha). After the fire, data from 2004 estimated 1 deer day use/acre (3 ddu/ha)

The soil is a rocky, sandy clay loam with a slightly alkaline pH (7.5). Nutrient levels are low with phosphorus and potassium both below the minimum levels determined necessary for normal plant development. Organic matter is fairly low overall. Soil depth is fairly shallow with an estimated effective rooting depth of just over 12 inches. A calcium carbonate layer exists about four inches down in the profile. Although the soil is quite shallow, there are sufficient breaks in the rocky layers to permit more deep rooted shrubs, such as true mountain mahogany, to do well. Erosion was rated as only slight in 2004.

Prior to burning in 2003 pinyon and juniper trees were abundant. The average height of pinyon and juniper trees in the chaining during the 1987 reading was about five feet and the stand was composed of mostly young trees. Point quarter data from 1994 estimated 266 pinyon and 116 juniper trees/acre. Average basal diameter of pinyon was just over 2 inches, while that of juniper was 1.6 inches. In 1999, point quarter data estimated 252 pinyon and 128 juniper trees/acre. The average basal diameter increased for both species, pinyon was estimated at just over 3 inches while juniper was just over 2 inches. Canopy cover of pinyon and juniper trees was estimated at 13% in 1999. One-third of the trees inventoried were knockdown trees from the chaining. There was a high density of seedling and young trees present throughout the site. In 2003 all trees were burned by the Bulldog fire and no live trees were sampled in 2004.

Wyoming big sagebrush was seeded as part of the fire rehabilitation and a few seedlings were sampled in 2004. The key browse species were black sagebrush and true mountain mahogany. Black sagebrush was the most abundant shrub, but was destroyed by the fire. In 1994, it accounted for 69% of the browse cover, and the population was estimated at 14,160 plants/acre. In 1999, estimated density was 12,600 plants/acre, with the majority being mature. Utilization was mostly light and vigor generally good over all sampling years. Percent decadency increased from 12% in 1987, to 21% by 1994, and was 22% in 1999, but this was still relatively low compared to many other sites. Mountain mahogany density was approximately 400 plants/acre in 1999, a slight decrease from 440 plants/acre estimated in 1994. The 1994 and 1999 estimates were half of the 1987 estimate, however this was due largely to the much larger shrub sample size taken in 1994 and 1999 which gives a more representative sample. During the 1987 reading, 67% of the mahogany were heavily hedged (>60% of twigs browsed). By 1994, the proportion of plants showing heavy use had decreased to 18%, and those with moderate use had increased from 25% to 45%. In 1999, 25% of the mahogany displayed moderate use with 55% showing heavy use. In 2004, 160 plants/acre were sampled that had resprouted after the fire.

The herbaceous species on the site have been diverse, but most occurred infrequently. Most perennial grasses had decreased in frequency since the initial reading in 1987, with the exception of Indian ricegrass which had increased in 1999. Crested wheatgrass showed moderate to heavy utilization in 1999. The increase in pinyon-juniper canopy cover may have caused the continued decreases in herbaceous understory abundance from 1987 to 1999 (Tausch and West 1994). Cheatgrass increased significantly in 1999, but after the fire in 2003 and subsequent rehabilitation there was a significant decrease in abundance. After fire rehabilitation, crested

wheatgrass increased significantly. Other species that were seeded and sampled in 2004 include: intermediate wheatgrass, slender wheatgrass, mountain brome, orchard grass, and Russian wildrye. Arizona fescue and prairie Junegrass were seeded but not sampled. Other species found with lower in abundance after the fire were: blue grama, Indian ricegrass, mutton bluegrass, and bottlebrush squirreltail. After the fire, perennial grass cover increased from 3% to 5% and annual grass cover decreased from 3% to 1%. Forbs have also been diverse with 23 species sampled in 1994, 21 in 1999, and 28 in 2004. Perennial forb cover doubled after the fire (3.2% to 6.3%). Seeded forbs include: alfalfa, blue flax, Rocky Mountain beeplant, sainfoin, and small burnet. Alfalfa was found in 48% of the quadrats and had 1.4% cover in 2004. Annual forb cover was almost non-existent prior to the fire, but was nearly 8% in 2004. This would be a typical response to fire and should decrease with competition from the perennial herbaceous species.

1994 TREND ASSESSMENT

Ground cover characteristics are very similar to those of the 1987 reading. Percent bare ground cover has declined slightly and erosion does not appear to be a problem on this site. Trend for soil is stable. Trend for browse is stable with healthy populations of black sagebrush and mountain mahogany. The herbaceous understory is in a state of decline. Sum of nested frequencies for perennial grasses and forbs have declined significantly since 1987.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly down (2)
winter range condition (DC index) - 54 (fair) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soil is stable with ground cover characteristics similar to those in 1994. Trend for the key browse, black sagebrush and true mountain mahogany, is stable. Although densities for both slightly decreased from 1994 estimates, percent decadency for black sagebrush did not increase and the proportion of decadent plants that are dying is very low at 4%. No decadent plants were sampled for mahogany. Vigor was good for both species even with moderate to heavy use on mahogany which is tolerant to high levels of browsing. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs increased in 1999. One negative aspect in the understory is the increase in nested and quadrat frequency values for cheatgrass.

TREND ASSESSMENT
soil- stable (3)
browse- stable (3)
herbaceous understory- stable (3)
winter range condition (DC index) - 52 (fair) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

The site burned in 2003. Trend for soil would be considered downward because of the loss of vegetative cover, litter cover, and the large increase in bare soil. Trend for the key browse, black sagebrush and true mountain mahogany, is downward because of the losses to fire. True mountain mahogany should be able to recover from the fire along with serviceberry. Black sagebrush does not resprout after fire. It can only come back through a seed source, and the fire has not left many sources. There is also the possibility that rabbitbrush could increase rapidly into the open sites left by the wildfire as it is an excellent pioneering species. Currently, browse cover is less than three-tenths of one percent. It will take the shrubs much longer to recover from the effects of the fire. Trend for the herbaceous understory is slightly improving with perennial grass nested frequency almost unchanged since 1999, while perennial forb nested frequency has

increased greatly since the fire. Overall, sum of nested frequency for perennial grasses and forbs has increased for 2003.

TREND ASSESSMENT
soil- down due to fire (1)
browse- down due to fire (1)
herbaceous understory- slightly up (4)
winter range condition (DC index) - 49 (fair-poor) Mountain big sagebrush/chaining type, that has burned and lost its browse component, but the herbaceous component has improved.

HERBACEOUS TRENDS --
Management unit 15 , Study no: 12

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	b63	a9	b46	c98	.19	.66	2.43
G	Agropyron intermedium	a-	a-	a-	b85	-	-	1.44
G	Agropyron trachycaulum	-	-	-	7	-	-	.04
G	Bouteloua gracilis	c174	b118	b97	a-	1.62	.93	-
G	Bromus carinatus	a-	a-	a-	b35	-	-	.70
G	Bromus tectorum (a)	-	a23	c177	b54	.08	3.40	1.33
G	Dactylis glomerata	-	-	-	9	-	-	.04
G	Elymus junceus	-	-	-	7	-	-	.19
G	Koeleria cristata	-	-	1	-	-	.00	-
G	Oryzopsis hymenoides	a-	a1	b57	a8	.03	.46	.01
G	Poa fendleriana	c101	c95	b61	a8	1.25	.88	.10
G	Sitanion hystrix	c163	b113	a14	a12	.43	.17	.12
G	Stipa comata	4	-	3	-	-	.00	-
Total for Annual Grasses		0	23	177	54	0.08	3.40	1.33
Total for Perennial Grasses		505	336	279	269	3.54	3.14	5.10
Total for Grasses		505	359	456	323	3.63	6.54	6.44
F	Achillea millefolium	a-	a-	a-	b24	-	-	.11
F	Agoseris glauca	a-	a3	b14	a-	.03	.10	-
F	Allium spp.	2	-	-	-	-	-	-
F	Arabis demissa	b31	a8	ab25	a3	.02	.09	.03
F	Astragalus moencopensis	a-	b12	a-	a-	.03	-	-
F	Aster spp.	-	4	-	-	.01	-	-
F	Astragalus spp.	b16	a6	a6	a-	.04	.12	-
F	Astragalus utahensis	a-	a-	a-	b47	-	-	.44
F	Castilleja chromosa	b40	a9	ab23	a-	.05	.70	-
F	Calochortus nuttallii	a-	b6	a8	a3	.02	.01	.00
F	Chenopodium fremontii (a)	-	-	-	3	-	-	.63

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Chenopodium leptophyllum(a)	-	$_{a}$-	$_{a}$-	$_{b}$24	-	-	3.62
F	Cleome spp. (a)	-	-	-	4	-	-	.06
F	Comandra pallida	$_{a}$-	$_{b}$14	$_{a}$-	$_{ab}$6	.11	-	.07
F	Crepis acuminata	-	2	1	-	.00	.01	-
F	Cryptantha spp.	-	-	3	-	-	.03	-
F	Descurainia pinnata (a)	-	2	-	2	.01	-	.00
F	Erigeron eatonii	-	-	-	3	-	-	.00
F	Eriogonum spp.	-	-	3	-	-	.00	-
F	Erigeron pumilus	19	19	19	14	.22	.09	.05
F	Eriogonum umbellatum	7	-	2	-	-	.00	-
F	Gayophytum ramosissimum(a)	-	$_{b}$28	$_{a}$-	$_{b}$27	.07	-	.72
F	Gilia spp. (a)	-	-	-	3	-	-	.03
F	Haplopappus acaulis	-	-	1	-	-	.00	.00
F	Hymenoxys acaulis	$_{b}$44	$_{b}$29	$_{b}$29	$_{a}$2	.10	.15	.00
F	Lappula occidentalis (a)	-	$_{b}$20	$_{a}$-	$_{b}$16	.12	-	.25
F	Lesquerella kingii	$_{b}$40	$_{b}$16	$_{c}$86	$_{a}$-	.04	.54	-
F	Linum lewisii	$_{bc}$51	$_{ab}$43	$_{a}$21	$_{c}$71	.13	.34	.57
F	Lomatium spp.	-	-	1	-	-	.00	-
F	Lygodesmia spinosa	$_{b}$20	$_{ab}$14	$_{a}$3	$_{ab}$7	.17	.01	.33
F	Machaeranthera canescens	3	-	-	-	-	-	.00
F	Medicago sativa	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$107	-	-	1.42
F	Nicotiana attenuata (a)	-	-	-	6	-	-	.07
F	Onobrychis viciaefolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$26	-	-	.38
F	Penstemon comarrhenus	2	6	3	-	.18	.01	-
F	Phlox longifolia	$_{b}$167	$_{a}$116	$_{a}$119	$_{a}$88	.33	.66	1.50
F	Physaria spp.	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$21	-	-	.15
F	Polygonum douglasii (a)	-	$_{b}$47	$_{a}$8	$_{b}$59	.10	.02	2.10
F	Sanguisorba minor	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$67	-	-	1.06
F	Senecio multilobatus	$_{b}$21	$_{a}$1	$_{b}$25	$_{a}$7	.00	.25	.02
F	Sphaeralcea coccinea	1	2	-	9	.00	-	.10
F	Unknown forb-perennial	3	-	-	-	-	-	-
F	Zigadenus paniculatus	2	1	2	-	.00	.03	-
Total for Annual Forbs		0	97	8	144	0.30	0.01	7.51
Total for Perennial Forbs		469	311	394	505	1.53	3.21	6.29
Total for Forbs		469	408	402	649	1.83	3.23	13.81

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

BROWSE TRENDS --
Management unit 15 , Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	4	3	0	.03	.03	-
B	Artemisia nova	96	94	0	18.32	16.84	-
B	Artemisia tridentata wyomingensis	0	0	3	-	-	.08
B	Atriplex canescens	0	0	1	-	-	.03
B	Cercocarpus montanus	17	13	4	1.15	2.04	.03
B	Chrysothamnus depressus	15	19	0	.39	.31	-
B	Chrysothamnus nauseosus	5	0	0	.18	-	-
B	Coryphantha vivipara arizonica	0	0	0	-	.01	-
B	Eriogonum microthecum	63	26	3	.64	.59	.03
B	Gutierrezia sarothrae	12	4	16	.01	.04	.11
B	Juniperus osteosperma	0	18	0	2.73	6.50	-
B	Opuntia spp.	4	1	0	-	-	-
B	Pinus edulis	0	12	0	3.24	7.62	-
B	Tetradymia canescens	1	0	0	-	-	-
Total for Browse		217	190	27	26.71	34.00	0.29

CANOPY COVER, LINE INTERCEPT --
Management unit 15 , Study no: 12

Species	Percent Cover	
	'99	'04
Eriogonum microthecum	-	.03
Gutierrezia sarothrae	-	.01
Juniperus osteosperma	4.80	-
Pinus edulis	8.39	-

POINT-QUARTER TREE DATA --
Management unit 15 , Study no: 12

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	128	-
Pinus edulis	252	-

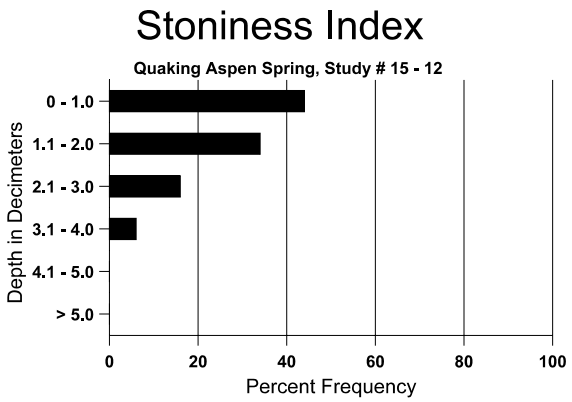
Average diameter (in)	
'99	'04
2.1	-
3.2	-

BASIC COVER --
Management unit 15 , Study no: 12

Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	7.75	33.40	39.97	18.57
Rock	18.50	22.14	24.27	29.15
Pavement	2.25	2.52	6.59	7.19
Litter	57.00	30.12	35.56	25.75
Cryptogams	.25	.00	1.26	0
Bare Ground	14.25	12.17	12.61	31.50

SOIL ANALYSIS DATA --
Management unit 15, Study no: 12, Study Name: Quaking Aspen Spring

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
12.3	64.4 (10.8)	7.5	51.3	22.2	26.6	2.1	6.6	44.8	.6



PELLET GROUP DATA --
Management unit 15 , Study no: 12

Type	Quadrat Frequency			Days use per acre (ha)	
	'94	'99	'04	'99	'04
Rabbit	17	28	16	-	-
Elk	-	-	2	-	-
Deer	9	16	2	18 (44)	1 (3)
Cattle	-	3	-	3 (7)	-
Buffalo	1	-	-	-	-

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**66**	200	66	-	-	-	100	0	-	-	0	-/-
94	**80**	-	20	60	-	-	0	0	-	-	0	32/51
99	**60**	-	-	60	-	-	0	100	-	-	0	37/48
04	**0**	-	-	-	-	-	0	0	-	-	0	29/36
Artemisia nova												
87	**12332**	4333	2866	7933	1533	-	28	9	12	.64	2	9/10
94	**14160**	360	700	10420	3040	-	0	.42	21	6	17	11/18
99	**12600**	60	780	9060	2760	1040	18	.63	22	.79	.79	12/19
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Artemisia tridentata wyomingensis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**60**	840	60	-	-	-	0	0	-	-	0	8/6
Atriplex canescens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	5/7
Cercocarpus montanus												
87	**799**	66	133	666	-	-	25	67	-	-	0	22/30
94	**440**	20	100	340	-	-	45	18	-	-	0	33/26
99	**400**	-	60	340	-	-	25	55	-	-	0	36/41
04	**160**	140	-	160	-	40	0	0	-	-	0	17/12
Chrysothamnus depressus												
87	**1466**	333	200	1133	133	-	9	14	9	-	0	6/6
94	**580**	120	80	480	20	-	0	0	3	-	0	4/7
99	**660**	40	80	520	60	-	9	0	9	6	6	4/9
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Chrysothamnus nauseosus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**120**	-	-	120	-	-	0	0	-	-	0	3/7
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Coryphantha vivipara arizonica												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	40	-	-	-	-	0	0	-	-	0	3/4
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Eriogonum microthecum												
87	**1933**	800	600	1333	-	-	28	0	0	-	0	5/4
94	**3380**	80	360	2980	40	-	0	0	1	-	2	5/6
99	**1640**	-	180	980	480	-	38	2	29	2	2	3/5
04	**120**	-	-	120	-	-	0	0	0	-	0	4/9
Gutierrezia sarothrae												
87	**999**	200	133	800	66	-	0	0	7	2	7	7/6
94	**320**	-	20	200	100	-	0	0	31	-	6	8/7
99	**120**	60	60	40	20	-	0	0	17	-	0	5/5
04	**360**	20	140	220	-	-	0	0	0	-	0	6/5
Juniperus osteosperma												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**400**	40	240	160	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	20	0	0	-	-	0	-/-
Opuntia spp.												
87	**400**	-	-	400	-	-	0	0	-	-	0	6/9
94	**80**	-	20	60	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	0	-	-	0	6/15
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
87	**532**	-	466	66	-	-	0	0	-	4	0	55/43
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**280**	20	60	220	-	20	0	0	-	-	0	-/-
04	**0**	-	-	-	-	20	0	0	-	-	0	-/-
Tetradymia canescens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	1/99
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 15-13-04

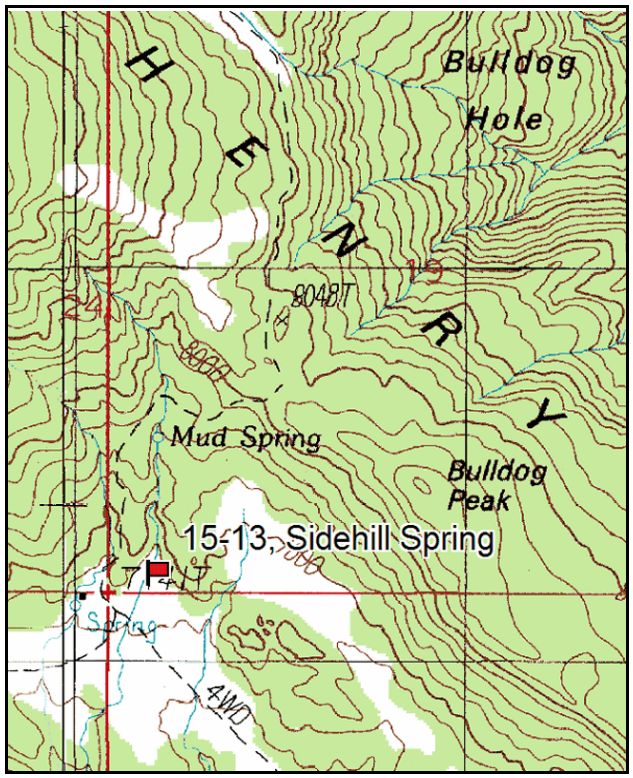
Study site name: Sidehill Spring . Vegetation type: Mountain Big Sagebrush .

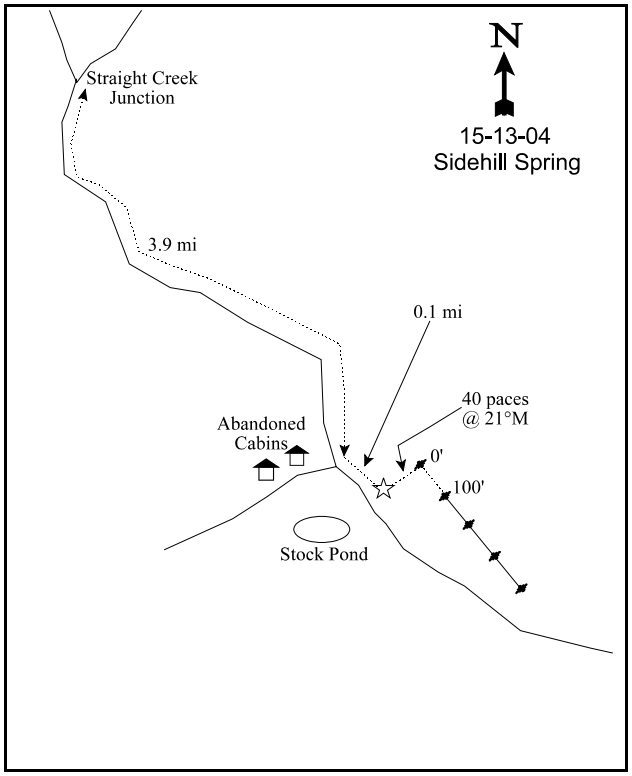
Compass bearing: frequency baseline 170 degrees magnetic.

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

LOCATION DESCRIPTION

From Straight Creek Junction (T33S, R10E, Sec. 12), proceed south on the main road for 0.3 miles to Straight Creek. Continue 3.6 miles to a minor fork by a spring, stock pond and some abandoned cabins. Bear left on the main road, cross a small wash and less than 0.1 miles into the sage flat where a witness post for the transect is found on the left side of the road. The study area is northeast of the witness post. The 0-foot stake has browse tag #472 attached, and is 40 paces away at a bearing of 21°M from the witness post.





Map Name: Cass Creek Peak

Diagrammatic Sketch

Township 33S , Range 11E , Section 19

GPS: NAD 27, UTM 12S 4196186 N, 522194 E

DISCUSSION

Sidehill Spring - Trend Study No. 15-13

The Sidehill Spring study is located one-half mile west of Bulldog Peak and halfway between Mt. Pennell and Mt. Hillars. The elevation at the site is 7,740 ft and the slope is gradual (4-5%) with a southeast aspect. This area was a sagebrush flat surrounded by a pinyon-juniper/oak woodland with young trees scattered throughout the flat, but it burned in 2003 in the Bulldog fire. The site was seeded and chained by the BLM to rehabilitate the area after the fire. The area is within the Pennell Allotment. Water is available for livestock and wildlife in a nearby spring, creek, and stock pond. This was considered a key area for mule deer during the summer and during mild winters, but after the fire there was very little browse available for deer. The 1999 pellet count data estimated 18 deer days use/acre (44 ddu/ha) and 25 cow days use/acre (63 cdu/ha). The pellet group transect data from 2004 showed only about 1 deer days use/acre (3 ddu/ha). There is evidence of past mining activity; a cabin, pump house, and old mining equipment is located near the spring.

The soil is a fairly deep loam soil with an estimated effective rooting depth of over 15 inches. Soil penetrometer readings used to estimate a stoniness profile index, indicated few rock within the profile. Almost all penetrometer readings were to the beginning of a clay hardpan. There was very little rock or pavement on or near the soil surface, about 5-8%. Black sagebrush was present in small scattered patches on the site before the burn indicating that at least some rocky and/or shallow hardpan exists within the soil profile. Some active gullies were noted in 1999. In 2004 erosion was rated a slight, with some erosion around the 0 and 200-foot stakes. Organic matter content is moderate at 2%. Phosphorus and potassium levels are near normal or above for normal plant development. The soil is slightly alkaline (pH of 7.4).

A dense stand of mostly mountain big sagebrush dominated the site prior to the 2003 Bulldog wildfire. Sagebrush density had been increasing with each sampling date to 5,920 plants/acre in 1999. Cover of sagebrush was relatively stable at nearly 19% in 1994 and 1999. Use was mostly light and vigor was good on the majority of the sagebrush. Percent decadency declined to 12% by 1999. After the fire density was only 520 young plants/acre. Seedlings were abundant with an estimated 1,560/acre. Sagebrush was not seeded here, but fourwing saltbush was and was noted in the tracks of the bulldozers. The only other shrub to be sampled was stickyleaf low rabbitbrush which has the potential to quickly increase after fire.

Perennial grasses had only 1.5% cover in 1994 and 2.2% in 1999. During this period of time, cheatgrass increased from less than 1% to almost 17% cover (an obvious fire hazard). After the fire in 2003 and the fire rehabilitation, cheatgrass had only 2% cover and had significantly lower nested frequency than both 1994 and 1999. Perennial grass cover was 8.6% in 2004 and much more abundant. Crested wheatgrass, intermediate (pubescent and tall) wheatgrass, Russian wildrye, Indian ricegrass, alfalfa, and Lewis flax were all seeded. Nested frequency for perennial forbs have also increased since the fire, but annual forbs have increased as they usually do following a major disturbance like a fire. They should decrease in time with competition from the perennial component of the herbaceous understory.

1994 TREND ASSESSMENT

Basic ground cover estimates were similar to those of 1987. Erosion is occurring on the site, nevertheless it does not appear to be severe. Continued increases in the shrub component will tend to accelerate erosion problems on this site. Trend for soil is currently stable. The browse population on this site is relatively dense. There are a combined total of 15,020 shrubs/acre on this site. Mountain big sagebrush and rabbitbrush account for 97% of that total. Both populations appear healthy with low percent decadency and dynamic biotic and reproductive potentials. Trend for browse is stable at this time, but an increase in decadency of sagebrush and rabbitbrush will likely occur in the future as the intraspecific and interspecific competition becomes more intense when coupled with continued drought. The herbaceous component is severely limited due to the

abundance of shrubs. Sum nested frequencies of perennial grasses have declined slightly, while those of perennial forbs increased. Nested frequency of silky lupine increased by 36%. Overall, trend for herbaceous understory is up but still deficient of perennial grasses which noted a slight drop in their nested frequency values. Thinning of sagebrush and rabbitbrush would be required before a more substantial improvement of the herbaceous understory is realized.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - up slightly (4)
winter range condition (DC index) - 52 (fair) Mountain big sagebrush type, mostly because of the depleted herbaceous understory.

1999 TREND ASSESSMENT

Trend for soil continues to be stable. The increase in cheatgrass brome decreased the amount of bare soil, while increasing herbaceous vegetative cover. Erosion is evident at the site with pedestaling around shrub stems, however some of the gullies at the site appear to be healing with herbaceous cover. Trend for the key browse, mountain big sagebrush, is stable. Percent decadency decreased from 29% in 1994 to 12% currently. Use is mostly light and vigor is good on most plants. The main negative indicator for sagebrush is the high proportion of decadent plants classified as dying (53%). However, recruitment from young plants is good at 14% and should provide enough incoming individuals to offset the loss of those that are dying. Trend for the herbaceous understory is down. The annual cheatgrass is by far the dominant species and is rapidly increasing over the site. Also, the quadrat and sum of nested frequencies for perennial grasses and forbs decreased in 1999.

TREND ASSESSMENT
soil- stable (3)
browse- stable (3)
herbaceous understory- down (1)
winter range condition (DC index) - 46 (poor) Mountain big sagebrush type, mostly because of the depleted herbaceous understory and the negative impact of the increase in cheatgrass.

2004 TREND ASSESSMENT

Trend for soil is down now because of the fire causing percent bare soil to more than triple to over 60%. The browse trend is also obviously down with all the mature browse being lost to the wildfire. Currently there are a few young mountain big sagebrush plants on the area (520 plants/acre). After fire rehabilitation perennial grass cover has increased to almost 9%, while cheatgrass cover has gone from almost 17% down to about 2%. Nested frequency for perennial forbs have also increased since the fire, but annual forbs have increased as they usually do following a major disturbance like a fire. They will decrease in time with competition from the perennial component of the herbaceous understory if there is not a significant grazing disturbance in the spring and early summer. Trend for the herbaceous understory is upward. The DCI rated this site as fair and the improvement is due to the increase in the perennial herbaceous understory, but the browse component was lost.

TREND ASSESSMENT
soil- down (1)
browse- down (1)
herbaceous understory- up (5)
winter range condition (DC index) - 56 (fair) Mountain big sagebrush type,

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

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	a-	a-	a-	b75	-	-	1.84
G	Agropyron intermedium	a-	a-	a-	b89	-	-	2.33
G	Agropyron spp.	9	-	-	-	-	-	-
G	Agropyron spicatum	-	-	-	3	-	.01	.00
G	Agropyron trachycaulum	a-	a-	a-	b69	-	-	1.83
G	Bouteloua gracilis	-	4	3	3	.00	.00	.15
G	Bromus carinatus	a-	a-	a-	b41	-	-	.98
G	Bromus tectorum (a)	-	b163	c326	a55	.80	16.80	2.17
G	Dactylis glomerata	-	-	-	5	-	-	.18
G	Elymus junceus	a-	a-	a-	b18	-	-	.45
G	Hilaria jamesii	2	-	-	-	-	-	-
G	Oryzopsis hymenoides	b33	a13	ab16	a10	.13	.17	.07
G	Poa interior	-	4	2	-	.03	.00	-
G	Sitanion hystrix	c138	c138	b88	a13	1.36	1.94	.75
G	Stipa lettermani	-	6	1	-	.01	.03	-
Total for Annual Grasses		0	163	326	55	0.80	16.80	2.17
Total for Perennial Grasses		182	165	110	326	1.55	2.16	8.63
Total for Grasses		182	328	436	381	2.35	18.97	10.81
F	Achillea millefolium	a-	a-	a-	b22	-	-	.77
F	Astragalus spp.	-	-	-	3	-	.00	.01
F	Castilleja linariaefolia	-	-	3	-	-	.41	-
F	Calochortus nuttallii	a7	b54	b41	a11	.14	.29	.03
F	Chenopodium album (a)	-	-	-	2	-	-	.18
F	Chenopodium leptophyllum(a)	-	a-	a-	b17	-	-	1.94
F	Gayophytum ramosissimum(a)	-	ab9	a-	b17	.02	-	.47
F	Ipomopsis aggregata	b11	a-	a-	a-	-	-	-
F	Lappula occidentalis (a)	-	4	-	4	.01	-	.18
F	Linum lewisii	a5	a3	a-	b17	.00	-	.28
F	Lomatium spp.	-	3	6	-	.03	.06	-
F	Lupinus sericeus	b58	c160	b71	a14	4.92	2.67	.78
F	Lygodesmia spinosa	-	-	-	8	-	-	1.21
F	Medicago sativa	-	-	-	8	-	-	.51
F	Nicotiana attenuata (a)	-	a-	a-	b10	-	-	.49
F	Penstemon comarrhenus	5	2	4	2	.00	.02	.15
F	Penstemon spp.	-	-	-	-	-	-	.00

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	Phlox longifolia	$_{b}$12	$_{a}$-	$_{ab}$5	$_{c}$72	-	.01	.83
F	Polygonum douglasii (a)	-	$_{a}$-	$_{a}$-	$_{b}$33	-	-	1.62
F	Ranunculus testiculatus (a)	-	-	-	6	-	-	.01
F	Solanum triflorum (a)	-	-	-	2	-	-	.89
F	Sphaeralcea coccinea	-	-	1	2	-	.15	.21
F	Zigadenus paniculatus	-	6	-	-	.01	.01	-
Total for Annual Forbs		0	13	0	91	0.02	0	5.80
Total for Perennial Forbs		98	228	131	159	5.11	3.63	4.80
Total for Forbs		98	241	131	250	5.14	3.63	10.60

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

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

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	2	2	0	.03	-	-
B	Artemisia nova	0	2	0	-	.41	-
B	Artemisia tridentata vaseyana	93	89	15	19.32	18.78	.30
B	Atriplex canescens	0	0	2	-	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	77	66	10	6.09	7.08	.26
B	Juniperus osteosperma	0	5	0	4.61	7.52	-
B	Opuntia spp.	5	5	0	.00	.00	-
B	Pinus edulis	0	3	0	1.61	2.62	-
B	Quercus gambelii	0	0	1	-	-	-
B	Rosa woodsii	0	0	1	-	-	-
B	Symphoricarpos oreophilus	10	7	1	.33	.18	.00
Total for Browse		187	179	30	32.02	36.63	0.57

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

Species	Percent Cover	
	'99	'04
Artemisia tridentata vaseyana	-	.11
Atriplex canescens	-	.18
Chrysothamnus viscidiflorus viscidiflorus	-	.08
Juniperus osteosperma	3.79	-
Pinus edulis	3.40	-
Symphoricarpos oreophilus	-	.16

POINT-QUARTER TREE DATA --
Management unit 15 , Study no: 13

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	29	-
Pinus edulis	17	-

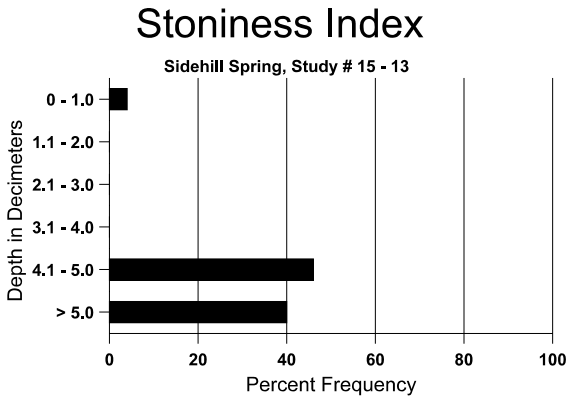
Average diameter (in)	
'99	'04
4.5	-
4.5	-

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

Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	7.25	40.99	53.78	20.81
Rock	.25	2.09	1.99	4.44
Pavement	2.00	.50	.99	3.35
Litter	62.75	32.65	39.14	10.51
Cryptogams	0	.18	.38	0
Bare Ground	27.75	25.28	24.26	68.29

SOIL ANALYSIS DATA --
Management unit 15, Study no: 13, Study Name: Sidehill Spring

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.4	61.0 (16.4)	7.3	37.6	37.8	24.6	2.1	13.6	252.8	0.6



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

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	19	24	19
Elk	1	-	1
Deer	12	5	3
Cattle	-	2	-

Days use per acre (ha)	
'99	'04
-	-
-	-
18 (44)	1 (3)
25 (63)	-

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 13

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**60**	-	-	60	-	-	33	0	-	-	0	17/143
99	**40**	-	-	40	-	-	0	0	-	-	0	48/44
04	**0**	-	-	-	-	-	0	0	-	-	0	25/48
Artemisia nova												
87	**1533**	1733	733	800	-	-	9	0	-	-	17	9/8
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	-	60	-	40	0	0	-	-	0	19/31
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia tridentata vaseyana												
87	**4799**	466	2266	2400	133	-	26	0	3	-	17	20/19
94	**5600**	3020	840	3120	1640	-	2	.71	29	9	9	51/54
99	**5920**	240	800	4400	720	1300	2	0	12	6	6	24/36
04	**520**	1560	520	-	-	280	0	0	0	-	0	14/26

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Atriplex canescens												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**60**	60	60	-	-	-	0	0	-	-	0	14/8
Cercocarpus montanus												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	12/9
Chrysothamnus viscidiflorus viscidiflorus												
87	**11332**	200	3866	7466	-	-	0	0	0	-	4	4/8
94	**8340**	3960	720	7520	100	-	.47	.23	1	-	0	31/22
99	**11000**	200	1400	9540	60	-	0	0	1	.18	.18	5/10
04	**340**	-	-	340	-	-	0	0	0	-	0	7/9
Gutierrezia sarothrae												
87	**866**	-	66	800	-	-	0	0	-	-	0	9/5
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Juniperus osteosperma												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	-	-	100	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	20	0	0	-	-	0	-/-
Opuntia spp.												
87	**132**	133	66	66	-	-	0	0	-	-	0	4/7
94	**200**	-	80	120	-	-	0	0	-	-	0	5/16
99	**100**	-	-	100	-	-	0	0	-	-	0	4/7
04	**0**	-	-	-	-	-	0	0	-	-	0	7/7
Pinus edulis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	20	40	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	60	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Quercus gambelii												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	-	40	-	-	0	0	-	-	0	25/19
Rosa woodsii												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	10/13
Symphoricarpos oreophilus												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**260**	20	40	180	40	-	15	0	15	-	0	9/46
99	**280**	-	160	120	-	-	0	0	0	-	0	17/24
04	**40**	-	-	40	-	-	0	0	0	-	100	15/36

Trend Study 15-14-04

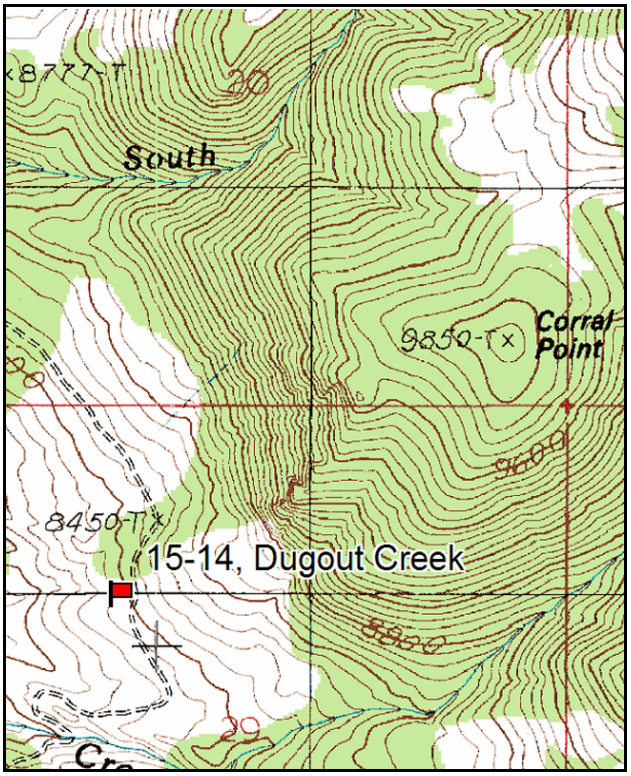
Study site name: Dugout Creek . Vegetation type: Mountain Big Sagebrush .

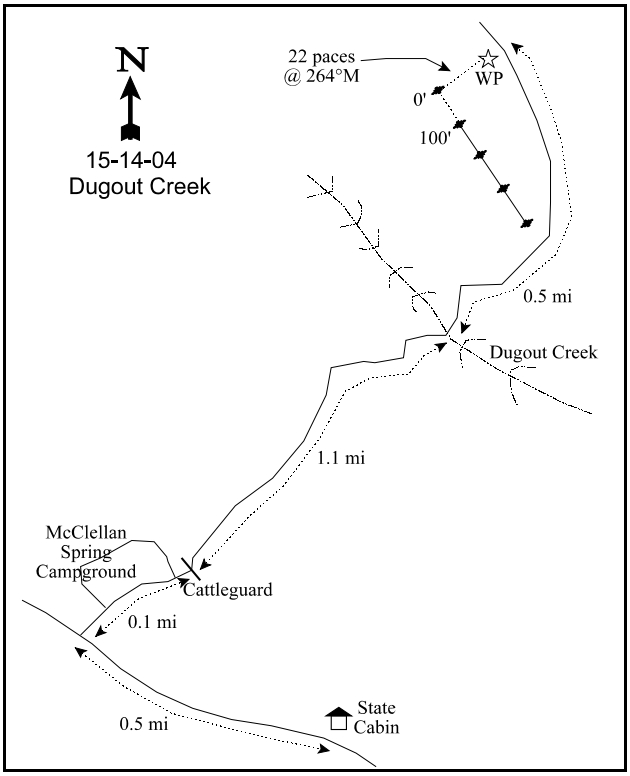
Compass bearing: frequency baseline 140°M-lines 1-2; 145°M-line 3; 140°M-line 4.

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

LOCATION DESCRIPTION

From the DWR State Cabin travel north-west toward McClellan Spring for 0.5 miles. Turn right onto the road passing McClellan Spring Campground. Travel 0.1 miles to a cattleguard. Cross the cattleguard and continue 1.1 miles to Dugout Creek. Continue 0.5 miles past the creek to a witness post on the left hand side of the road. The beginning of the baseline is 22 paces from the witness post at 264°M. The 0-foot stake is marked with browse tag #153.





Map Name: Mount Ellen

Township 31S , Range 10E , Section 29

Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4214962 N, 514504 E

DISCUSSION

Dugout Creek - Trend Study No. 15-14

The Dugout Creek study is a replacement study for Dugout (15-3) which was in an area too small to lengthen the transect the larger sampling size adopted in 1992. This new site is just a short distance from the old one. It is located on a sagebrush flat that is surrounded by scattered pinyon, juniper, and oak brush. The site is dominated by mountain big sagebrush and secondarily by black sagebrush. The site is considered a key wintering area for deer. The site is located on a southeast aspect at an elevation of 8,360 feet with a variable slope of 10-15%. Water is available for livestock and wildlife within one-quarter mile of the study site. The site lies within the Nasty Flat Cattle Allotment. Pellet group data from 2004 indicates light use by cattle and bison with 3 cow days use/acre (7 cdu/ha) and 9 bison days use/acre (21 bdu/ha). Deer use was moderate at 41 deer days use/acre (102 ddu/ha).

The soils appear to be fairly deep with an estimated average effective rooting depth of almost 11 inches, although the measurements were quite variable as indicated by the abundance of both mountain big sagebrush (deeper soils) and black sagebrush (more shallow soils). There is a somewhat restrictive clay layer from 6 to 10 inches in depth, but it is quite variable, creating the distributional mosaic of mountain big sagebrush and black sagebrush. Rocks are prevalent on the soil surface (almost 15%) and throughout the upper portion of the soil profile. The soil is brown, clay loam with a neutral pH (7.3). Erosion was rated as stable in 2004. Vegetative and litter cover appears to be adequate to keep erosion at minimal levels. Some of the steeper slopes surrounding the site show more erosion.

Mountain big sagebrush and black sagebrush are the key browse species in the area. Mountain big sagebrush is the most abundant browse on the site with an estimated density of 3,340 plants/acre and 15% cover which is 47% of the total browse cover. There were no plants classified as young, but there were just over 10,000 seedlings/acre. Percent decadence is slightly above what one would normally expect at 31%. Forty-four percent of the plants were classified with moderate use. Black sagebrush was second in abundance in 2004 with an estimated density of 2,880 plants/acre and 7% cover. Recruitment was fair at 8% of the population classified as young. Percent decadence is moderate at 36%. Only 8% of the plants were determined to have moderate use. The moderately high percent decadence with the sagebrush has been common throughout the state due to drought. At this higher elevation it is not as pronounced as at the lower elevations.

Other preferred browse sampled were serviceberry and Gambel oak. Serviceberry is an important species, but is not very abundant (60 plants/acre) so it is not considered a key species here. Gambel oak shows little to no use. Pinyon pine, juniper, Rocky Mountain juniper, and limber pine are present but in low numbers. All four species combined only contribute to 6% total cover.

Grasses and forbs are diverse on the site, but none are particularly abundant. Eight grass and twenty forb species were sampled, totaling 34% of the total vegetative cover. Nearly 60% of the herbaceous understory is made up of cheatgrass (10% cover). Cheatgrass is found in association with mountain big sagebrush on this site. Soils must be different where black sagebrush occurs as no cheatgrass was found there. Slender wheatgrass, mutton bluegrass and bottlebrush squirreltail are the most abundant perennial grasses on the site. All occur at nearly the same quadrat frequency. These three species contribute to 91% of the perennial grass component. cheatgrass is a problem as it contributes to 59% of the total herbaceous cover.

APPARENT TREND ASSESSMENT

In 2004, litter cover (47%) and vegetative cover (49%) contribute substantially to total ground cover (96%). This would indicate that the site is well buffered from the erosive forces of wind and water. The browse trend would be considered stable to slightly down, depending on what proportion of the mountain big sagebrush

seedlings become established, because there is no young age class within the population at this time. At this time, mountain big sagebrush contributes to 47% of the total browse cover. The herbaceous understory trend would be thought of as slightly downward because of the large amount of cheatgrass throughout the understory. Currently, it makes up almost 60% of the herbaceous cover. Winter range condition (DC index) is 42, which is poor for a mountain big sagebrush community. It received a fairly low value because of the moderately high decadence for the preferred browse species and the high amount of cheatgrass on the site.

winter range condition (DC Index) - 42 (poor) Mountain big sagebrush type

HERBACEOUS TRENDS --
Management unit 15 , Study no: 14

Type	Species	Nested Frequency '04	Average Cover % '04
G	Agropyron trachycaulum	48	1.36
G	Bromus tectorum (a)	271	9.84
G	Oryzopsis hymenoides	1	.00
G	Poa fendleriana	45	1.32
G	Poa pratensis	2	.03
G	Poa secunda	3	.03
G	Sitanion hystrix	53	.85
G	Stipa lettermani	19	.30
Total for Annual Grasses		271	9.84
Total for Perennial Grasses		171	3.90
Total for Grasses		442	13.75
F	Agoseris glauca	12	.04
F	Antennaria rosea	4	.18
F	Arabis spp.	1	.00
F	Aster spp.	6	.03
F	Castilleja linariaefolia	7	.07
F	Calochortus nuttallii	10	.03
F	Cirsium spp.	1	.03
F	Crepis acuminata	48	.58
F	Cymopterus spp.	12	.04
F	Erigeron eatonii	38	.68
F	Gayophytum ramosissimum(a)	8	.06
F	Ipomopsis aggregata	4	.04
F	Lappula occidentalis (a)	39	.22
F	Lomatium spp.	5	.03
F	Machaeranthera canescens	4	.01
F	Phlox longifolia	21	.13

Type	Species	Nested Frequency '04	Average Cover % '04
F	Polygonum douglasii (a)	66	.20
F	Senecio multilobatus	1	.00
F	Taraxacum officinale	8	.31
F	Tragopogon dubius	5	.06
Total for Annual Forbs		113	0.49
Total for Perennial Forbs		187	2.32
Total for Forbs		300	2.81

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

BROWSE TRENDS --
Management unit 15 , Study no: 14

Type	Species	Strip Frequency '04	Average Cover % '04
B	Amelanchier utahensis	3	.03
B	Artemisia nova	37	7.15
B	Artemisia tridentata vaseyana	56	14.93
B	Chrysothamnus depressus	1	-
B	Chrysothamnus nauseosus graveolens	8	1.01
B	Gutierrezia sarothrae	25	1.14
B	Juniperus osteosperma	1	.85
B	Juniperus scopulorum	0	3.77
B	Opuntia spp.	1	-
B	Pinus edulis	1	1.00
B	Pinus flexilis	1	.85
B	Quercus gambelii	4	.76
Total for Browse		138	31.52

CANOPY COVER, LINE INTERCEPT --
Management unit 15 , Study no: 14

Species	Percent Cover '04
Amelanchier utahensis	.36
Artemisia nova	5.98
Artemisia tridentata vaseyana	15.30
Chrysothamnus nauseosus graveolens	1.11
Gutierrezia sarothrae	.51
Juniperus osteosperma	1.08
Juniperus scopulorum	4.59
Pinus edulis	1.60
Pinus flexilis	1.26
Quercus gambelii	.90

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 15 , Study no: 14

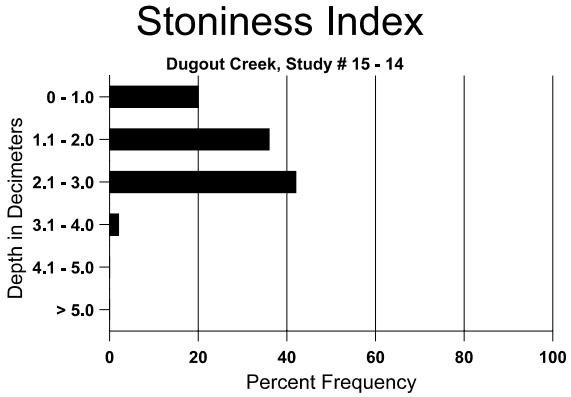
Species	Average leader growth (in) '04
Artemisia tridentata vaseyana	1.4

BASIC COVER --
Management unit 15 , Study no: 14

Cover Type	Average Cover % '04
Vegetation	48.49
Rock	11.46
Pavement	3.27
Litter	46.51
Cryptogams	.03
Bare Ground	12.10

SOIL ANALYSIS DATA --
Management unit 15, Study no: 14, Study Name: Dugout Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
10.5	58.4 (11.8)	7.2	28.3	32.2	39.5	2.1	14.0	361.6	0.5



PELLET GROUP DATA --
Management unit 15 , Study no: 14

Type	Quadrat Frequency '04	Days use per acre (ha) '04
Rabbit	11	-
Deer	8	42 (103)
Cattle	-	3 (7)
Buffalo	7	9 (22)

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 14

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
04	**60**	-	-	60	-	-	67	0	-	-	0	29/35
Artemisia nova												
04	**2880**	460	240	1600	1040	460	8	0	36	9	9	12/24
Artemisia tridentata vaseyana												
04	**3340**	10080	-	2300	1040	960	44	0	31	13	13	26/35
Cercocarpus montanus												
04	**0**	-	-	-	-	-	0	0	-	-	0	36/45
Chrysothamnus depressus												
04	**20**	-	-	20	-	-	0	0	-	-	0	6/10
Chrysothamnus nauseosus graveolens												
04	**260**	20	-	140	120	-	0	0	46	8	15	34/39

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
04	**1180**	60	180	980	20	-	8	0	2	-	0	7/9
Juniperus osteosperma												
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Opuntia spp.												
04	**20**	-	20	-	-	-	0	0	-	-	0	4/18
Pinus edulis												
04	**20**	60	20	-	-	-	0	0	-	-	0	-/-
Pinus flexilis												
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Quercus gambelii												
04	**420**	-	80	340	-	120	0	0	-	-	0	45/22
Ribes spp.												
04	**0**	-	-	-	-	-	0	0	-	-	0	61/56
Symphoricarpos oreophilus												
04	**0**	-	-	-	-	-	0	0	-	-	0	20/44

Trend Study 15-15-04

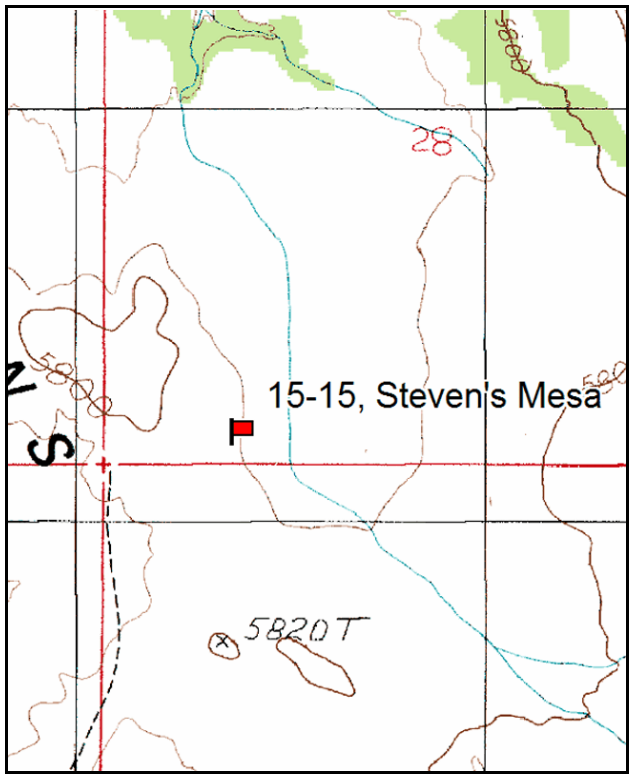
Study site name: Steven's Mesa . Vegetation type: Desert Shrub .

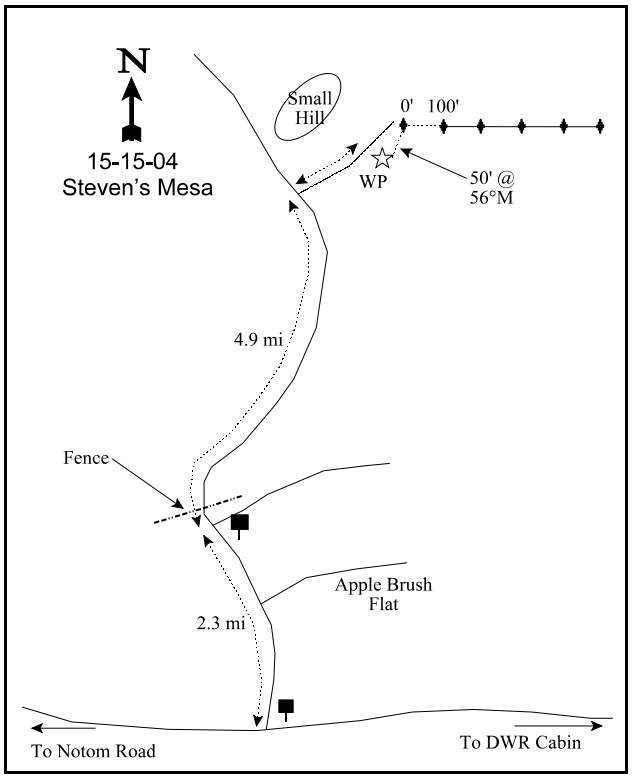
Compass bearing: frequency baseline 86 degrees magnetic.

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

LOCATION DESCRIPTION

On the road between Notom Road and the DWR State Cabin look for a sign for the turnoff to Stevens Mesa and Apple Brush Flat. Take this turnoff and travel north for 2.3 miles to a fork with a sign for Stevens Mesa and Cedar Creek Bench. Stay to the left passing through a fence and continue 4.9 miles to a very faint 2-track. Take a right onto the 2-track and travel 0.2 miles to a witness post on the right side of the road. The 0-foot stake is 50 feet from the witness post at 56°M and is marked with browse tag #139.





Map Name: Stevens Mesa

Diagrammatic Sketch

Township 30S , Range 9E , Section 28

GPS: NAD 27, UTM 12S 4224180 N, 504380 E

DISCUSSION

Stevens Mesa - Trend Study No. 15-15

Stevens Mesa is located on the a lower elevation gently sloping mesa. The area is north and west of Mt. Ellen at an elevation of 5,800 feet. The site has a slight 1% slope to the east. The site was located on this mesa because of the complaints of permittees for the perceived excessive use by bison on this winter allotment. It is felt that the bison are forced down to the lower elevation when the cattle are up high, thereby eating the forage that the cattle would use latter in the winter. It is doubtful that this site would be much use to any class of animal. The pellet group transect showed little use, probably about a year old. The bison use was estimated at only 2 bison days use/acre (5 bdu/ha). Cattle use on the site was evident, but not enough to estimate use. The amount of rabbit droppings was very high on site as almost half of the 100 quadrats had droppings in them.

The soil is a sandy loam with few rocks, but some desert pavement on the surface which is limited to only on average about 6% cover. The soil is loose and easily transported by wind. It is characterized as being slightly alkaline (pH of 7.4) in nature with relatively low amounts of organic matter (.72). The amounts of phosphorus in the soil is marginal for what is thought necessary for normal plant growth. There is a compacted layer of fine sands and clay at about 6 inches with a hardpan of clay at about 10 inches associated with an accumulation of calcium carbonate. The high amount of bare soil (72%), there is obviously a high amount of wind erosion on this site. Serious erosion by water would not be a problem on this site because of the lack of slope and characteristics of a sandy soil. This area basically has a low site potential.

Four-wing saltbush is the only preferred browse species on this site and only had 3% cover with a density of 900 plants/acre in 2004. Percent decadence is acceptable at 18%, but the percentage plants also classified as dying is relatively high (13%), but not unusual for a dry lower elevation site. The remainder of the cover is made up of two useless increaser species, narrowleaf low rabbitbrush and broom snakeweed. Together, these two species had almost 14% cover in 2004. This is not a good indicator of anything other than a downward trend.

The herbaceous understory was poor as total grass cover was only a little over 1%. Forb cover was about 7.5%, but that was nearly completely from annual species with little value. The only good thing that can be said of the site is that cheatgrass was not sampled.

2004 APPARENT TREND ASSESSMENT

Litter cover (9%) and vegetative cover (25%) contribute to very little protective ground cover as percent bare soil is very high at 72%. Soil trend would obviously be downward. Most soil loss on this site would mostly be from wind related events rather than water and runoff events because of the characteristic of sandy soil, almost flat ground, and low precipitation area. The shrub component is poorly represented by only four-wing saltbush which only contributes to 3% cover, while two “useless increasers” make up nearly 14% cover, or 81% of the total browse cover. The herbaceous understory is also in poor condition and downward trend because the grass component barely contributes to 1% cover. The forb component is also poorly represented with 99% of the forb cover coming from weedy annuals. Winter range condition (DC index) is only 23 which is rated as poor for a desert shrub community. It received a fairly low value because of the low cover value for the preferred browse species and the poor herbaceous component, for both grasses and forbs.

winter range condition (DC Index) - 23 (poor) Desert shrub type

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

Type	Species	Nested Frequency '04	Average Cover % '04
G	Bouteloua gracilis	3	.15
G	Hilaria jamesii	52	.64
G	Oryzopsis hymenoides	24	.26
G	Sporobolus cryptandrus	30	.28
Total for Annual Grasses		0	0
Total for Perennial Grasses		109	1.33
Total for Grasses		109	1.33
F	Gilia spp. (a)	39	.42
F	Helianthus annuus (a)	2	.18
F	Lappula occidentalis (a)	12	.11
F	Mentzelia albicaulis (a)	122	5.01
F	Plantago patagonica (a)	4	.01
F	Salsola iberica (a)	31	1.78
F	Sphaeralcea grossulariaefolia	9	.07
F	Townsendia spp.	2	.00
Total for Annual Forbs		210	7.53
Total for Perennial Forbs		11	0.07
Total for Forbs		221	7.61

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

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

Type	Species	Strip Frequency '04	Average Cover % '04
B	Atriplex canescens	28	3.17
B	Chrysothamnus viscidiflorus stenophyllus	62	9.12
B	Ephedra viridis	2	-
B	Gutierrezia sarothrae	71	4.70
Total for Browse		163	16.99

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

Species	Percent Cover '04
Atriplex canescens	3.29
Chrysothamnus viscidiflorus stenophyllus	8.28
Ephedra viridis	.33
Gutierrezia sarothrae	6.33

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

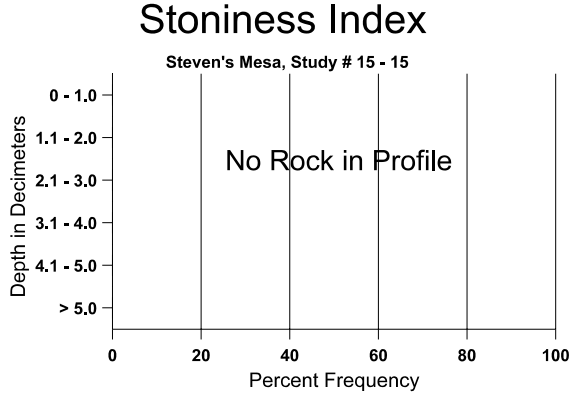
Species	Average leader growth (in) '04
Atriplex canescens	8.2

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

Cover Type	Average Cover % '04
Vegetation	25.42
Rock	.02
Pavement	5.69
Litter	8.71
Bare Ground	72.12

SOIL ANALYSIS DATA --
Management unit 15, Study no: 15, Study Name: Steven's Mesa

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
9.3	70.4 (9.4)	7.4	63.6	13.8	22.6	0.7	10.9	185.6	0.5



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

Type	Quadrat Frequency '04	Days use per acre (ha) '04
Rabbit	47	-
Cattle	2	-
Bison	4	2 (5)

BROWSE CHARACTERISTICS --
Management unit 15 , Study no: 15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Atriplex canescens												
04	**900**	-	100	640	160	40	13	7	18	13	16	25/29
Chrysothamnus viscidiflorus stenophyllus												
04	**4220**	-	-	4060	160	500	0	0	4	.47	.47	10/15
Ephedra viridis												
04	**40**	-	-	40	-	-	0	0	-	-	0	8/9
Gutierrezia sarothrae												
04	**4720**	-	140	4500	80	440	0	0	2	.84	.84	7/9
Opuntia spp.												
04	**0**	-	-	-	-	-	0	0	-	-	0	4/12

SUMMARY

MANAGEMENT UNIT 15 - HENRY MOUNTAINS

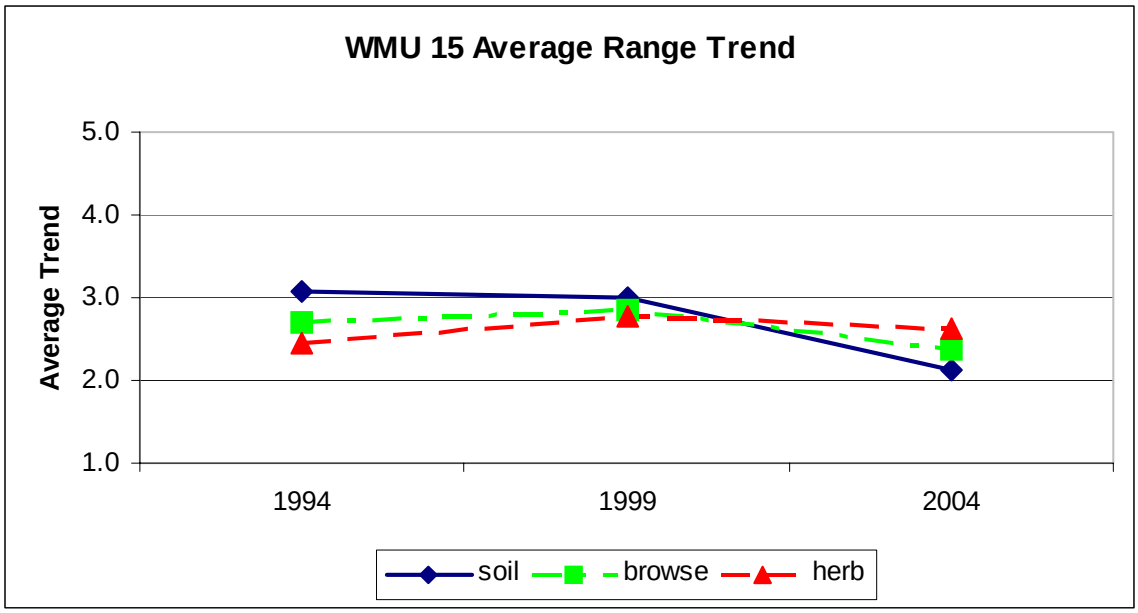
Lower elevation winter range transects include Eagle Bench (#1) and Stevens Mesa (#15, new site). Cave Flat Chaining (#9) and Cave Flat (#10) were not read due to poor road conditions. Browse trend is slightly down on Eagle Bench. Herbaceous trend is also slightly down on Eagle Bench with perennial species decreasing in nested frequency. The perennial grass component barely contributes to 1% cover, and the forbs are almost entirely made up of annuals. Soil trend for Eagle Bench (#1) is slightly improved, while the Stevens Mesa (#15) is down because of very little herbaceous cover and over 70% bare soil.

Pinyon-juniper chaining projects make up a large portion of spring and summer range for deer and bison on the unit. The most important vegetational aspect of these treatments is their herbaceous understory. Five study sites occur within these treatments. They include: South Creek Chaining (#4), Bates Knob (#5), Box Springs Chaining (#6), Airplane Spring (#7), and Quaking Aspen Spring (#12). Soil trends for all sites was variable. Although, all were down to slightly down except for Airplane Spring which was determined as stable. Most all these downward changes were due to the decrease in protective ground cover. Browse trends were either stable to slightly improved for all of the sites, except Quaking Aspen Spring (#12) which was down because of the fire. The South Creek Chaining (#4), Box Springs Chaining (#6), and Airplane Spring Chaining (#7) showed slightly downward herbaceous trends, while Bates Knob was showing a downward trend with the drought. The only site that showed an upward trend for herbaceous species was Quaking Aspen Spring (#12), where herbaceous species were seeded with the fire rehabilitation.

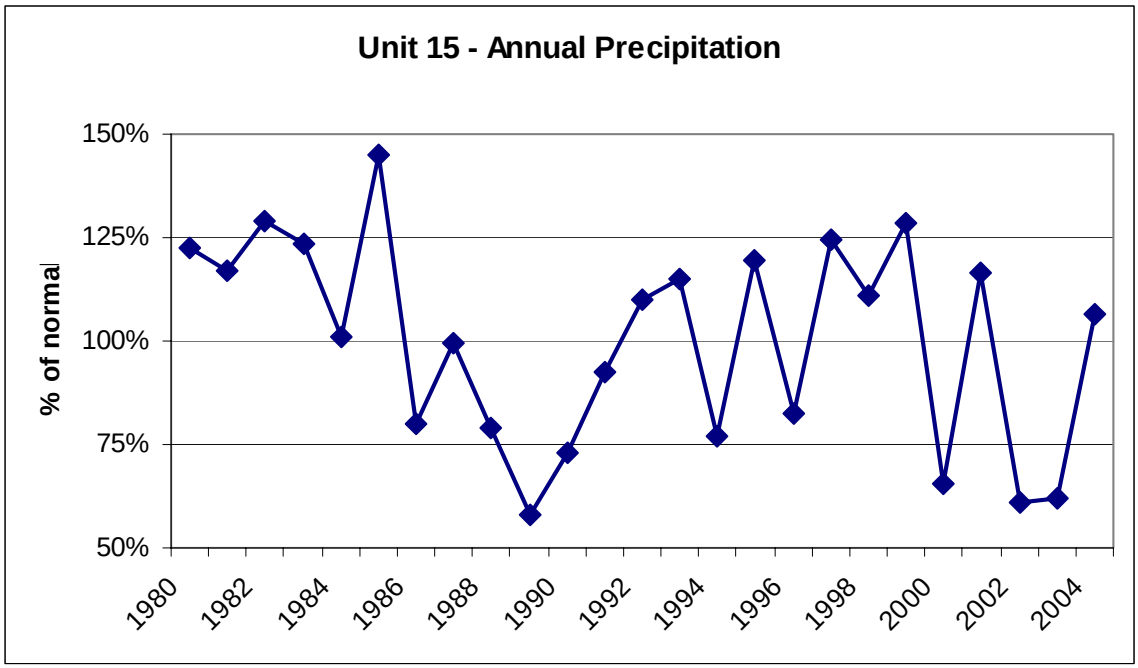
Other summer range sites which occur outside of pinyon-juniper chainings include a pinyon-juniper woodland which is proposed for future treatment Garden Basin (#8 and suspended until treated); two mountain big sagebrush flats Sidehill Spring (#13 which burned in 2003) and Dugout Creek (#14 new site); two mixed mountain brush sites, Dugout (#3) and Above Coyote Bench (#11), which were both suspended; and one aspen area, Nasty Flat (#2). Sidehill Spring (#13) displays downward soil and browse trends since the fire. The herbaceous trend upward now with cheatgrass playing a more limited role in the understory. The aspen site at Nasty Flat (#2) occurs in a mature aspen stand with little browse component. The baseline was relocated closer to the edge of the clone in 1999 to better sample aspen regeneration. Trends continue to be stable for all categories except for browse, which was slightly down but of little consequence for this site.

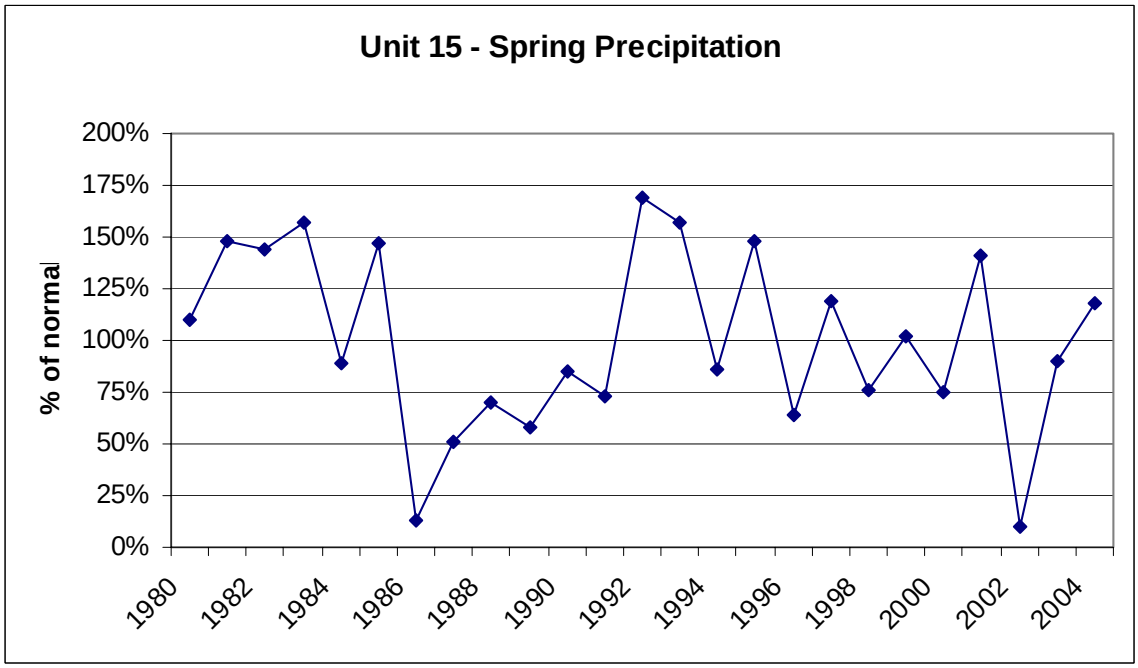
Average Range Trends -- WMU 15 Henry Mountains

	1994	1999	2004
soil	3.1	3.0	2.1
browse	2.7	2.8	2.4
herb	2.5	2.8	2.6
	13 sites	13 sites	8 sites



Precipitation graphs for the Henry Mountain unit. Data is percent of normal precipitation averaged for 5 weather stations on the Henry Mountains (BLM Weather Stations 2004).





Trend Summary

	Category	1987	1994	1999	2004
15-1 Eagle Bench	soil	est	2	3	4
	browse	est	3	3	2
	herbaceous understory	est	2	4	2
15-2 Nasty Flat	soil	est	3	3	3
	browse	est	3	3	1
	herbaceous understory	est	3	3	3
15-3 Dugout	soil	est	3	3	susp
	browse	est	3	3	susp
	herbaceous understory	est	3	3	susp
15-4 South Creek Chaining	soil	est	4	3	2
	browse	est	2	2	5
	herbaceous understory	est	3	3	2
15-5 Bates Knob	soil	est	3	3	1
	browse	est	1	4	3
	herbaceous understory	est	1	3	1
15-6 Box Springs Chaining	soil	est	3	3	2
	browse	est	3	3	3
	herbaceous understory	est	3	3	2
15-7 Airplane Spring	soil	est	3	3	3
	browse	est	5	4	3
	herbaceous understory	est	1	3	2
15-8 Garden Basin	soil	est	3	3	susp
	browse	est	2	1	susp
	herbaceous understory	est	3	3	susp

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

	Category	1987	1994	1999	2004
15-9 Cave Flat Chaining	soil	est	4	3	NR
	browse	est	1	1	NR
	herbaceous understory	est	3	3	NR
15-10 Cave Flat	soil	est	4	3	NR
	browse	est	3	4	NR
	herbaceous understory	est	2	2	NR
15-11 Above Coyote Bench	soil	est	2	3	susp
	browse	est	3	3	susp
	herbaceous understory	est	2	2	susp
15-12 Quaking Aspen Spring	soil	est	3	3	1
	browse	est	3	3	1
	herbaceous understory	est	2	3	4
15-13 Sidehill Spring	soil	est	3	3	1
	browse	est	3	3	1
	herbaceous understory	est	4	1	5
15-14 Dugout Creek	soil				est
	browse				est
	herbaceous understory				est
15-15 Stevens Mesa	soil				est
	browse				est
	herbaceous understory				est

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

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