

# UTAH BIG GAME RANGE TREND STUDIES 1999 Volume 1



Photo by James Davis

**PUBLICATION NUMBER 00-01  
REPORT FOR FEDERAL AID PROJECT W-135-R-20**

**STATE OF UTAH  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF WILDLIFE RESOURCES**

**UTAH BIG GAME  
RANGE TREND STUDIES  
1999 Volume 1**

Written and Edited by

James N. Davis	Range Trend Program Coordinator
Mark Farmer	Asst. Range Trend Program Leader
Ashley Green	Asst. Range Trend Program Leader

Tables and Maps prepared by

Jason Vernon	Asst. Range Trend Program Leader
Ashley Green	Asst. Range Trend Program Leader
Tyler Thompson	Range Technician

Field Work

Joe Abbott	Tamara Heaton
Ben Baldwin	Haven Redd
Jed Carling	Danny Summers
James Davis	Tyler Thompson
Mark Farmer	Jason Vernon
Ashley Green	John Watkins
	Allison Whittaker

Performance Report for Federal Aid Project W-135-R-20

Publication No. 00-01

UTAH DEPARTMENT OF NATURAL RESOURCES  
Division of Wildlife Resources  
1596 West North Temple  
Salt Lake City, Utah 84114

TABLE OF CONTENTS

	<u>Page</u>
PROGRAM NARRATIVE .....	.iii
REMARKS .....	.iv
MAP OF UTAH HERD UNITS .....	.v
RANGE TREND STUDY METHODS .....	.vi
REPORT FORMAT .....	.xvii

	<u>Page</u>		<u>Page</u>
<b>Wildlife Management Unit 13A (33) La Sal</b>		14-29 Salt Creek Mesa	
<b>Mountains</b> .....	1	14-30 Milk Ranch Point	
13A-01 Two Mile Chaining		14-31 Chippean Ridge	
13A-02 East LaSal Pass		14-32 Lower Deer Flat	
13A-03 Buck Hollow			
13A-05 Slaughter Flat		<b>Wildlife Management Unit 15 (38) Henry</b>	
13A-06 Amasas Back		<b>Mountains</b> .....	434
13A-07 Round Mountain		15-01 Eagle Bench	
13A-08 Black Ridge		15-02 Nasty Flat	
13A-09 Taylor Flat		15-03 Dugout	
13A-10 Upper Fisher Valley		15-04 South Creek Chaining	
13A-11 North Beaver Mesa		15-05 Bates Knob	
13A-12 Below Polar Rim		15-06 Box Springs Chaining	
13A-13 Beaver Canyon		15-07 Airplane Spring	
13A-14 Lower Lackey Fan		15-08 Garden Basin	
13A-15 Hideout Mesa		15-09 Cave Flat Chaining	
		15-10 Cave Flat	
<b>Wildlife Management Unit 14 (35,36)</b>		15-11 Above Coyote Bench	
<b>San Juan</b> .....	132	15-12 Quaking Aspen Spring	
14-01 Alkali Point		15-13 Sidehill Spring	
14-02 Brushy Basin			
14-03 Gold Queen Basin		<b>References</b> .....	.574
14-04 Camp Jackson Reservoir			
14-05 Jackson Ridge			
14-06 Harts Draw Reservoir			
14-07 Shay Mountiain			
14-08 Peters Point			
14-09 Harts Draw			
14-10 Harts Point			
14-11 Shay Mesa			
14-12 Shingle Mill			
14-13 Black Mesa			
14-14 Texas Flat			
14-15 Harmony Flat			
14-16 Lower Lost Park			
14-17 Deer Flat			
14-18 Kigalia Point			
14-19 Woodenshoe			
14-20 Gooseberry			
14-21 North Long Point			
14-22 Wild Cow Point			
14-23 South Plain			
14-24 Ruin Park			
14-25 Davis Pocket			
14-26 The Wilderness			
14-27 Mormon Pasture Point			
14-28 North Cottonwood			

## PROGRAM NARRATIVE

State: UTAH

Project Number: W-135-R

Project Title: Statewide Big Game Range Trend Studies

**Problem and Need:** The ability to monitor vegetation composition changes (range trend) on key big game areas is an important part of a big game management program. The health and vigor of big game populations are closely associated with the quality and quantity of forage in key areas. Key areas are defined as those areas "where deer or other big game have demonstrated a definite pattern of use during normal climatic conditions over a long period." This project will emphasize deer and elk habitat although monitoring efforts may include other big game species as needed. Winter ranges for both deer and elk will comprise the bulk of the trend studies, although there are certain herd units where summer range is the portion of the unit that limits carrying capacity. Most of the key areas are located on public lands (BLM, USFS or State Lands) that are impacted by livestock grazing programs. Most of these programs are summarized in allotment management plans (USFS) or resource management plans (BLM) which are used to direct the management of a variety of resources on public lands (rangelands, watersheds, energy and minerals, recreational opportunities, etc.). This project was initiated to direct the attention of local interagency committees on the proper management of key big game areas throughout the state. The Division adopted monitoring guidelines established by the Utah State Interagency Committee (staff level biologists from BLM, USFS and DWR) which assures that data collected by DWR is compatible with that collected by both federal agencies. This limits the amount of duplication involved in monitoring certain key areas where either BLM, USFS or DWR may have overlapping responsibilities or concerns about range trend.

**Objective:** To monitor, evaluate, and report range trend at designated key areas throughout the state during grant period. This includes monitoring wildlife habitat improvement projects and promoting cooperative efforts among Interagency personnel with respect to trend study site selection, sharing trend data, development of trend monitoring procedures and data analysis, and identification of management objectives for study areas.

**Expected Results and Benefits:**

Every five years the trend studies in each of the five regions will be reread and the status of the vegetation in key areas of each herd unit will be evaluated. The local interagency committee will be able to use the information to determine if key areas are declining in habitat value and if so, to recommend adjustments in management programs that would help restore big game habitat.

## REMARKS

The work completed during the 1999 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Southeastern Region. Trend studies surveyed in these management units were established in 1985-89, 1992 and 1994, with rereads in 1992, 1994 and 1999. Some new sites were established in 1999 as well.

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

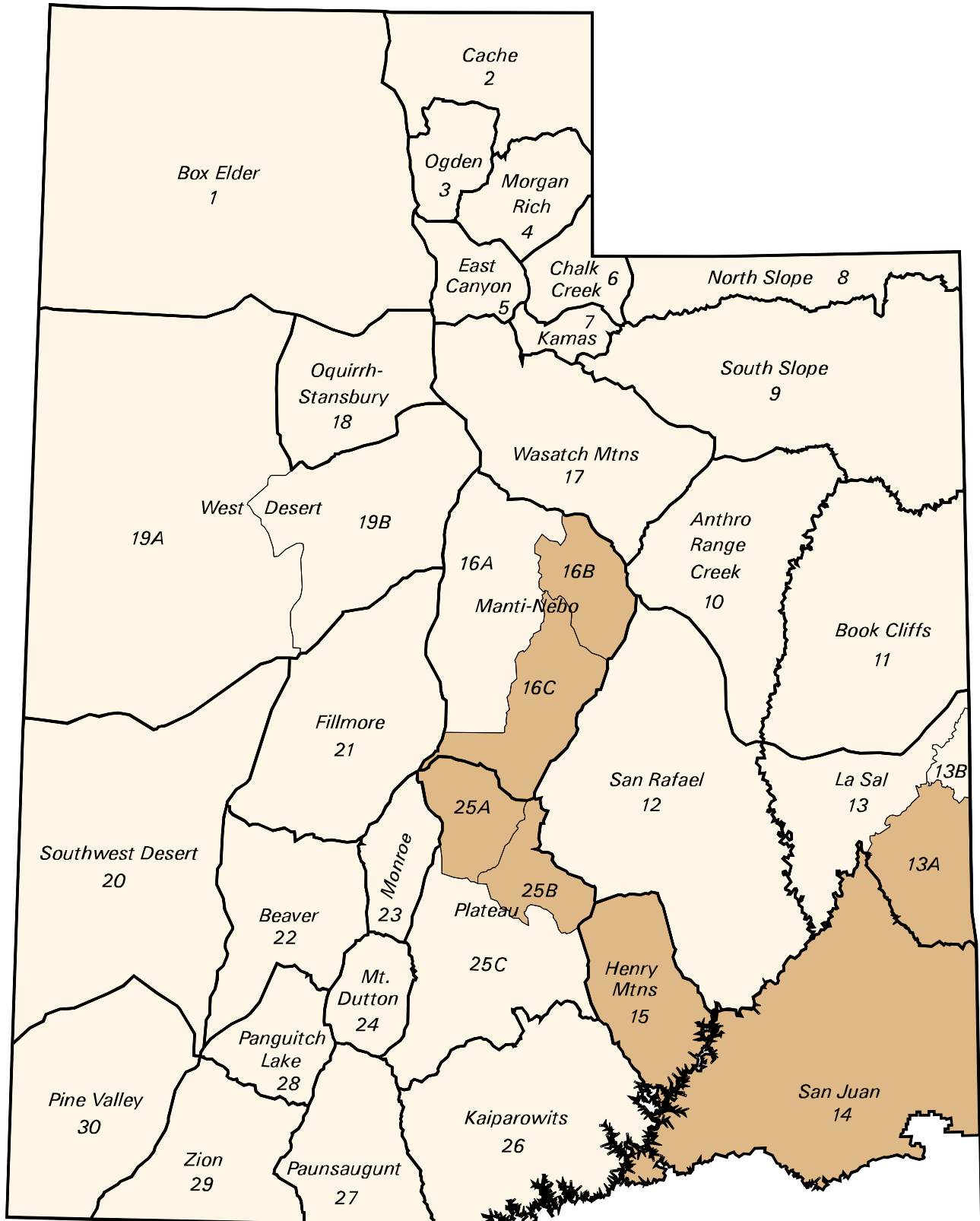
Manti-LaSal National Forest  
Moab Ranger District  
Monticello Range District

Fish Lake National Forest  
Loa Ranger District

Bureau of Land Management  
Monticello Resource Area  
Moab Resource Area

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

# Utah Management Units Surveyed in 1999



## RANGE TREND STUDY METHODS

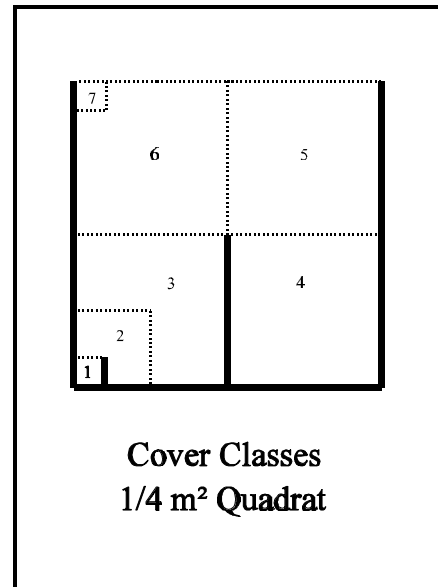
Studies monitoring range trend depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetative or habitat types within a unit, it is necessary to concentrate on specific sites and/or “key” areas within distinct plant communities on big game ranges. These “key” areas should be 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, the 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 the transects proper identification.

### Vegetative composition

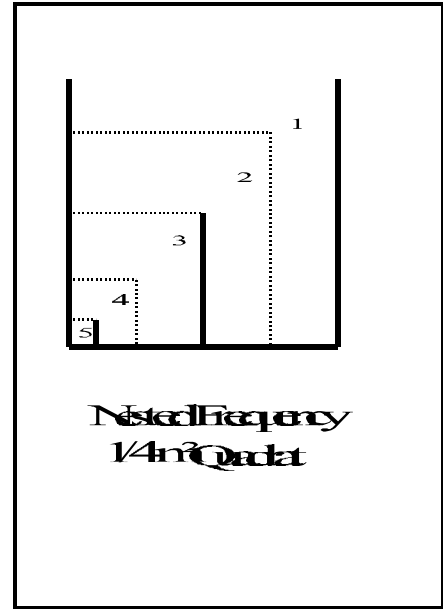
Determining vegetational characteristics for each “key” area is determined by setting up 5 consecutive 100 ft base line transects in the area of interest. This 500 ft line is the baseline and one, 100 ft belt is placed perpendicular to each 100 ft section of the base line at random foot marks and centered on the 50 ft mark. A 1/4 m<sup>2</sup> quadrat is centered every 5 feet along the same side of the belt. 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 species occurring within a quadrat, including annual species.

Currently, cover is determined using a slightly modified Daubenmire (1959) cover class method (Baley and Poulton, 1968). The seven cover class are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, 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.

Canopy cover of shrubs or trees above eye level 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.



Nested frequency values for the quadrat range from 1-5 according to which area or which sub-quadrat the plant species 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.



Higher nested frequency scores represent a higher abundance for that plant species. 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 (Mosley and others 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. Quadrat frequency is used to give another quantitative, but less sensitive measure to help corroborate the trends being illustrated by the sum of nested frequency values.

Nested frequency, quadrat frequency, and average percent cover data for individual grass and forb species are summarized in the “Vegetative 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. (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 1/5-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 the amount of use by placing shrubs in Form Classes 1 through 9.

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 by Vigor Classes 1-4.

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 possible sample of 50 plants per species depending on their respective densities. Tree density is determined by the point-center quarter method centered on two-hundred foot intervals, where 300 feet are added to the end of the transect so that five-200 foot point-quarter centers can be read. This allows sampling trees to on a much larger scale. The strip method, used to estimate shrub density, can in most cases effectively inventory seedling and young tree densities.

A more accurate method of determining shrub frequency is being used in this and all subsequent reports. It was found that nested and quadrat frequency of shrubs in previous reports did not usually reflect accurate trends in shrub populations which had particularly low or high densities. Each 1/100 acre shrub strip is divided into 20, five foot segments. Presence or absence is now determined in these strip segments to give a more accurate measure of shrub frequency. This larger sample will better reflect changing trends in the shrub populations. This data along with shrub cover is recorded in the browse trends table. For example, if a species was rooted in 25 of the shrub 100 strips, strip frequency for this species would be 25%.

### TREND DETERMINATION

The methods described above rely on relative and absolute measurements of plant composition as determined from the frequency and density data. In addition, estimates of plant vigor, height, crown diameter, form class, and age class are utilized to characterize shrub populations. Particular attention is paid to woody plants and their important role as trend indicators on critical winter ranges. A variety of parameters are used to help determine trend on key browse species through time. These include:

- 1) changes in density or number of plants/acre
- 2) proportion of decadent plants and 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

Trends in herbaceous plants as a group or as a single "key" species can be determined by comparing the sum of nested and quadrat 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. The ratio of bare soil nested frequency values to protective cover nested frequency values can also be used to help determine changes in soil trend. 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 "vegetative trends" table summarizes average cover, quadrat frequency, and nested frequency data for individual grass and forb species. The table contains all the grass species found on site 23-1. Readings prior to mid-1992 include only nested and quadrat 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 have a combined total cover of 11.39%. In 1985, *Agropyron spicatum* had

a sum of nested frequency value of 227. In 1991, the sum of nested frequency value did not change and is still 227. By 1998, sum of nested frequency declined to 183. The subscript letters indicate that the sum of nested frequency value between 1985 and 1991 were not statistically different. Although, the 1998 sum of nested frequency for *A. spicatum* shows a significant decrease compared to 1985 and 1991. Quadrat frequency showed a slight increase from 1985 to 1991 and then a marked decrease in 1998. Cover was estimated at 7.78% for *A. spicatum* in 1998. Trend for this grass is down due to a significant decline in sum of nested frequency.

In 1985, perennial grasses had a sum of nested frequency value of 265. This value has steadily increased to 313 in 1991 and 344 in 1998. The summed value of 344 for 1998 was derived by subtracting the annual grass value (*Bromus tectorum*) from the total value of 386. These changes would indicate a slightly upward overall trend for perennial grasses on this site. The forb trend can be determined in a similar manner. The herbaceous understory trend is determined using both (combined value for nested frequency) the grass and forb nested frequency value. For example, total herbaceous cover is 12.23% (total grass cover + total forb cover) with grass providing the bulk of the cover. Therefore, when determining herbaceous trend, the grass proportion should be weighted more heavily than the forb proportion in this example.

HERBACEOUS TRENDS --

Herd unit 23 , Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % 08
		'85	'91	'98	'85	'91	'98	
G	<i>Agropyron spicatum</i>	<sub>b</sub> 227	<sub>b</sub> 220	<sub>a</sub> 183	79	84	68	7.78
G	<i>Bromus tectorum</i> (a)	-	-	42	-	-	14	.43
G	<i>Oryzopsis hymenoides</i>	4	12	12	2	4	4	.17
G	<i>Poa fendleriana</i>	<sub>a</sub> 6	<sub>b</sub> 36	<sub>b</sub> 49	3	16	21	.98
G	<i>Poa secunda</i>	<sub>a</sub> 3	<sub>b</sub> 18	<sub>c</sub> 94	1	10	40	2.00
G	<i>Sitanion hystrix</i>	<sub>b</sub> 25	<sub>ab</sub> 20	<sub>a</sub> 6	13	9	3	.01
Total Annual Grasses		0	0	42	0	0	14	.43
Total Perennial Grasses		265	313	344	98	123	136	10.96
Total for Grasses		265	313	386	98	123	150	11.39
F	<i>Agoseris glauca</i>	-	10	1	-	5	1	.00
F	<i>Arabis</i> spp.	<sub>a</sub> -	<sub>b</sub> 18	<sub>a</sub> 1	-	9	1	.00
F	<i>Astragalus convallarius</i>	<sub>a</sub> 2	<sub>a</sub> 4	<sub>b</sub> 6	1	1	6	.15
F	<i>Calochortus nuttallii</i>	<sub>ab</sub> 4	<sub>b</sub> 8	<sub>a</sub> -	2	4	-	-
F	<i>Collinsia parviflora</i> (a)	-	-	3	-	-	1	.00
F	<i>Crepis acuminata</i>	-	6	7	-	2	2	.06
F	<i>Eriogonum racemosum</i>	-	-	4	-	-	1	.03
F	<i>Eriogonum umbellatum</i>	-	1	9	-	1	5	.16
F	<i>Phlox austromontana</i>	-	6	4	-	3	2	.16
F	<i>Phlox longifolia</i>	<sub>a</sub> 8	<sub>b</sub> 27	<sub>a</sub> 16	4	14	6	.20
Total Annual Forbs		0	0	3	0	0	1	.00
Total Perennial Forbs		14	80	48	0	0	24	.78

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % 08
		'85	'91	'98	'85	'91	'98	
	Total for Forbs	14	80	51	7	39	25	.78

Values with different subscript letters are significantly different at  $P < .10$  (annuals excluded)

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 had a strip frequency of 40 out of a possible 100. Cover is determined using the 1/4m<sup>2</sup> quadrat and estimating the percent of the quadrat covered below eye level (~4 feet). In this case, mountain big sagebrush cover is estimated to be 2.54%.

#### BROWSE TRENDS --

Herd unit 23 , Study no: 1

Type	Species	Strip Frequency 08	Average Cover % 08
B	Artemisia nova	35	2.24
B	Artemisia tridentata vaseyana	40	2.54
B	Chrysothamnus depressus	1	-
B	Chrysothamnus viscidiflorus viscidiflorus	1	.15
B	Gutierrezia sarothrae	2	-
B	Juniperus osteosperma	4	5.51
B	Opuntia spp.	1	.15
B	Pinus edulis	4	5.99
B	Purshia tridentata	18	3.20
	Total for Browse	106	19.79

To more accurately estimate overhead canopy cover for trees and tall shrubs, the line intercept method is used along each 100' belt. This data is reported in the canopy cover table which follows. For example, *Juniperus osteosperma* has an estimated average cover of 7%.

#### CANOPY COVER --

Herd unit 23 , Study no: 1

Species	Percent Cover 08
Juniperus osteosperma	7
Pinus edulis	3

The basic cover table summarizes nested frequency and 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 projected vegetational cover (30.04). Therefore, comparisons can be made for all cover measurements except for general vegetation cover which now examines projected foliar cover rather than just basal cover.

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

Cover Type	Nested Frequency '88	Average Cover %		
		'85	'91	'98
Vegetation	274	2.00	5.75	30.04
Rock	216	6.00	5.25	11.18
Pavement	279	30.50	24.25	26.32
Litter	381	46.50	46.50	42.49
Cryptogams	46	5.00	3.00	.93
Bare Ground	254	10.00	15.25	21.42

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., 64.4°F), with the average depth (in inches) as the lower measurement (12.7). Chemical and textural characteristics are also listed and were determined by laboratory analysis of a composite sample taken near each of the 5 baseline starting stakes.

SOIL ANALYSIS DATA --  
Herd Unit 23, Study # 01, Study Name: Bear Ridge

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.2	64.4 (12.7)	7.3	40.0	33.4	26.6	3.4	9.0	57.6	.5

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

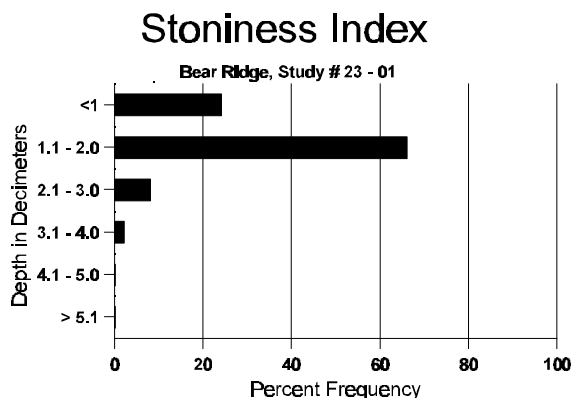
Ultra acid	<3.5
Extremely acid	3.5-4.4
Very strongly acid	4.5-5.0
Strongly acid	5.1-5.5
Moderately acid	5.6-6.0
Slightly acid	6.1-6.5
Neutral	6.6-7.3
Slightly alkaline	7.4-7.8
Moderately alkaline	7.9-8.4
Strongly alkaline	8.5-9.0
Very strongly alkaline	>9.1

Percent organic matter (%OM) refers to the amount of organic matter in the top 12 inches of soil. Parts per million of phosphorus and potassium are also included. Values for phosphorus and potassium less than 10 ppm and 70 ppm respectively have been shown to 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 help become more aware of how rock is distributed throughout the upper soil profile, a stoniness index is determined for each of the sites. Depth to the nearest rock is estimated at the first 10 feet (at one-foot intervals) of 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.



The pellet group frequency table summarizes the quadrat frequency of wildlife and livestock droppings found on the site. This data was not included in reports done prior to mid-1992. For example in 1998, rabbit pellet

groups were found in 25% of the quadrats placed on study 23-1, indicating the relative amount of rabbit use. With future readings, this data can help characterize changes in wildlife use patterns on the site.

PELLET GROUP FREQUENCY --

Herd unit 23 , Study no: 1

Type	Quadrat Frequency 08	Pellet Transect Days Use/Acre (ha) 08
Rabbit	25	n/a
Elk	4	2 (5)
Deer	36	25 (62)

It was determined additional information on pellet-groups was necessary. Therefore, a larger sample distributed over a larger area is now read in conjunction with the vegetative transects. The pellet-group transect utilizes 50, 100ft<sup>2</sup> circular plots which are placed through the 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. If more precision is required, the transect is marked permanently (rebar) and the pellet groups within the circular plots are removed or marked.

On the following page is a section of a browse table which summarizes characteristics of shrubs on study 23-1. Total plants/acre for Mountain big sagebrush, excluding seedlings (S) and dead (X) was 1,400 in 1985, 1,065 in 1991, and 1,100 in 1998. Seedlings are excluded from the population estimate because with summer drought, they will most likely all 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 species populations that characteristically are clumped and/or have discontinuous distributions. The earlier smaller sample could easily either over estimate or under estimate shrub populations. Other characteristics like percent decadency, vigor, percent heavy hedging, biotic potential, etc. should be given more weight in determining shrub trend when comparing sampled years where sample sizes are different.

The following data on mountain big sagebrush shows the proportion of decadent shrubs (abbreviated as Dec: in the table) in the population has steadily increased from 53% in 1985 to 63% in 1991 and to 67% by 1998. More seedlings were encountered in 1985 and 1991, with slight fluctuations in the numbers of young plants. The percentage of plants displaying poor vigor has increased from 14% in 1985 to 38% in 1991 and is estimated at 40% in 1998. This percentage is determined by dividing the number of shrubs in vigor classes 3 and 4 by the total number of shrubs sampled (yearly totals for each grouping; Y, M, and D). The proportion of shrubs displaying heavy hedging declined from 24% in 1985, to 6% in 1991, and only 2% by 1998. This is determined by dividing the number of shrubs in form classes 3, 6 and 9 by the total number of shrubs sampled (total column). The proportion of shrubs displaying moderate use has fluctuated from 67% in 1985, down to 19% in 1991, and up to 56% in 1998. This is determined by dividing the number of shrubs in form classes 2 and 5 by the total number of shrubs sampled. The dead to live ratio is 2:1. This ratio is determined by dividing the number of dead plants by the number of live plants. The average height of sagebrush (mature plants) and crown diameter has fluctuated from 13" x 15" to 12" x 13" and finally 15" x 23". Considering all these factors, trend for sagebrush in 1998 is slightly downward due to increased poor vigor and increased percent decadency. Also the number of dead plants encountered is more than double the number of live plants inventoried. An additional statistic to look at is the proportion of plants classified as dying in the decadent age class. For example, 60% of the decadent plants were reported as dying in 1991 and 41% of the decadent plants were reported as dying in 1998. This number is determined by dividing the number of plants

in vigor class 4 by the total number of plants in the decadent age class. Both the dead to live ratio and the percentage of dying plants in the decadent age class indicate there has been a large shrub die off in the past and this might continue into the future.

BROWSE CHARACTERISTICS --

Herd unit 23, Study no: 1

AGE	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Artemisia tridentata vaseyana																		
S	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	91	-	-	-	1	-	-	4	-	-	5	-	-	-	333		5	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	-	2	1	-	-	-	-	-	-	3	-	-	-	200		3	
	91	4	-	-	1	-	-	-	-	-	5	-	-	-	333		5	
	98	2	-	-	3	-	-	-	-	-	5	-	-	-	100		5	
M	85	1	4	1	-	-	-	-	-	-	4	-	2	-	400	13 15	6	
	91	-	-	1	-	-	-	-	-	-	1	-	-	-	66	12 13	1	
	98	2	9	1	1	-	-	-	-	-	12	-	1	-	260	15 23	13	
D	85	1	8	3	-	-	-	-	-	-	11	-	1	-	800		12	
	91	5	3	-	2	-	-	-	-	-	4	-	-	6	666		10	
	98	14	22	-	1	-	-	-	-	-	16	-	6	15	740		37	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	2300		115	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		67%			24%			14%			-24%							
'91		19%			06%			38%			+ 3%							
'98		56%			02%			40%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1400	Dec:	57%			
												'91	1065		63%			
												'98	1100		67%			

Management background information, photographs, and knowledgeable plant identification add to the data base for each site. Management and background information for each site is obtained from the administering agency. Permanently located photographs are taken; a general view down and back up the line, then a close-up of each half-high fence post end markers to further characterize 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.



Sometimes information is requested for the production of shrubs and/or herbaceous species. These methods are described in a Interagency Technical Reference on Sampling Vegetation Attributes (<sup>2</sup>U.S. Department of Interior Bureau of Land Management 1996). The standard double weight sampling method is used for determining shrub production. This requires the establishment of a weight reference unit for each shrub species occurring in the area being sampled. Weights for 10 mature shrubs are determined for each species. Then this average weight is used with the population estimates to help estimate production by species on a per acre basis. When estimates for herbaceous species are needed, the same method is utilized except that three clipped quadrats are correlated to the herbaceous plant cover values.

## REFERENCES

- Bailey, A. W. & C. E. Poulton. 1968. Plant communities and environmental interrelationships in a portion of the Tillamook burn, Northwest Oregon. *Ecology*. Vol 49, No. 1. pp. 1-13.
- Conover, W. J. 1980. *Practical Nonparametric Statistics* (second edition). John Wiley & Sons, New York. 493pp.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. Reveal and P. Holmgren. 1977. *Intermountain Flora* (volume six). Columbia University Press, New York. 584pp.
- Daubenmire, R. 1959. A canopy coverage method of vegetational analysis. *Northwest Science* 33:43-66.
- Guinta, B. C. 1983. Utah interagency big game range trend plant species list. Utah Dept. Of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah. 283 pp.
- Mosley, J. C., S. C. Bunting, and M. Hironaka. 1986. Determining range condition from frequency data in mountain meadows of central Idaho. *J. Range Manage.* 39:561-565.
- <sup>1</sup>U.S. Department of Interior Bureau of Land Management. 1996. *Utilization Studies and Residual Measurements*, Interagency Technical Reference, BLM/RS/ST-96/004+1730.
- <sup>2</sup>U.S. Department of Interior Bureau of Land Management. 1996. *Sampling vegetation attributes*, Interagency Technical Reference, BLM/RS/ST-96/002+1730.
- Welsh, S. L., N.D. Atwood, S. Goodrich and L. C. Higgins. 1987. *A Utah Flora*. Great Basin Naturalist Memoirs No. 9. Brigham Young University. 894 pp.

## REPORT FORMAT

An introductory segment at the beginning of each herd 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.

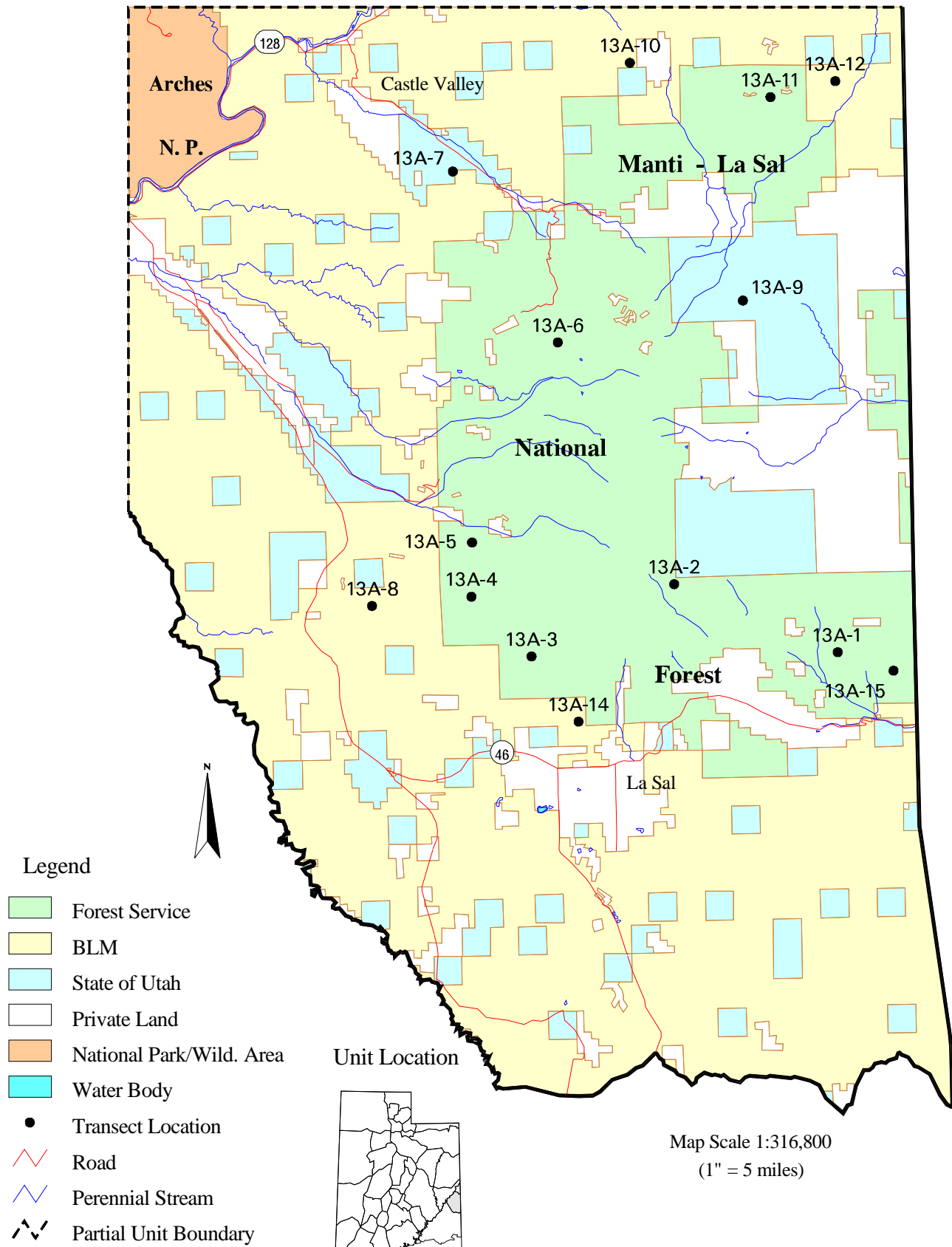
The name of the site and directions for locating the site are given on the location page. Due to many changes in management unit boundaries, trend studies have been renumbered. The previous trend study number is found in parenthesis following the trend study number currently being used. Also included on this page are the range 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, 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 change is indicated in the herbaceous trends table.

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



## WILDLIFE MANAGEMENT UNIT 13A (33, 30A) - 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. 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-1-99

Study site name: Two Mile Chaining .

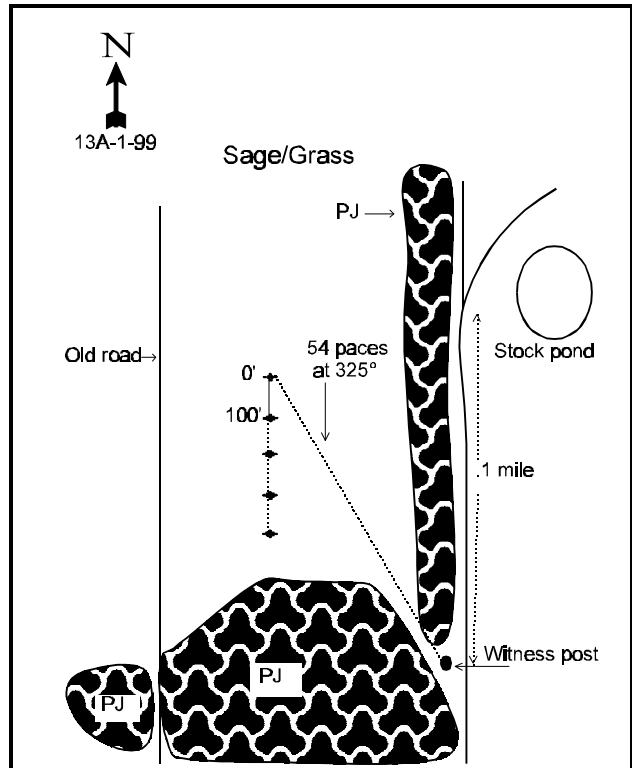
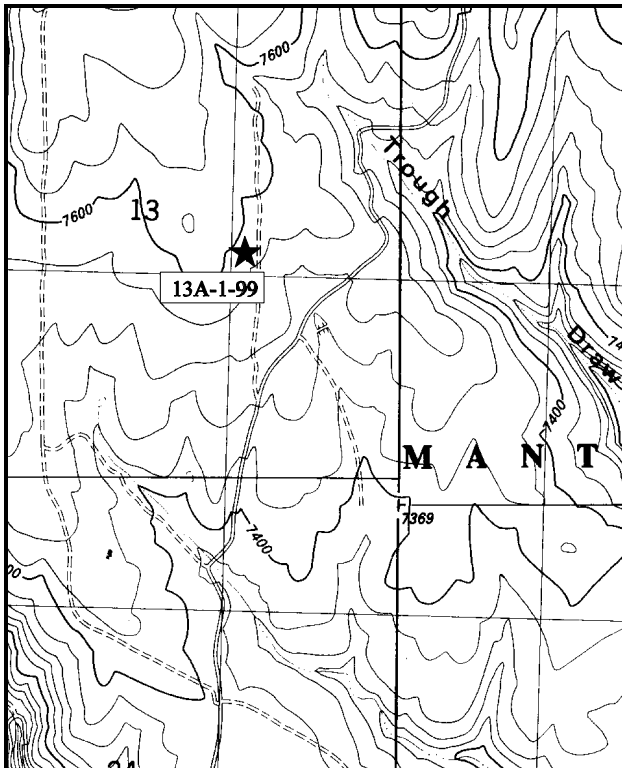
Range type: Chained, Cabled, Seeded P-J .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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°). The 0-foot baseline stake is a 1-foot tall fencepost, tagged #7813.



Map Name: Ray Mesa

Diagrammatic Sketch

Township 28S , Range 25E , Section 13

UTM 4247895.620 N, 665143.632 E

## DISCUSSION

### Trend Study No.13A -1 (33-1)

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. During the 1994 surveys, elk pellet groups occurred twice that of deer. The data from 1999 continues to show this same trend with 32 deer days use/acre (79 ddu/ha) and 70 elk days use/acre (173 edu/ha). The allotment also receives summer/fall cattle use. The site is dominated by mountain big sagebrush and many other useful browse species. Grasses, especially seeded species, are an important vegetative component on the site.

The study site is characterized by long, gently sloping foothills, generally with a southeast aspect and an elevation of 7,650 feet. Slope of study area is a gentle 4%. 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, as at least 10ppm is necessary for normal plant development. Organic matter appears to be well below average (2%). The sites in this herd unit average 3.5% organic matter. Erosion potential is low to moderate.

Mountain big sagebrush is the dominant browse species on the site. It made up 60% of the total browse cover in 1994, however it currently only makes up 39%. Low rabbitbrush is more than twice as abundant as the sagebrush, but only contributes 13% (1994) and 21% (1999) of the total browse cover. The moderately dense sagebrush population is composed mainly of light to moderately hedged mature plants. The proportion of the plants that are moderately hedged has increased from 13% (1994) to where it is currently at 41%. The biotic potential (proportion of seedlings to population) was quite high in 1994 (16%), and is still fairly good at 8% in 1999. In 1987, there were no seedlings sampled. The proportion of decadent plants in the population had risen from 13% (1987) to 42% in 1994. However, it has currently gone down to 24%. These changes in percent decadency are not necessarily the result of utilization, because no more than 3% the population in any year, has shown heavy use. The extended drought the state has experienced since 1985, is considered the major cause of this downward trend. Other desirable browse species are less common on the site. These species would include bitterbrush, serviceberry, snowberry, and mountain mahogany which are more common near the edge of the chaining. Scattered oak clumps are vigorous and show light to moderate hedging.

Herbaceous species diversity is 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. It has currently gone down to 18% of the total grass cover. Bulbous bluegrass, intermediate wheatgrass, and smooth brome are also important cover species. Silvery lupine was the dominant forb in 1994 (67% of the forb cover). It currently only makes up 3% of the forb cover. Some individual plants have been damaged by insects. Other forbs provide some green forage in the spring. The number of forb species have fluctuated over the years from 16 (1987), 12 (1994), and 16 (1999).

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 this has occurred on all sites because of the extended drought for most years since 1985.

### 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 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.

TREND ASSESSMENT

- soil - down slightly
- browse - stable to slightly down
- herbaceous understory - down

1999 TREND ASSESSMENT

The trend for soils is actually slightly up at this time with decreases in percent bare soil and the ratio of protective cover vs bare soil has improved from 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 up with notable increases in sum of nested frequency for the grasses which make up almost 90% of the herbaceous cover.

TREND ASSESSMENT

- soil - slightly improved
- browse - slightly down for the key browse, mountain big sagebrush
- herbaceous understory - slightly up

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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	135	106	100	55	39	40	2.46	2.50
G	Agropyron intermedium	-	-	3	-	-	1	-	.03
G	Bouteloua gracilis	15	19	17	5	6	8	1.07	.14
G	Bromus inermis	75	67	63	31	27	26	.63	2.40
G	Bromus tectorum (a)	-	-	3	-	-	1	-	.00
G	Carex spp.	-	-	-	-	-	-	.00	-
G	Koeleria cristata	<sub>b</sub> 61	<sub>a</sub> 3	<sub>a</sub> 19	23	1	8	.03	.18
G	Oryzopsis hymenoides	-	3	3	-	1	1	.00	.00
G	Poa bulbosa	<sub>a</sub> 220	<sub>b</sub> 256	<sub>b</sub> 250	81	85	82	7.14	8.01
G	Poa fendleriana	<sub>a</sub> -	<sub>b</sub> 16	<sub>c</sub> 53	-	7	21	.06	.38
G	Sitanion hystrix	<sub>b</sub> 6	<sub>ab</sub> 1	<sub>a</sub> -	3	1	-	.00	-
G	Stipa comata	<sub>b</sub> 48	<sub>a</sub> 14	<sub>ab</sub> 24	21	7	10	.11	.23



Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'87	'99
	Total for Annual Grasses	0	0	3	0	0	1	0	0.00
	Total for Perennial Grasses	560	485	532	219	174	197	11.52	13.89
	Total for Grasses	560	485	535	219	174	198	11.52	13.90
F	Astragalus convallarius	<sub>b</sub> 40	<sub>a</sub> 17	<sub>ab</sub> 25	22	11	14	.10	.42
F	Castilleja chromosa	<sub>c</sub> 38	<sub>b</sub> 4	<sub>a</sub> -	18	3	-	.01	-
F	Castilleja linariaefolia	-	2	1	-	2	1	.01	.03
F	Calochortus nuttallii	<sub>b</sub> 8	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	Crepis acuminata	<sub>b</sub> 14	<sub>a</sub> 6	<sub>a</sub> -	7	2	-	.03	-
F	Erigeron flagellaris	-	-	3	-	-	1	-	.15
F	Erigeron pumilus	<sub>b</sub> 111	<sub>a</sub> 21	<sub>a</sub> 43	42	10	17	.07	.51
F	Eriogonum racemosum	<sub>b</sub> 63	<sub>a</sub> 30	<sub>a</sub> 34	27	13	15	.14	.30
F	Hymenoxys acaulis	3	-	3	1	-	1	-	.00
F	Lomatium triternatum	<sub>b</sub> 31	<sub>a</sub> -	<sub>a</sub> -	13	-	-	-	-
F	Lupinus argenteus	<sub>c</sub> 162	<sub>b</sub> 57	<sub>a</sub> 20	64	24	9	3.64	.14
F	Machaeranthera canescens	1	-	2	1	-	2	-	.01
F	Penstemon caespitosus	<sub>b</sub> 23	<sub>a</sub> -	<sub>a</sub> -	11	-	-	-	-
F	Penstemon spp.	<sub>b</sub> 62	<sub>a</sub> 2	<sub>a</sub> 6	29	2	2	.01	.03
F	Petradoria pumila	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 5	-	-	3	-	.06
F	Phlox longifolia	<sub>b</sub> 67	<sub>ab</sub> 53	<sub>a</sub> 31	30	23	13	.14	.06
F	Senecio multilobatus	-	1	1	-	1	1	.00	.00
F	Sphaeralcea coccinea	58	55	52	27	29	24	1.24	.38
F	Tragopogon dubius	6	-	-	2	-	-	-	-
F	Trifolium gymnocarpon	-	3	3	-	1	1	.00	.00
F	Unknown forb-perennial	<sub>b</sub> 6	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	Zigadenus paniculatus	-	-	3	-	-	1	-	.00
	Total for Annual Forbs	0	0	0	0	0	0	0	0
	Total for Perennial Forbs	693	251	232	300	121	105	5.43	2.15
	Total for Forbs	693	251	232	300	121	105	5.43	2.15

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

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

Type	Species	Strip Frequency		Average Cover %	
		'04	'99	'04	'99
B	Amelanchier utahensis	18	18	2.25	3.74
B	Artemisia tridentata vaseyana	86	82	16.28	9.40
B	Chrysothamnus depressus	12	26	.66	.72
B	Chrysothamnus viscidiflorus viscidiflorus	86	80	3.62	4.96
B	Cowania mexicana stansburiana	0	1	-	-
B	Coleogyne ramosissima	0	0	-	-
B	Coryphantha vivipara arizonica	0	2	-	-
B	Eriogonum microthecum	10	16	.01	.53
B	Gutierrezia sarothrae	0	4	.01	.04
B	Opuntia spp.	36	35	.32	.56
B	Pinus edulis	0	16	2.92	3.53
B	Purshia tridentata	0	1	-	-
B	Quercus gambelii	0	3	.76	.63
B	Symphoricarpos oreophilus	3	2	-	-
Total for Browse		251	286	26.86	24.13

CANOPY COVER --  
Herd unit 13A, Study no: 1

Species	Percent Cover '09
Amelanchier utahensis	.80
Pinus edulis	4

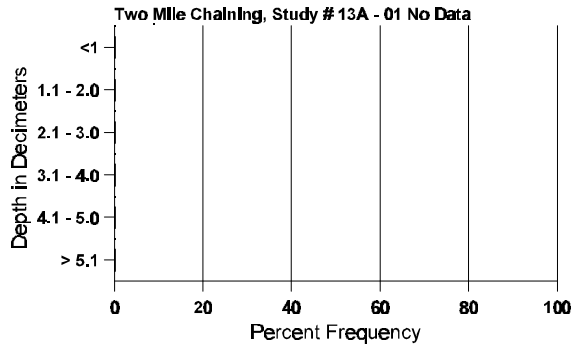
BASIC COVER --  
Herd unit 13A, Study no: 1

Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	333	336	15.25	33.38	39.61
Rock	10	3	0	.02	.00
Pavement	18	22	0	.03	.04
Litter	387	345	61.00	46.05	40.37
Cryptogams	111	179	3.50	1.50	8.07
Bare Ground	301	265	20.25	32.20	29.56

SOIL ANALYSIS DATA --  
Herd Unit 13A, Study # 01, Study Name: Two Mile Chaining

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.0	58.6 (11.7)	6.5	48.2	30.6	21.3	2.0	8.0	105.6	0.4

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 13A, Study no: 1

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Rabbit	44	6	N/A
Elk	28	26	70 (173)
Deer	14	28	32 (79)
Cattle	-	2	6 (15)

## BROWSE CHARACTERISTICS --

Herd unit 13A, Study no: 1

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches)		Total			
		1	2	3	4		Ht.	Cr.				
<b>Amelanchier utahensis</b>												
S	'87	1	-	-	-	-	-	-	1	-	-	1
	'94	-	-	-	-	-	-	-	0	-	-	0
	'99	3	-	-	-	-	-	-	60	-	-	3
Y	'87	1	-	-	-	-	-	-	66	-	-	1
	'94	6	-	-	3	-	-	-	180	-	-	9
	'99	2	2	-	-	1	-	-	100	-	-	5
M	'87	-	-	-	-	-	-	-	0	-	-	0
	'94	8	5	1	-	-	-	-	280	41	42	14
	'99	1	2	3	2	4	1	-	300	51	53	15
D	'87	-	-	-	-	-	-	-	0	-	-	0
	'94	1	-	-	-	-	-	-	20	-	-	1
	'99	-	-	-	-	2	-	-	40	-	-	2
X	'87	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	0	-	-	0
	'99	-	-	-	-	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		00%		00%		00%		+86%				
'94		21%		04%		00%		- 8%				
'99		36%		32%		09%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	66	Dec:	0%			
						'94	480		4%			
						'99	440		9%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total							
		1	2	3	4										
<i>Artemisia tridentata vaseyana</i>															
S	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	45	-	-	2	-	-	-	-	-	-	-	47	-	47
	99	17	-	-	1	-	-	-	-	-	-	-	18	-	18
Y	87	2	1	1	-	-	-	-	-	-	-	-	4	-	4
	94	10	-	-	-	-	-	-	-	-	-	-	10	-	10
	99	15	12	-	-	-	-	-	-	-	-	-	27	-	27
M	87	20	15	3	-	-	-	-	-	-	-	-	37	-	38
	94	96	26	3	4	-	-	-	-	-	-	-	121	-	129
	99	76	48	1	2	1	1	-	-	-	-	-	128	-	129
D	87	2	4	-	-	-	-	-	-	-	-	-	6	-	6
	94	94	4	2	1	-	-	-	-	-	-	-	85	-	101
	99	20	22	4	2	-	-	-	-	-	-	-	43	-	48
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	120
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	280
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'87		42%		08%		02%		+33%							
'94		13%		02%		10%		-15%							
'99		41%		03%		03%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	3199	Dec:	13%		
										'94	4800		42%		
										'99	4080		24%		
<i>Chrysothamnus depressus</i>															
S	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	4	-	-	-	-	-	-	-	-	-	-	4	-	4
	99	2	-	-	-	-	-	-	-	-	-	-	2	-	2
Y	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	5	-	-	-	-	-	-	-	-	-	-	5	-	5
M	87	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	28	-	-	-	-	-	-	-	-	-	-	28	16	28
	99	46	26	-	2	-	-	-	-	-	-	-	74	4	74
X	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'87		00%		00%		00%									
'94		00%		00%		00%		+65%							
'99		33%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-		
										'94	560		-		
										'99	1580		-		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																	
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	94	121	-	-	4	-	-	-	-	-	125	-	-	-	2500		125
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	23	-	-	-	-	-	-	-	-	22	-	1	-	1533		23
	94	12	-	-	-	-	-	-	-	-	12	-	-	-	240		12
	99	24	-	-	-	-	-	-	-	-	24	-	-	-	480		24
M	87	56	13	1	-	-	-	-	-	-	69	1	-	-	4666	5 8	70
	94	348	-	-	4	-	-	-	-	-	348	-	-	4	7040	9 20	352
	99	377	9	-	10	-	-	-	-	-	396	-	-	-	7920	5 10	396
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	2	1	-	1	-	-	-	-	-	3	-	-	1	80		4
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		14%			01%			01%			+15%						
'94		00%			00%			01%			+14%						
'99		02%			00%			.23%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	6199	Dec:	0%			
											'94	7300		0%			
											'99	8480		1%			
<i>Cowania mexicana stansburiana</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	20		-			
<i>Coleogyne ramosissima</i>																	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	11 4	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-			
											'94	0		-			
											'99	0		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4		1	2				
<i>Coryphantha vivipara arizonica</i>												
M	87	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	60	3	5	3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		00%		00%		00%						
'94		00%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'87	0	Dec:	-		
							'94	0		-		
							'99	60		-		
<i>Eriogonum microthecum</i>												
S	87	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	20		1	
	99	1	-	-	-	-	-	-	20		1	
Y	87	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	0	-	-	0
	94	14	-	-	-	-	-	-	280	8	8	14
	99	14	3	-	2	-	-	-	380	5	7	19
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		00%		00%		00%						
'94		00%		00%		00%		+30%				
'99		15%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'87	0	Dec:	-		
							'94	280		-		
							'99	400		-		
<i>Gutierrezia sarothrae</i>												
Y	87	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	20		1	
M	87	1	-	-	-	-	-	-	66	8	6	1
	94	-	-	-	-	-	-	-	0	7	9	0
	99	7	-	-	-	-	-	-	140	11	8	7
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		00%		00%		00%						
'94		00%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'87	66	Dec:	-		
							'94	0		-		
							'99	160		-		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	12	-	-	-	-	-	-	-	-	12	-	-	-	240		12	
	99	20	-	-	-	-	-	-	-	-	20	-	-	-	400		20	
M	87	3	-	-	-	-	-	-	-	-	1	-	2	-	200	3	6	3
	94	49	2	-	-	-	-	-	-	-	46	-	5	-	1020	2	7	51
	99	43	-	-	-	-	-	-	-	-	43	-	-	-	860	3	9	43
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			67%			+86%							
'94		03%			00%			07%			-11%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	200	Dec:	0%			
												'94	1480		15%			
												'99	1320		5%			
Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4	
Y	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	6	-	-	-	-	-	-	2	-	8	-	-	-	160	-	-	8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	-			
												'94	0		-			
												'99	340		-			

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Purshia tridentata</b>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	28	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	40	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	0		-				
											'99	20		-				
<b>Quercus gambelii</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	-	-	2	-	-	-	-	40		2	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	1	-	-	-	-	-	8	-	9	-	-	-	-	180	43	18	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	0		-				
											'99	220		-				
<b>Symphoricarpos oreophilus</b>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	1	-	-	-	-	1	-	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	2	1	-	1	-	-	-	-	4	-	-	-	-	80	8	19	
	99	-	-	-	1	-	-	-	-	1	-	-	-	-	20	22	36	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		25%			00%			00%			-50%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	80		-				
											'99	40		-				



Trend Study 13A-2-99

Study site name: East LaSal Pass .

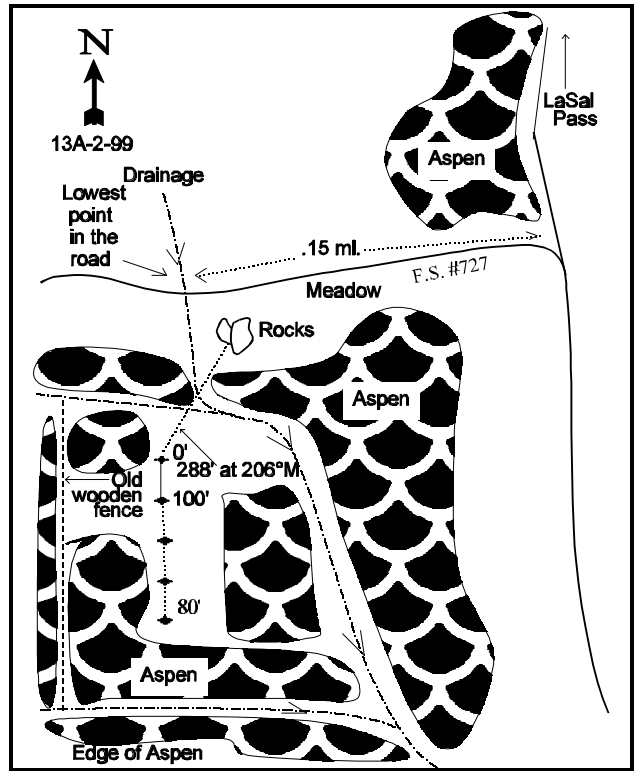
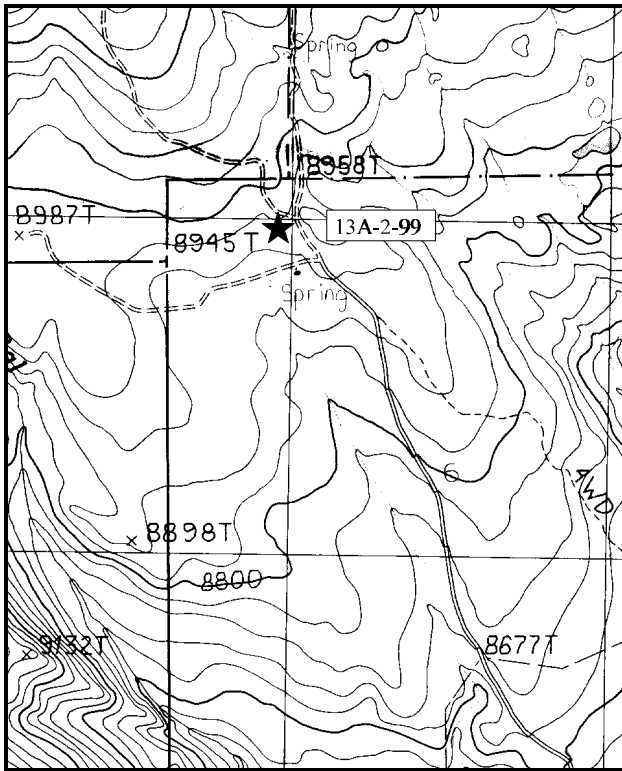
Range type: Quaking Aspen .

Compass bearing: frequency baseline 165°M .

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

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. Turn left on FS Road #727 and drive 0.15 miles to the center of the meadow near the lowest point in the road. In the meadow to the left, several boulders mark the starting place to pace off to find the transect starting point. The 0 foot stake can be found 288 feet away in the aspens at a bearing of 206°M. The 0, 200, and 400 foot stakes are full high fenceposts. The 100 and 300 stakes are half high fenceposts.



Map Name: Mount Peale

Diagrammatic Sketch

Township 28S , Range 25E , Section 6

UTM 4251755.630 N , 655865.120 E

## DISCUSSION

### Trend Study No. 13A-2 (33-2)

The East LaSal Pass study is south of Mt. Peale and is characterized by aspen hillsides and large, wet meadows, which provide both deer and elk with high quality summer range. However, the meadows are dominated by iris, which is an increaser with heavy grazing. The area has a high water table with many springs. The study itself is in one of the more mature aspen stands at an elevation of 8,900 feet. There is no prevailing aspect as the sampled area is basically level. The large bench below the conifer-covered peaks slopes gently to many natural drainages which generally drain to the southeast.

The soil is a light-textured, dark loam soil with abundant organic matter (nearly 6%). The top layer is covered with duff and thick vegetative cover. The soil appears to be quite deep (effective rooting depth of almost 22 inches) with a few scattered boulders on the surface. The soil is moderately acidic (6.0 pH) with only 7.9 ppm of phosphorus. This could be a limiting factor to the site because a minimum of 10ppm is required for normal plant development. There are no signs of erosion within the aspens, although the soil could easily be disturbed. The meadows and stream banks show some signs of erosion.

Line intercept data from 1999 estimates average canopy cover of this uneven-aged aspen stand at 54%. Values are quite variable for canopy cover over the length of the transect. Point quarter data taken during the 1994 reading estimates 247 aspen trees/acre and 21 Douglas fir trees/acre on the site. In 1999, point quarter data indicated a slight increase in the aspen population to 267 trees/acre, while the Douglas fir population remained the same. Average diameter of aspen is 9.5 inches in 1994 and 11.25 inches in 1999. Downed trees are prevalent and the naturally occurring openings that are created are the major sources for aspen regeneration. The young trees average three feet in height, making them all available, but show only light to moderate use and are vigorous. Snowberry is common and quite dense in some spots. It has a density of approximately 4,000 plants/acre with almost 80% of them classified as mature plants that are only lightly hedged. Other woody species are uncommon. Browse cover only contributes 8% of the total vegetative cover.

The most abundant herbaceous species are rather large forbs; thistle, peavine, northern bedstraw, blunt seed sweet root, and common dandelion. These four species alone make up more than 80% of the total forb cover, and the forbs make up more than 60% of the total vegetative cover. These species along with an understory of Kentucky bluegrass and Carex, form a thick protective carpet. There is abundant regeneration both the grasses and forbs. Forbs are especially diverse with 15-17 species being encountered through the years.

The dense herbaceous understory provides excellent ground cover. Litter cover is very high, but it has varied through the years from 75% (1994) to 92% (1999), due to a thick layer of duff. Bare soil is almost nonexistent and found only where trees have been uprooted and fallen to the ground.

### 1994 TREND ASSESSMENT

Soil trend for this site is stable and excellent condition. The browse trend is not as critical as it would be for a winter range, but it would be stable. The trend for the herbaceous understory is stable with a 31% increase in the nested frequency values for the grasses, but a 17% decrease for the forbs which contribute more than three times the plant cover as the grasses do.

TREND ASSESSMENT

soil - stable and in excellent condition

browse - stable but not as important as the herbaceous component

herbaceous understory - stable

1999 TREND ASSESSMENT

Soil trend for this site continues to be stable and in excellent condition. The browse trend is not critical for this site because it is not a winter range, and also that browse only contributes 8% of the total vegetative cover. The trend for browse on this site is stable. The trend for the herbaceous understory is stable with a slight increase in the sum of nested frequency values for the grasses and forbs.

TREND ASSESSMENT

soil - stable and in excellent condition

browse - stable, but not as important as the herbaceous component

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 13A, Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'84	'89
G	Agropyron trachycaulum	a-	b21	c74	-	9	30	.56	2.99
G	Bromus carinatus	a13	b46	b33	5	20	17	.76	.74
G	Carex spp.	b144	a40	a53	56	17	18	2.17	3.81
G	Dactylis glomerata	b11	a-	a-	4	-	-	-	-
G	Festuca thurberi	a-	ab3	b12	-	1	4	.63	.22
G	Phleum alpinum	-	-	-	-	-	-	-	.00
G	Phleum pratense	a-	b8	b9	-	4	3	.04	.33
G	Poa pratensis	a139	b262	b293	53	80	87	6.32	14.91
G	Stipa columbiana	a-	b26	a-	-	9	-	.93	-
G	Stipa lettermani	-	2	-	-	1	-	.00	-
G	Unknown grass - perennial	4	-	-	2	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		311	408	474	120	141	159	11.44	23.01
Total for Grasses		311	408	474	120	141	159	11.44	23.01
F	Achillea millefolium	a10	b33	b55	4	12	19	.30	1.12
F	Agoseris glauca	-	2	2	-	1	2	.00	.01
F	Allium spp.	5	3	1	2	2	1	.01	.00
F	Calochortus gunnisoni	-	2	-	-	2	-	.01	-
F	Corallorhiza spp.	b6	a-	a-	3	-	-	-	-
F	Delphinium nuttallianum	b7	a-	a-	4	-	-	-	-
F	Erigeron speciosus	-	2	3	-	1	1	.03	.03
F	Fragaria virginiana	-	-	2	-	-	1	-	.15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	Galium boreale	a100	ab137	b156	41	50	60	2.60	3.70
F	Iris missouriensis	2	-	6	1	-	2	.03	.06
F	Lathyrus lanszwertii	b284	a239	b261	92	86	85	24.76	21.55
F	Ligusticum porteri	a-	a-	b9	-	-	5	-	1.07
F	Lomatium spp.	b30	ab15	a4	13	7	2	.31	.09
F	Osmorhiza depauperata	c318	a173	b227	95	67	84	2.92	11.39
F	Pterospora andromedea	-	-	1	-	-	1	-	.00
F	Senecio serra	ab1	b4	a-	1	3	-	.01	-
F	Taraxacum officinale	102	107	125	48	41	52	1.64	4.77
F	Thalictrum fendleri	a2	ab8	b17	1	3	5	.33	1.46
F	Thermopsis montana	6	4	6	3	2	2	.19	.53
F	Unknown forb-perennial	b17	a-	a-	9	-	-	-	-
F	Viola adunca	62	70	36	28	29	18	.72	1.83
F	Vicia americana	a67	a51	b97	29	23	43	1.31	3.42
Total for Annual Forbs		0	0	0	0	0	0	0	0
Total for Perennial Forbs		1019	850	1008	374	329	383	35.20	51.23
Total for Forbs		1019	850	1008	374	329	383	35.20	51.23

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

#### BROWSE TRENDS --

Herd unit 13A, Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'04	'99	'04	'99
B	Pinus ponderosa	-	-	-	.15
B	Populus tremuloides	2	37	.11	.75
B	Ribes montigenum	2	2	.38	.38
B	Rosa woodsii	4	3	.06	.03
B	Symphoricarpos oreophilus	83	74	5.06	5.31
Total for Browse		91	116	5.62	6.62

#### CANOPY COVER --

Herd unit 13A, Study no: 2

Species	Percent Cover '09
Populus tremuloides	54

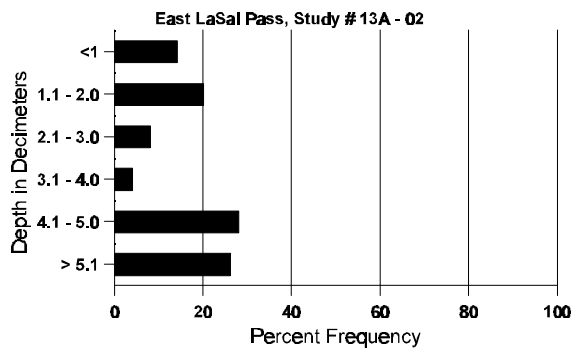
BASIC COVER --  
Herd unit 13A, Study no: 2

Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	353	368	8.00	49.04	73.12
Rock	3	2	.25	.15	.15
Pavement	-	-	0	0	0
Litter	392	399	90.00	75.38	91.84
Cryptogams	-	15	0	0	.95
Bare Ground	15	3	1.75	.48	.15

SOIL ANALYSIS DATA --  
Herd Unit 13A, Study # 02, Study Name: East LaSal Pass

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
21.6	43.0 (17.6)	6.0	46.2	30.6	23.3	5.63	7.9	1180.4	0.4

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 13A, Study no: 2

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'04	'09	
Elk	-	2	0
Deer	2	-	N/A

BROWSE CHARACTERISTICS --  
Herd unit 13A, Study no: 2

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Populus tremuloides																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
Y	87	7	3	-	-	-	-	-	-	-	10	-	-	-	333		10	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	34	-	-	4	-	-	-	-	-	38	-	-	-	760		38	
M	87	-	-	-	-	-	-	-	3	-	3	-	-	-	100	393 219	3	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	- -	1	
	99	-	-	-	-	2	-	-	17	-	19	-	-	-	380	- -	19	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		23%			00%			00%			-86%							
'94		00%			00%			00%			+95%							
'99		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	433	Dec:	-				
											'94	60		-				
											'99	1140		-				
Ribes montigenum																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	18 139	3	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	38 28	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%			+50%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	60		-				
											'99	120		-				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Rosa woodsii																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	99	-	-	2	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	16	6	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	13	5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+82%							
'94		00%			00%			00%			-56%							
'99		00%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'94	180		-			
												'99	80		-			
Symphoricarpos oreophilus																		
S	87	19	-	-	-	-	-	-	-	-	19	-	-	-	633		19	
	94	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
	99	27	-	-	1	-	-	-	-	-	28	-	-	-	560		28	
Y	87	80	27	2	-	-	-	-	-	-	97	4	8	-	3633		109	
	94	76	-	-	4	-	-	-	-	-	68	12	-	-	1600		80	
	99	35	-	-	2	-	-	-	-	-	37	-	-	-	740		37	
M	87	49	39	3	-	-	-	-	-	-	89	1	1	-	3033	27	25	
	94	142	-	-	-	-	-	-	-	-	134	8	-	-	2840	21	23	
	99	157	2	-	1	-	-	-	-	-	160	-	-	-	3200	22	21	
D	87	3	9	1	-	-	-	-	-	-	11	1	1	-	433		13	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		35%			03%			05%			-37%							
'94		00%			00%			00%			-10%							
'99		01%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	7099	Dec:	6%			
												'94	4440		0%			
												'99	4000		2%			

Trend Study 13A-3-99

Study site name: Buck Hollow .

Range type: Chained, Seeded P-J .

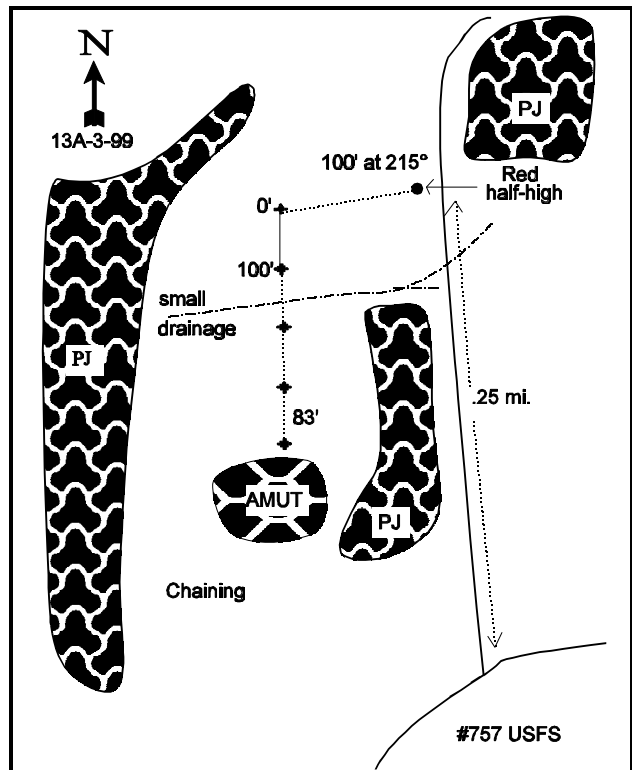
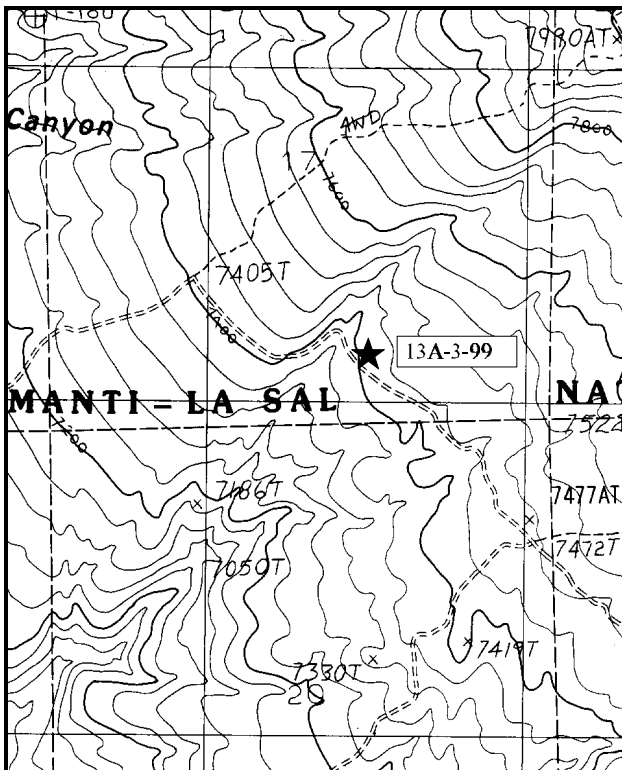
Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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 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

Diagrammatic Sketch

Township 28S , Range 24E , Section 17

UTM 4247658.608 N , 647773.460 E



## DISCUSSION

### Trend Study No. 13A-3 (33-3)

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. As of 1999, there was an estimated 66 deer days use/acre (163 ddu/ha), 15 elk days use/acre (37 edu/ha), and 20 cow days use/acre (49 cdu/ha) on the site. The 700 acre Buck Hollow chaining and seeding project was completed in 1982. The site is now dominated by seeded grasses which currently contribute 62% 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 7,300 feet with a general aspect to the southwest on a gentle south-facing slope (5-7%).

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.

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 reinvading and/or releasing of pinyon and juniper within the chaining. The point-quarter method estimated 64 juniper trees/acre and 115 pinyon trees/acre. Average diameter of juniper was 3.3 inches while that of pinyon was 3.9 inches.

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 96% of the grass cover and 70% of the total vegetative cover in 1994. At the present time, the numbers are very similar. Combined, they now contribute 97% of the grass cover and 62% of the total vegetative cover. Several other species are present, including tall wheatgrass, orchardgrass, Indian ricegrass, bottlebrush squirreltail, Carex, and an *Elymus* species. Forbs are not as essential because they only contribute about 20% of the total vegetative cover. The most abundant forb is alfalfa, which makes up 70% of the forb cover.

### 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 61% (53% in 1994). There is a scattering of rock and pavement cover totaling less than 10%. Percent bare ground is only at 12% (14% in 1994).

### 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 14% 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.

TREND ASSESSMENT

soil - stable

browse - stable, but almost nonexistent

herbaceous understory - stable

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.

TREND ASSESSMENT

soil - improving

browse - stable, but almost nonexistent

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 13A, Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	b <sub>119</sub>	a <sub>58</sub>	a <sub>80</sub>	54	28	33	.88	2.45
G	Agropyron intermedium	b <sub>290</sub>	a <sub>208</sub>	a <sub>205</sub>	89	71	71	6.18	6.94
G	Bromus inermis	a <sub>150</sub>	b <sub>208</sub>	b <sub>231</sub>	56	66	78	7.42	10.11
G	Carex spp.	9	23	19	5	10	9	.46	.44
G	Oryzopsis hymenoides	b <sub>5</sub>	a <sub>-</sub>	a <sub>-</sub>	3	-	-	-	.00
G	Poa fendleriana	-	3	8	-	1	4	.03	.09
G	Poa secunda	-	-	6	-	-	2	-	.06
G	Sitanion hystrix	b <sub>34</sub>	b <sub>21</sub>	a <sub>3</sub>	16	11	1	.13	.03
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		607	521	552	223	187	198	15.12	20.14
Total for Grasses		607	521	552	223	187	198	15.12	20.14
F	Alyssum spp. (a)	-	-	-	-	-	-	.00	-
F	Arabis hirsuta	2	-	6	2	-	2	-	.01
F	Astragalus convallarius	18	21	22	7	11	12	.37	1.35
F	Aster spp.	-	2	-	-	1	-	.03	-
F	Chaenactis douglasii	3	3	-	1	2	-	.01	-
F	Collinsia parviflora (a)	-	3	-	-	1	-	.00	-
F	Cruciferae	4	-	-	2	-	-	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	Cryptantha spp.	a-	b17	a4	-	8	2	.06	.01
F	Descurainia pinnata (a)	-	7	1	-	3	1	.01	.01
F	Gilia spp. (a)	-	3	-	-	1	-	.00	-
F	Lesquerella spp.	b22	a-	a-	13	-	-	-	-
F	Machaeranthera spp	-	1	-	-	1	-	.00	-
F	Melilotus officinalis	c53	b18	a-	25	7	-	.16	-
F	Medicago sativa	a1	b28	b27	1	13	12	1.64	4.81
F	Penstemon spp.	a-	b24	b21	-	11	9	.13	.17
F	Phacelia spp.	b10	a-	a-	6	-	-	-	-
F	Phlox austromontana	a-	b14	b10	-	7	4	.25	.09
F	Physaria chambersii	a-	b14	b16	-	7	6	.03	.20
F	Polygonum douglasii (a)	-	10	1	-	5	1	.02	.00
F	Sanguisorba minor	a3	b-	b-	3	-	-	-	-
F	Senecio multilobatus	-	-	2	-	-	2	-	.03
F	Sphaeralcea coccinea	11	12	15	5	6	7	.25	.28
F	Tragopogon dubius	3	2	-	1	2	-	.03	-
F	Trifolium spp.	-	-	2	-	-	1	-	.03
F	Unknown forb-perennial	4	-	-	2	-	-	-	-
Total for Annual Forbs		0	23	2	0	10	2	0.05	0.01
Total for Perennial Forbs		134	156	125	68	76	57	3.00	7.01
Total for Forbs		134	179	127	68	86	59	3.05	7.02

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

#### BROWSE TRENDS --

Herd unit 13A, Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'04	'99	'04	'99
B	Amelanchier utahensis	2	0	-	-
B	Atriplex canescens	0	0	-	-
B	Cercocarpus montanus	4	4	-	.15
B	Juniperus osteosperma	0	4	-	.15
B	Opuntia spp.	0	1	-	-
B	Pinus edulis	0	4	2.64	3.98
B	Symphoricarpos oreophilus	1	0	-	-
Total for Browse		7	13	2.64	4.28

CANOPY COVER --

Herd unit 13A, Study no: 3

Species	Percent Cover 09
Juniperus osteosperma	2
Pinus edulis	4

BASIC COVER --

Herd unit 13A, Study no: 3

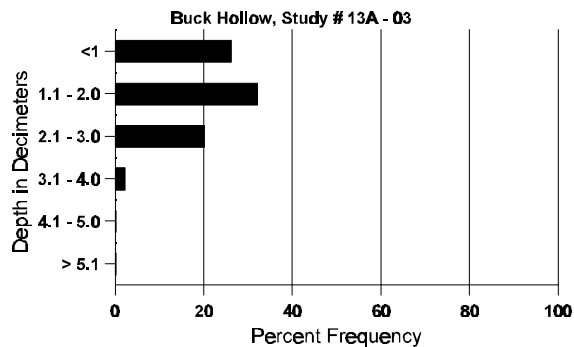
Cover Type	Nested Frequency		Average Cover %		
	04	'99	'87	'94	'99
Vegetation	332	329	11.25	24.78	34.29
Rock	192	141	2.50	4.80	5.32
Pavement	195	185	2.25	.96	4.56
Litter	386	389	72.75	53.42	61.43
Cryptogams	-	9	0	0	.12
Bare Ground	246	186	11.25	14.31	12.04

SOIL ANALYSIS DATA --

Herd Unit 13A, Study # 03, Study Name: Buck Hollow

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.6	590.4 (15.2)	7.6	52.9	21.8	25.3	4.5	25.0	144.0	0.7

### Stoniness Index



PELLET GROUP DATA --

Herd unit 13A, Study no: 3

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha) 09
	04	09	
Rabbit	10	19	N/A
Elk	14	12	15 (37)
Deer	17	29	66 (163)
Cattle	2	6	20 (49)

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

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	87	21	-	-	-	-	-	-	-	-	21	-	-	-	700		21	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	9	6	1	-	-	-	1	-	-	15	-	2	-	566		17	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	2	-	-	1	-	-	-	-	3	-	-	-	100	59	28	3
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	66	75	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	59	73	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		45%			05%			10%			-94%							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	666	Dec:	-				
											'94	40		-				
											'99	0		-				
Cercocarpus montanus																		
Y	87	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	33	21	19	1
	94	4	1	-	-	-	-	-	-	-	5	-	-	-	100	33	30	5
	99	1	2	-	-	2	-	-	-	-	5	-	-	-	100	48	38	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		50%			50%			00%			+34%							
'94		20%			00%			00%			+ 0%							
'99		80%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-				
											'94	100		-				
											'99	100		-				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4							
Juniperus osteosperma												
S	87	2	-	-	-	-	-	-	2	66		2
	94	-	-	-	-	-	-	-	0	0		0
	99	-	-	-	-	-	-	-	0	0		0
Y	87	-	-	-	-	-	-	-	0	0		0
	94	-	-	-	-	-	-	-	0	0		0
	99	5	-	-	-	-	-	-	5	100		5
M	87	1	-	-	-	-	-	-	1	33	51 197	1
	94	-	-	-	-	-	-	-	0	0	- -	0
	99	-	-	-	-	-	-	-	0	0	- -	0
X	87	-	-	-	-	-	-	-	0	0		0
	94	-	-	-	-	-	-	-	0	0		0
	99	-	-	-	-	-	-	-	40	40		2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		00%		00%		00%						
'94		00%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'87	33	Dec:	-		
							'94	0		-		
							'99	100		-		
Opuntia spp.												
M	87	1	-	-	-	-	-	-	1	33	12 6	1
	94	-	-	-	-	-	-	-	0	0	4 19	0
	99	1	-	-	-	-	-	-	1	20	8 18	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		00%		00%		00%						
'94		00%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'87	33	Dec:	-		
							'94	0		-		
							'99	20		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Pinus edulis																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	2	-	-	-	-	-	1	-	-	3	-	-	-	100		3	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	-	-	-	-	-	-	-	4	-	-	-	-	80		4	
M	87	1	-	-	-	-	-	-	-	1	-	-	-	33	35	24	1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	99	-	-	-	-	-	-	-	-	-	-	-	-	20		1		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	133	Dec:	-				
											'94	0		-				
											'99	100		-				
Symphoricarpos oreophilus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	94	1	-	-	-	-	-	-	-	1	-	-	-	20	30	55	1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	26	52	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	20		-				
											'99	0		-				

Trend Study 13A-4-99

Study site name: Slaughter Flat .

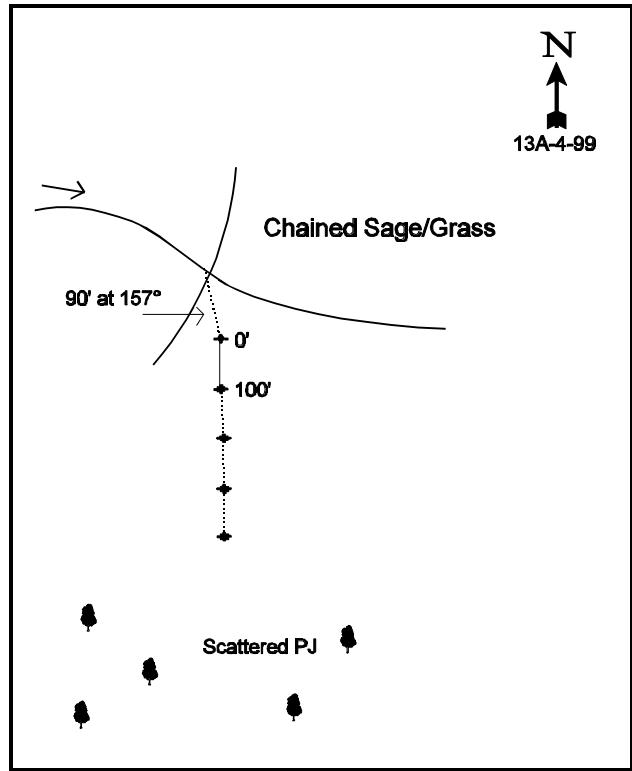
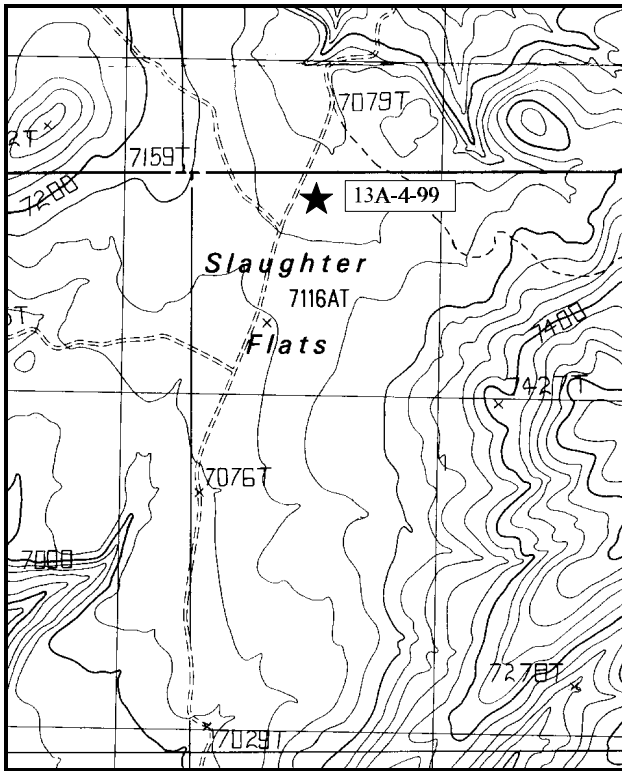
Range type: Chained, Seeded P-J .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Turn east on the Black Ridge Road 0.15 miles south of mile marker 113 on SR 191 south of Moab. Proceed up canyon 3.65 miles to a fork by a stock pond. Bear right up the dugway for 1.15 miles to a fork. Stay left (road #116), go 1 mile to another fork. Stay left, proceed 0.6 miles to a fork. Stay right, proceed 0.35 miles to the powerlines. Pass under the powerlines and across a road. Continue 0.7 miles to a fence (Forest Service boundary). Proceed through the gate, go 1.7 miles to a crossroads in a large chained flat. The transect is located in the SE quarter, marked by short fence posts. The 0-foot baseline stake is tagged #7125.



Map Name: Mount Tukuhtivatz

Diagrammatic Sketch

Township 28S , Range 23E , Section 1

UTM 4251046.374 N, 644362.910 E



## DISCUSSION

### Trend Study No. 13A-4 (33-4)

The Slaughter Flat Study area has long been recognized as important big game winter range. In 1999, pellet group transects indicated use at 25 deer days use/acre (62 ddu/ha), 53 elk days use/acre (131 edu/ha), and 22 cow days use/acre (53 cdu/ha). In 1974, 940 acres were chained and seeded. It is successional now a sagebrush-grass community. This Forest Service land is grazed using a combination rest/deferred rotation system from mid-June through mid-October.

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 east.

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 an above normal organic matter content in the soil surface. 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.

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. The sagebrush made up 60% of the browse cover in 1994, and 56% in 1999. There has been steady, but slight decrease in the sagebrush population since 1987. The population has gone from 3,298 plants/acre (1987), to 2,940 plants/acre (1994), to its current level at 2,560 plants/acre (1999). The population has shown through the years, varying amounts of use, but not use that should cause this kind of loss. Thus, sagebrush loss has most likely been caused by years of extended drought and associated winter injury. The proportion of the population that shows heavy use has never exceeded 22%. Percent decadency has increased from 10% to 20%. Twenty-six percent of the population was classified as young in 1987, now this is only 16%. Biotic potential has varied greatly through the years, 0% in 1987, 12% in 1994, and only 2% in 1999. 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. It has increased from providing 27% to 30% of the browse cover. Other more palatable browse species are uncommon, comprising only a minor percentage of the browse population. The serviceberry, white-stemmed rubber rabbitbrush, and slenderbush eriogonum display good vigor, but sustain moderately heavy use. Overall density of other desirable browse is quite low.

In 1987, it was noted that grasses were an important vegetative component on this site as western wheatgrass was fairly thick in places; but 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 together they contributed to a little more than 3% cover.

In 1999, there were only 7 forb species which contributed to less than 1% of the cover. Of the eight perennial grass species, only crested wheatgrass and western wheatgrass showed significant increases (sum of nested frequency and cover). There were significant losses to needle and thread grass which used to be the most abundant species. There were also significant losses to bottle brush squirreltail, Indian rice grass, Sandberg bluegrass, and mutton bluegrass. Long-term drought has had a detrimental effect on most of the native grasses and forbs. Cheatgrass has greatly increased its deleterious influence on the successional development

of this community. It has increased in cover by over 23 times since 1994.

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.

TREND ASSESSMENT

soil - stable

browse - slightly down

herbaceous understory - stable

1999 TREND ASSESSMENT

The trend for the soil is still somewhat mixed, with the percent bare soil increasing and photo evidence of more pedestaling of herbaceous species. There were also increases in cheatgrass and prickly pear cactus. Trend for soil is slightly down. 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 are 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.

TREND ASSESSMENT

soil - slightly down

browse - slightly down

herbaceous understory - slightly down

HERBACEOUS TRENDS --

Herd unit 13A, Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	a <sup>57</sup>	a <sup>79</sup>	b <sup>211</sup>	23	30	74	2.23	8.42
G	Agropyron smithii	a <sup>8</sup>	b <sup>42</sup>	c <sup>64</sup>	3	17	25	.31	.49
G	Bromus inermis	-	1	1	-	1	1	.00	.00
G	Bromus tectorum (a)	-	83	237	-	33	73	.32	7.39
G	Oryzopsis hymenoides	a <sup>24</sup>	b <sup>66</sup>	a <sup>25</sup>	12	27	13	1.71	.83
G	Poa fendleriana	c <sup>232</sup>	b <sup>146</sup>	a <sup>97</sup>	78	56	36	3.84	2.91
G	Poa secunda	a <sup>20</sup>	b <sup>47</sup>	a <sup>14</sup>	9	23	5	.53	.07
G	Sitanion hystrix	b <sup>24</sup>	b <sup>18</sup>	a <sup>1</sup>	12	11	1	.13	.03
G	Stipa comata	c <sup>221</sup>	b <sup>168</sup>	a <sup>26</sup>	79	64	10	6.00	.63
G	Vulpia octoflora (a)	-	1	1	-	1	1	.00	.00
Total for Annual Grasses		0	84	238	0	34	74	0.32	7.39
Total for Perennial Grasses		586	567	439	216	229	165	14.77	13.41
Total for Grasses		586	651	677	216	263	239	15.10	20.81

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'87	'99
F	Antennaria spp.	-	3	-	-	1	-	.00	-
F	Arabis spp.	a-	b17	a-	-	8	-	.04	-
F	Astragalus convallarius	a11	b35	a3	5	15	1	1.37	.00
F	Castilleja chromosa	a6	b4	a-	3	3	-	.04	-
F	Cirsium spp.	-	3	-	-	1	-	.00	-
F	Cordylanthus wrightii (a)	b16	b17	a2	8	8	1	.04	.03
F	Crepis acuminata	b9	b5	a-	7	3	-	.01	-
F	Cryptantha spp.	b12	b8	a-	7	5	-	.02	-
F	Draba reptans (a)	-	b39	a4	-	18	1	.09	.00
F	Erigeron pumilus	8	3	1	5	1	1	.00	.00
F	Gayophytum ramosissimum (a)	-	b13	a-	-	5	-	.02	-
F	Lappula occidentalis (a)	-	b5	a-	-	3	-	.01	-
F	Microsteris gracilis (a)	-	b73	a15	-	28	6	.38	.03
F	Petradoria pumila	-	3	-	-	1	-	.03	-
F	Phlox longifolia	a-	b98	a-	-	44	-	.27	-
F	Polygonum douglasii (a)	-	b49	a-	-	21	-	.10	-
F	Ranunculus testiculatus (a)	-	b12	a-	-	4	-	.02	-
F	Sphaeralcea coccinea	a17	b78	b64	9	34	29	.57	.71
F	Taraxacum officinale	a1	b12	a-	1	7	-	.04	-
F	Tragopogon dubius	1	-	-	1	-	-	-	-
F	Trifolium gymnocarpon	b118	b102	a3	56	49	1	.32	.00
F	Unknown forb-perennial	3	-	-	2	-	-	-	-
F	Zigadenus paniculatus	b15	a-	a-	6	-	-	-	-
Total for Annual Forbs		16	208	21	8	87	8	0.68	0.06
Total for Perennial Forbs		201	371	71	102	172	32	2.74	0.72
Total for Forbs		217	579	92	110	259	40	3.43	0.79

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

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

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

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

Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	349	358	12.75	35.90	38.68
Rock	61	15	0	.27	.06
Pavement	118	103	0	.24	.52
Litter	398	370	53.25	39.65	41.77
Cryptogams	24	50	.75	.36	.52
Bare Ground	340	314	33.25	35.01	37.35

SOIL ANALYSIS DATA --  
Herd Unit 13A, Study # 04, Study Name: Slaughter Flat

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
130.4	64.8 (14.3)	7.2	52.9	19.8	27.3	1.9	50.4	89.6	0.4

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

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'04	'09	
Rabbit	11	19	N/A
Elk	41	34	53 (131)
Deer	14	36	25 (62)
Cattle	1	1	23 (57)

BROWSE CHARACTERISTICS --

Herd unit 13A, Study no: 4

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Amelanchier utahensis</i>																		
Y	87	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	44	54	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	51	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	33	Dec:	-				
											'94	0		-				
											'99	0		-				
<i>Artemisia tridentata wyomingensis</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	22	-	-	-	-	-	-	-	-	22	-	-	-	440		22	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	87	17	7	1	1	-	-	-	-	-	24	-	2	-	866		26	
	94	19	-	-	-	-	-	-	-	-	19	-	-	-	380		19	
	99	19	-	2	-	-	-	-	-	-	21	-	-	-	420		21	
M	87	15	31	18	1	-	-	-	-	-	62	-	2	1	2166	23	22	
	94	95	15	3	-	-	-	-	-	-	89	-	24	-	2260	19	28	
	99	30	33	18	-	1	-	-	-	-	82	-	-	-	1640	20	28	
D	87	2	2	3	1	-	-	-	-	-	7	-	1	-	266		8	
	94	10	3	-	-	2	-	-	-	-	8	-	2	5	300		15	
	99	9	10	5	1	-	-	-	-	-	16	-	-	9	500		25	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	360		18	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	480		24	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		40%			22%			06%			-11%							
'94		14%			02%			21%			-13%							
'99		34%			20%			07%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	3298	Dec:	8%				
											'94	2940		10%				
											'99	2560		20%				

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
<b>Chrysothamnus nauseosus albicaulis</b>																		
M	87	-	-	1	-	-	-	-	-	-	1	-	-	-	33	31	28	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	32	27	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%			-39%							
'94		00%			00%			00%			+ 0%							
'99		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	0%			
												'94	20		100%			
												'99	20		100%			
<b>Chrysothamnus viscidiflorus</b>																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	94	65	-	-	4	-	-	-	-	-	69	-	-	-	1380			69
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
Y	87	36	1	-	-	-	-	-	-	-	37	-	-	-	1233			37
	94	29	-	-	-	-	-	-	-	-	29	-	-	-	780			29
	99	54	2	-	-	-	-	-	-	-	56	-	-	-	1120			56
M	87	69	3	-	-	-	-	-	-	-	72	-	-	-	2400	5	10	72
	94	312	1	-	2	-	-	-	-	-	315	-	-	-	6300	5	12	315
	99	270	36	-	-	-	-	-	-	-	306	-	-	-	6120	5	12	306
D	87	15	-	-	-	-	-	-	-	-	15	-	-	-	500			15
	94	4	-	-	-	-	-	-	-	-	3	-	-	1	80			4
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		03%			00%			00%			+42%							
'94		.27%			00%			.27%			+ 2%							
'99		10%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	4133	Dec:	12%			
												'94	7160		1%			
												'99	7340		1%			
<b>Coryphantha vivipara arizonica</b>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	3	3	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	40		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		5	6		7	8	9	1	2	3	4	
Eriogonum microthecum																	
M	87	-	-	1	-	-	-	-	-	1	-	-	-	33	12	7	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	1	-	-	-	-	1	-	-	-	20	6	9	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			100%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	33	Dec:	-				
										'94	0		-				
										'99	20		-				
Gutierrezia sarothrae																	
S	87	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	6	-	-	-	-	-	-	-	6	-	-	-	120			6
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	2	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	5	-	-	-	-	-	-	-	5	-	-	-	100			5
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	5	-	-	-	-	-	-	-	5	-	-	-	166	7	6	5
	94	5	-	-	-	-	-	-	-	5	-	-	-	100	1	2	5
	99	2	-	-	-	-	-	-	-	2	-	-	-	40	8	10	2
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			-14%						
'94		00%			00%			00%			-80%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	232	Dec:	-				
										'94	200		-				
										'99	40		-				
Juniperus osteosperma																	
Y	87	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	33	Dec:	-				
										'94	0		-				
										'99	20		-				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<b>Opuntia polyacantha</b>																	
S	87	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4
	94	10	-	-	-	-	-	-	-	-	8	1	1	-	200		10
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
Y	87	13	-	-	-	-	-	-	-	-	12	-	1	-	433		13
	94	28	-	-	-	-	-	-	-	-	21	-	7	-	560		28
	99	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17
M	87	18	-	-	-	-	-	-	-	-	11	-	5	2	600	5 7	18
	94	74	-	-	-	-	-	-	-	-	69	1	4	-	1480	4 16	74
	99	89	-	1	-	-	-	-	-	-	90	-	-	-	1800	4 10	90
D	87	4	-	-	-	-	-	-	-	-	3	-	1	-	133		4
	94	6	-	2	-	-	-	-	-	-	5	-	1	2	160		8
	99	13	-	1	-	-	-	-	-	-	7	-	2	5	280		14
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			26%			+47%						
'94		00%			02%			13%			+ 9%						
'99		00%			02%			06%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	1166	Dec:	11%			
											'94	2200		7%			
											'99	2420		12%			
<b>Pediocactus simpsonii</b>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	20		-			
<b>Pinus edulis</b>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	20		-			





## DISCUSSION

### Trend Study No. 13A-5 (33-5)

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 illustrated by the pellet group transects done on the site in 1999 which showed 34 deer days use/acre (84 ddu/ha) and 54 elk days use/acre (133 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. 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. The study is located at an elevation of about 7,000 feet on a moderately sloping (5-8%) 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 small to good sized 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 manifested 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 site has a mildly alkaline soil (7.5 pH). Soil phosphorus could be a limiting factor with 7.5 ppm, where 10 ppm is considered necessary for normal plant development. Percent organic matter is average for sites in this area. Soil temperature could also be another limiting factor with a temperature of 65°F at about 10 inches. Winter annuals could be quite successful on this type of site with these warm soil temperatures.

Black sagebrush makes up 57% of the browse cover. The moderately dense, mostly mature population (74%) exhibits little sign of over utilization; although some are moderately hedged. Young plants have made up from 7% to 17% of the population in the past, now they represent 8% of the population. In the past, some of the mature plants showed signs of reduced vigor by the presence of chlorotic leaves, with the percentage of the population showing decadence being relatively stable (8-9%). Percent decadence has gone up to 18% in 1999. The biotic potential (proportion of seedlings to the population) has gone from 6% (1994) to zero (1999). The population has decreased from 2,720 plants/acre (1994) to currently where it is down to 2,020 plants/acre. Other desirable browse plants are limited to a few bitterbrush, green ephedra, and fourwing saltbush. The pinyon pine and juniper are becoming more dominant on the chaining where many plants are at the height of 8-10 feet.

The seeded wheatgrasses were more prevalent in the past, where now they only provide about one-fifth of the grass cover. They have all decreased nested frequency values, likely due to the extended drought coupled with spring livestock grazing. Cheatgrass contributed 74% of the grass cover in 1994. Currently, this value has decreased to 59%, however the sum of nested values indicate it has increased in abundance. Cover has decreased because of the drought. Perennial forb density and diversity is low. Eighteen species have been encountered through the years, but only eleven were sampled in 1999. Almost half of these were annuals. The only forb species found with fair cover in 1994 was rock goldenrod, thistleleaf peavine, and timber poisonvetch. Currently, only rock goldenrod has fair cover. This one species makes up 68% of the total forb cover.

The prevalence of rocks on the surface accounts for the estimated 22% rock and pavement cover. The value has increased in 1999 to 26%. This value has been steadily increasing since 1987. The percentage of vegetative cover is fairly good. Litter cover, although there is abundant debris from the chaining, is composed mostly of cheatgrass and has decreased from 62% down to 42%. However, percent bare ground is only at 12% for 1994 and 1999.

1994 TREND ASSESSMENT

The soil trend is stable to slightly improved. There has been some loss of the liter cover, which would be expected with the extended drought, but percent bare ground has decreased to only 12%. 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.

TREND ASSESSMENT

soil - stable to slightly improved

browse - stable to improving

herbaceous understory - down with the extended drought

1999 TREND ASSESSMENT

The soil trend is 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 (13% 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 associated winter injury, 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. 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.

TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - continued down for perennial species with the extended drought

HERBACEOUS TRENDS --

Herd unit 13A, Study no: 5

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	94	65	83	39	25	36	2.66	3.08
G	Agropyron intermedium	<sub>b</sub> 137	<sub>a</sub> 48	<sub>a</sub> 49	53	21	19	1.01	1.23
G	Bromus anomalus	<sub>b</sub> 31	<sub>ab</sub> 7	<sub>a</sub> -	16	2	-	.15	-
G	Bromus japonicus (a)	-	-	2	-	-	2	-	.01
G	Bromus tectorum (a)	-	317	333	-	94	98	16.43	9.10
G	Hilaria jamesii	<sub>a</sub> -	<sub>b</sub> 13	<sub>b</sub> 22	-	6	7	.13	.66
G	Oryzopsis hymenoides	56	30	24	22	14	14	1.12	.79

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
G	<i>Poa fendleriana</i>	36	26	19	17	13	9	.43	.24
G	<i>Sitanion hystrix</i>	<sub>b</sub> 64	<sub>a</sub> 33	<sub>a</sub> 16	28	17	7	.14	.17
Total for Annual Grasses		0	317	335	0	94	100	16.43	9.11
Total for Perennial Grasses		418	222	213	175	98	92	5.66	6.18
Total for Grasses		418	539	548	175	192	192	22.09	15.30
F	<i>Arabis perennans</i>	<sub>b</sub> 12	<sub>ab</sub> 6	<sub>a</sub> -	7	2	-	.01	-
F	<i>Astragalus convallarius</i>	<sub>a</sub> -	<sub>b</sub> 10	<sub>b</sub> 15	-	7	9	1.54	.43
F	<i>Astragalus coltoni</i>	2	3	2	1	2	2	.03	.01
F	<i>Castilleja linariaefolia</i>	-	3	-	-	2	-	.01	-
F	<i>Cryptantha humilis</i>	-	-	-	-	-	-	.00	-
F	<i>Cymopterus</i> spp.	-	-	1	-	-	1	-	.03
F	<i>Descurainia pinnata</i> (a)	-	5	2	-	2	1	.01	.00
F	<i>Draba reptans</i> (a)	-	<sub>b</sub> 61	<sub>a</sub> 3	-	29	2	.15	.03
F	<i>Erigeron pumilus</i>	3	-	-	1	-	-	-	-
F	<i>Gilia</i> spp. (a)	-	<sub>b</sub> 36	<sub>a</sub> 5	-	17	3	.08	.01
F	<i>Lathyrus lanszwertii</i>	<sub>a</sub> 2	<sub>b</sub> 81	<sub>b</sub> 56	1	37	28	2.56	.74
F	<i>Lesquerella</i> spp.	-	1	6	-	1	2	.00	.01
F	<i>Machaeranthera canescens</i>	5	3	-	2	1	-	.00	-
F	<i>Microsteris gracilis</i> (a)	-	<sub>b</sub> 46	<sub>a</sub> 5	-	24	3	.12	.01
F	<i>Petradoria pumila</i>	<sub>a</sub> 34	<sub>b</sub> 75	<sub>b</sub> 62	14	30	25	4.05	2.96
F	<i>Phlox longifolia</i>	<sub>a</sub> -	<sub>b</sub> 7	<sub>a</sub> -	-	4	-	.02	-
F	<i>Ranunculus testiculatus</i> (a)	-	<sub>b</sub> 6	<sub>a</sub> -	-	3	-	.04	-
F	<i>Sphaeralcea coccinea</i>	<sub>a</sub> -	<sub>ab</sub> 6	<sub>b</sub> 8	-	2	4	.41	.07
Total for Annual Forbs		0	154	15	0	75	9	0.40	0.07
Total for Perennial Forbs		58	195	150	26	88	71	8.67	4.26
Total for Forbs		58	349	165	26	163	80	9.07	4.33

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

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

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

CANOPY COVER --  
Herd unit 13A, Study no: 5

Species	Percent Cover '09
Juniperus osteosperma	1

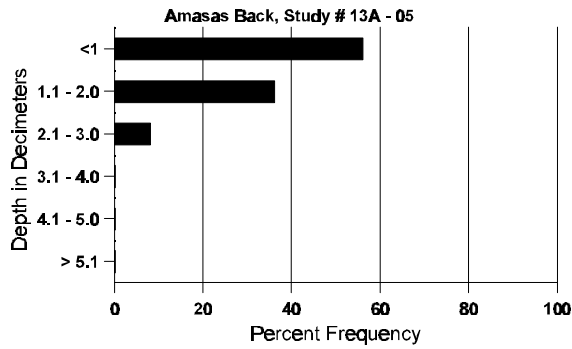
BASIC COVER --  
Herd unit 13A, Study no: 5

Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	343	354	4.75	41.08	37.70
Rock	278	263	17.50	19.76	20.53
Pavement	201	201	1.25	1.53	5.09
Litter	377	371	61.50	42.43	42.45
Cryptogams	39	71	.50	.58	1.34
Bare Ground	225	230	14.50	12.41	12.25

SOIL ANALYSIS DATA --  
Herd Unit 13A, Study # 05, Study Name: Amasas Back

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.7	65.0 (10.6)	7.5	50.9	19.8	29.3	3.5	7.5	96.0	0.6

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 13A, Study no: 5

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	04	09	
Rabbit	9	20	N/A
Elk	7	20	54 (133)
Deer	13	23	34 (84)

## BROWSE CHARACTERISTICS --

Herd unit 13A, Study no: 5

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<b>Artemisia nova</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	9	3	-	-	-	-	-	-	-	10	1	1	-	400			12
	94	9	1	-	-	-	-	-	-	-	6	-	4	-	200			10
	99	5	3	-	-	-	-	-	-	-	7	-	1	-	160			8
M	87	38	12	1	1	-	-	-	-	-	44	2	6	-	1733	12	16	52
	94	87	25	-	3	-	-	-	-	-	93	-	22	-	2300	18	31	115
	99	44	25	5	1	-	-	-	-	-	75	-	-	-	1500	17	27	75
D	87	2	4	-	-	-	-	-	-	-	6	-	-	-	200			6
	94	5	2	2	-	2	-	-	-	-	6	-	3	2	220			11
	99	12	3	1	2	-	-	-	-	-	13	-	-	5	360			18
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	280			14
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		27%			01%			10%			+14%							
'94		22%			01%			23%			-26%							
'99		31%			06%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	2333	Dec:	9%			
												'94	2720		8%			
												'99	2020		18%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	34	56	0
	99	-	2	-	-	-	-	-	-	-	2	-	-	40	30	34	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		100%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	0		-		
												'99	40		-		
<i>Atriplex canescens</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	-	1	1	-	-	-	-	-	-	2	-	-	40			2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	3	-	-	-	-	-	-	-	3	-	-	-	60	36	44	3
	99	-	2	-	-	-	-	-	-	2	-	-	-	40	34	40	2
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%			+20%						
'99		60%			40%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%		
												'94	80		0%		
												'99	100		20%		
<i>Coryphantha vivipara arizonica</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	1	-	-	-	-	-	1	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	1	-	-	-	20	3	8	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	0		-		
												'99	40		-		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4			
<i>Ephedra viridis</i>								
Y	87	-	-	-	-	-	-	-
	94	1	-	-	-	-	-	-
	99	-	-	-	-	-	-	-
M	87	-	-	-	-	-	-	-
	94	-	-	4	-	-	-	-
	99	1	-	1	-	-	-	-
X	87	-	-	-	-	-	-	-
	94	-	-	-	-	-	-	-
	99	-	-	-	-	-	-	-
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>
'87		00%		00%		00%		
'94		00%		80%		00%		-60%
'99		00%		50%		00%		
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec: -
						'94	100	-
						'99	40	-
<i>Gutierrezia sarothrae</i>								
S	87	-	-	-	-	-	-	-
	94	2	-	-	-	-	-	-
	99	-	-	-	-	-	-	-
Y	87	-	-	-	-	-	-	-
	94	6	-	-	-	-	-	-
	99	4	-	-	-	-	-	-
M	87	-	-	-	-	-	-	-
	94	21	-	-	-	-	-	-
	99	17	-	-	-	-	-	-
D	87	-	-	-	-	-	-	-
	94	6	-	-	-	-	-	-
	99	-	-	-	-	-	-	-
X	87	-	-	-	-	-	-	-
	94	-	-	-	-	-	-	-
	99	-	-	-	-	-	-	-
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>
'87		00%		00%		00%		
'94		00%		00%		03%		-36%
'99		00%		00%		00%		
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec: 0%
						'94	660	18%
						'99	420	0%



A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Juniperus osteosperma</b>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	3	-	-	-	-	-	-	-	-	3	-	-	-	100	46	31	3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	7	-	-	-	-	-	-	1	-	8	-	-	-	160	-	-	8
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	100	Dec:	-			
												'94	0		-			
												'99	220		-			
<b>Opuntia erinacea</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	-	-	1	-	20	2	4	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	15	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			100%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	20		-			
												'99	0		-			
<b>Pediocactus simpsonii</b>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20	1	3	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	40		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total									
		1	2	3	4												
<i>Pinus edulis</i>																	
Y	87	-	-	-	-	-	-	-	-	-	0		0				
	94	-	-	-	-	-	-	-	-	-	0		0				
	99	2	-	-	-	-	-	-	-	-	40		2				
M	87	-	-	-	-	-	-	-	-	-	0	-	0				
	94	-	-	-	-	-	-	-	-	-	0	-	0				
	99	1	-	-	3	-	-	-	-	-	80	-	4				
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-				
										'94	0		-				
										'99	120		-				
<i>Purshia tridentata</i>																	
M	87	-	1	-	-	-	-	-	-	1	-	-	-	33	5	11	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	16	29	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	19	43	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		100%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	33	Dec:	-				
										'94	0		-				
										'99	0		-				
<i>Yucca baccata baccata</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	4	8	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-				
										'94	0		-				
										'99	0		-				

Trend Study 13A-6-99

Study site name: Bald Mesa .

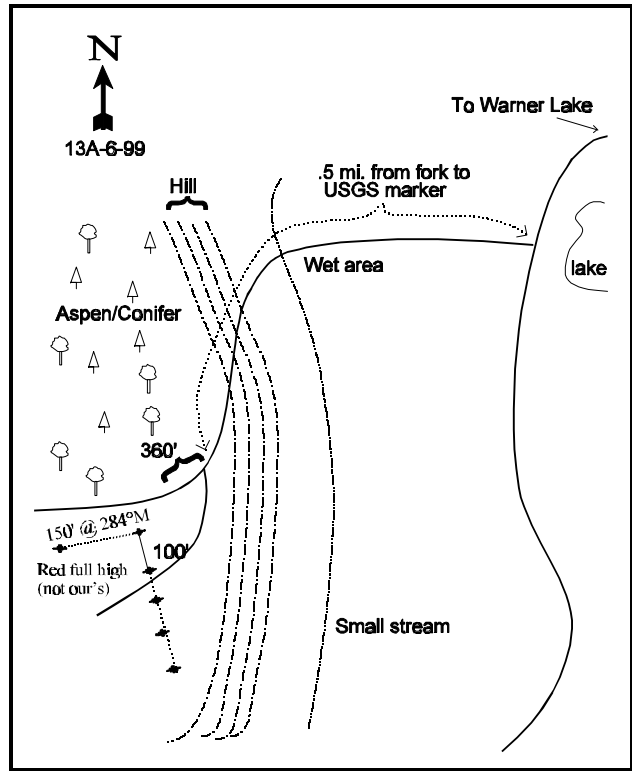
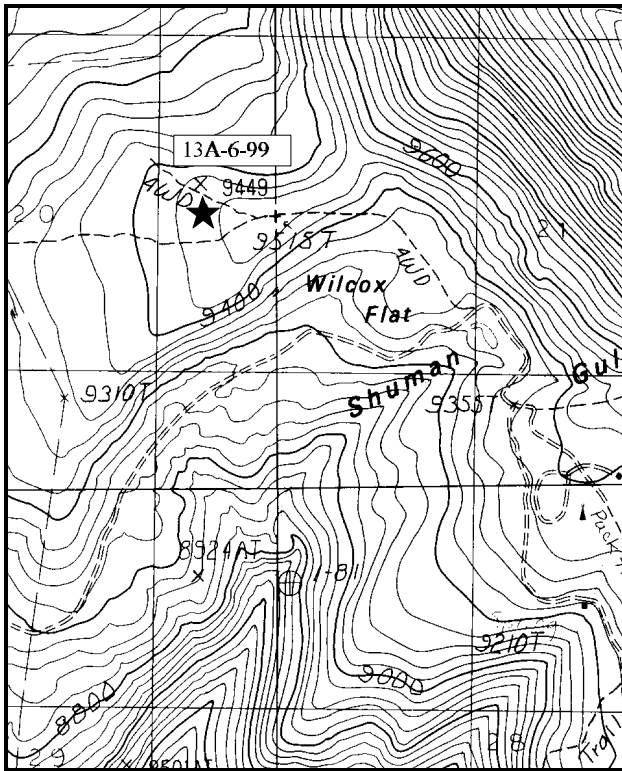
Range type: Snowberry .

Compass bearing: frequency baseline 185°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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

UTM 4265472.838 N , 649258.710 E

## DISCUSSION

### Trend Study No. 13A-6 (33-6)

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. The area is used mostly as summer range for cattle with some big game use. 1999 pellet group transect data estimates 9 elk days use/acre (22 edu/ha) and 84 cow days use/acre (207 cdu/ha).

The fairly level mesa has a southwest aspect on a gentle 2% slope and an elevation of 9,400 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, where 10 ppm is considered minimal for normal plant development. No significant erosion has occurred on the site, although the access roads (which have now been closed) are washed out and severely eroded.

Snowberry forms the dominant shrub cover on this open site which comprises 67% of the shrub cover for 1994 and 1999. The plants are vigorous with mostly light use, but some showing moderate use. The mountain big sagebrush on the site has shown significant changes in its population, however this has been because of the problem with classifying whether it was mountain big sagebrush or black sagebrush. The combined sagebrush population for 1994 and 1999 is 620 plants/acre for both years, with over 90% being classified as black sagebrush in 1999. The decrease in the mountain big sagebrush density is mostly because some of these individuals were reclassified as black sagebrush during the 1994 reading, and more so in the 1999 reading. Because of the elevation and not generally used as a winter range, browse is not critical for this site. Also, the browse only makes up approximately 25% of the total vegetative cover. Other browse species found on the site include currant (*Ribes sp.*), low rabbitbrush, and Wood's rose.

Herbaceous vegetation forms a diverse and dense understory. Forbs are abundant with them providing almost 49% (1994) and 40% (1999) of the total vegetative cover. These species provide valuable summer forage. More than 30 forb species have been encountered on the site in 1994 and 1999, with 8 of the most common forb species providing 80% of the total forb cover. Grasses are also quite dense providing on average about 28% of the total vegetative cover. Kentucky bluegrass makes up the bulk of the grass cover, on average contributing 85% of it. The majority of the herbaceous species on this site are increasers with heavy grazing. The dense herbaceous understory accounts for a high amount of the vegetative cover (on average, 73% of the total vegetative cover). Litter cover decreased slightly in 1994, but since then it has increased by almost 30% in 1999.

### 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. 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.

### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly down, but still in very good condition

## 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.

### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly down, but still in very good condition

### HERBACEOUS TRENDS --

Herd unit 13A, Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron spp.	<sub>b</sub> 128	<sub>a</sub> -	<sub>a</sub> 1	54	-	1	-	.01
G	Bromus anomalus	<sub>ab</sub> 1	<sub>b</sub> 5	<sub>a</sub> -	1	3	-	.04	-
G	Carex spp.	4	-	5	2	-	2	-	.03
G	Dactylis glomerata	-	-	5	-	-	2	-	.04
G	Koeleria cristata	<sub>a</sub> -	<sub>b</sub> 35	<sub>b</sub> 27	-	15	12	.36	.21
G	Phleum pratense	-	-	5	-	-	2	-	.15
G	Poa arida	<sub>b</sub> 136	<sub>a</sub> 28	<sub>a</sub> 17	41	11	6	.54	1.07
G	Poa fendleriana	-	-	3	-	-	1	-	.03
G	Poa pratensis	<sub>a</sub> 257	<sub>b</sub> 332	<sub>b</sub> 346	78	94	96	12.42	22.36
G	Sitanion hystrix	<sub>a</sub> 34	<sub>b</sub> 57	<sub>ab</sub> 45	14	31	19	.80	.72
G	Stipa comata	<sub>b</sub> 99	<sub>a</sub> 49	<sub>a</sub> 32	43	24	13	1.14	.68
G	Stipa lettermani	<sub>a</sub> -	<sub>b</sub> 59	<sub>b</sub> 48	-	31	21	1.08	1.42
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		659	565	534	233	209	175	16.42	26.75
Total for Grasses		659	565	534	233	209	175	16.42	26.75
F	Achillea millefolium	102	125	110	37	45	44	2.53	2.02
F	Agoseris glauca	<sub>a</sub> -	<sub>b</sub> 14	<sub>b</sub> 19	-	6	9	.08	.12
F	Androsace septentrionalis (a)	<sub>b</sub> 16	<sub>a</sub> -	<sub>a</sub> -	8	-	-	-	-
F	Arenaria congesta	<sub>a</sub> 181	<sub>b</sub> 240	<sub>a</sub> 195	66	76	73	8.03	5.33
F	Arabis drummondi	<sub>b</sub> 38	<sub>a</sub> -	<sub>a</sub> -	18	-	-	-	-
F	Aster chilensis	<sub>a</sub> -	<sub>b</sub> 50	<sub>a</sub> -	-	17	-	.89	-
F	Astragalus miser	<sub>c</sub> 226	<sub>b</sub> 191	<sub>a</sub> 72	78	72	30	7.73	3.42
F	Astragalus spp.	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 179	-	-	69	-	7.96

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	Castilleja linariaefolia	a-	b19	b15	-	9	7	.26	.30
F	Calochortus nuttallii	a-	ab3	b13	-	2	7	.01	.08
F	Chenopodium album (a)	-	-	1	-	-	1	-	.00
F	Cirsium calcareum	a51	b108	a52	27	49	23	1.19	1.97
F	Clematis hirsutissima	b13	a-	a-	6	-	-	-	-
F	Comandra pallida	28	21	31	11	8	11	.33	.78
F	Collinsia parviflora (a)	-	-	1	-	-	1	-	.00
F	Crepis acuminata	15	18	18	6	6	8	.16	.45
F	Delphinium nuttallianum	c75	b8	a-	39	6	-	.08	-
F	Erigeron flagellaris	88	52	29	37	21	12	.33	.21
F	Eriogonum racemosum	61	65	56	31	31	29	1.35	.84
F	Erigeron speciosus	a39	b65	a15	15	28	6	1.98	.27
F	Eriogonum umbellatum	12	6	2	6	2	1	.01	.15
F	Galium boreale	-	5	4	-	2	2	.53	.41
F	Holosteum umbellatum (a)	-	-	5	-	-	2	-	.01
F	Ipomopsis aggregata	2	3	3	1	1	1	.00	.00
F	Lathyrus brachycalyx	-	-	-	-	-	-	-	.53
F	Lomatium dissectum	-	3	1	-	1	1	.00	.38
F	Lupinus sericeus	b117	a57	a41	50	24	20	3.16	2.66
F	Lychnis drummondii	-	-	2	-	-	2	-	.01
F	Mertensia brevistyla	b8	ab3	a-	5	1	-	.00	-
F	Penstemon palmeri	b49	a4	a4	23	2	2	.15	.03
F	Petradoria pumila	a-	b26	b31	-	10	14	.92	.51
F	Penstemon strictus	a-	b32	b31	-	17	11	.52	.61
F	Penstemon thompsoniae	a-	ab2	b6	-	1	3	.03	.06
F	Phlox spp.	-	3	3	-	1	1	.15	.03
F	Potentilla anersina	64	95	78	27	40	35	2.24	1.72
F	Polygonum douglasii (a)	-	a1	b15	-	1	6	.00	.03
F	Senecio integerrimus	c197	b84	a29	78	31	13	1.18	.29
F	Sedum lanceolatum	b22	ab1	a-	9	1	-	.00	-
F	Taraxacum officinale	b172	a66	a65	76	26	29	.39	1.35
F	Thalictrum fendleri	-	-	3	-	-	1	-	.30
F	Trifolium spp.	1	-	3	1	-	1	-	.00
F	Unknown forb-perennial	b34	a-	a-	19	-	-	-	-
F	Zigadenus paniculatus	2	-	-	2	-	-	-	-
Total for Annual Forbs		16	1	22	8	1	10	0.00	0.05
Total for Perennial Forbs		1597	1369	1110	668	543	465	34.35	32.89
Total for Forbs		1613	1370	1132	676	544	475	34.36	32.94

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

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

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

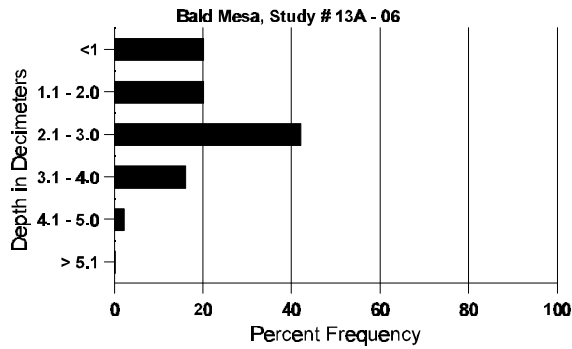
BASIC COVER --  
Herd unit 13A, Study no: 6

Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	392	390	26.00	66.22	70.77
Rock	145	68	2.75	1.59	1.36
Pavement	91	99	0	.20	1.12
Litter	364	348	64.00	39.64	54.87
Cryptogams	21	5	.50	.12	.06
Bare Ground	212	145	6.75	6.11	5.03

SOIL ANALYSIS DATA --  
Herd Unit 13A, Study # 06, Study Name: Bald Mesa

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	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

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 13A, Study no: 6

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Elk	4	3	9 (22)
Deer	-	1	0
Cattle	4	17	84 (207)

## BROWSE CHARACTERISTICS --

Herd unit 13A, Study no: 6

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	4	4	1	-	-	-	-	-	-	9	-	-	-	180			9
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	-	8	-	-	-	-	-	-	-	8	-	-	-	160			8
M	87	2	3	1	-	-	-	-	-	-	4	-	2	-	400	15	25	6
	94	15	3	-	-	-	-	-	-	-	18	-	-	-	360	16	20	18
	99	5	7	-	2	-	-	-	1	-	15	-	-	-	300	14	21	15
D	87	3	2	3	-	-	-	-	-	-	6	-	2	-	533			8
	94	10	-	-	-	-	-	-	-	-	7	-	-	3	200			10
	99	5	3	-	-	-	-	-	-	-	8	-	-	-	160			8
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	420			21
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		36%			29%			29%			-34%							
'94		10%			00%			10%			+ 0%							
'99		58%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	933	Dec:	57%			
												'94	620		32%			
												'99	620		26%			



A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Chrysothamnus viscidiflorus lanceolatus</b>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	6	-	-	-	-	-	-	-	-	-	-	-	120			6
	99	3	-	-	-	-	-	-	-	-	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	61	-	-	-	-	-	-	-	-	-	-	-	1220	14	18	61
	99	45	2	-	3	-	-	-	-	-	-	-	-	1000	14	18	50
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%			-21%						
'99		04%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	1340		-		
												'99	1060		-		
<b>Chrysothamnus viscidiflorus stenophyllus</b>																	
S	87	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	2
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	9	10	1	-	-	-	-	-	-	-	-	20	-	-	-	20
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	10	7	1	-	-	-	-	-	-	-	-	18	-	-	-	18
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	87	2	3	2	-	-	-	-	-	-	-	-	7	-	-	-	7
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		44%			09%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	2999	Dec:	16%		
												'94	0		0%		
												'99	0		0%		
<b>Ribes spp.</b>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	3	-	-	6	-	-	-	-	-	-	-	9	-	-	-	9
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	180		-		
												'99	0		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ribes cereum cereum																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	2	-	-	3	-	-	-	60	65	90	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	60		-			
Ribes montigenum																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	3	-	-	3	-	-	-	60	34	37	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	60		-			
Rosa woodsii																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	19	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%			+ 0%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	20		-			
												'99	20		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Sambucus racemosa</b>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	-	-	-	3	-	-	-	-	-	3	-	-	-	60	29	40	
	99	-	-	-	1	-	-	1	-	-	2	-	-	-	40	35	39	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	60		-			
												'99	60		-			
<b>Symphoricarpos oreophilus</b>																		
S	87	28	-	-	-	-	-	-	-	-	28	-	-	-	1866		28	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	87	43	9	-	-	-	-	-	-	-	52	-	-	-	3466		52	
	94	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	99	4	-	-	-	-	-	1	-	-	5	-	-	-	100		5	
M	87	6	9	1	-	-	-	-	-	-	16	-	-	-	1066	25	23	
	94	94	-	-	2	-	-	-	-	-	96	-	-	-	1920	22	50	
	99	40	9	1	3	-	-	4	-	-	57	-	-	-	1140	25	42	
D	87	-	4	-	-	-	-	-	-	-	4	-	-	-	266		4	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	3	-	-	2	-	-	8	-	-	-	160		8	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		31%			01%			00%			-56%							
'94		00%			00%			00%			-33%							
'99		13%			01%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	4798	Dec:	6%			
												'94	2100		0%			
												'99	1400		11%			

Trend Study 13A-7-99

Study site name: Round Mountain .

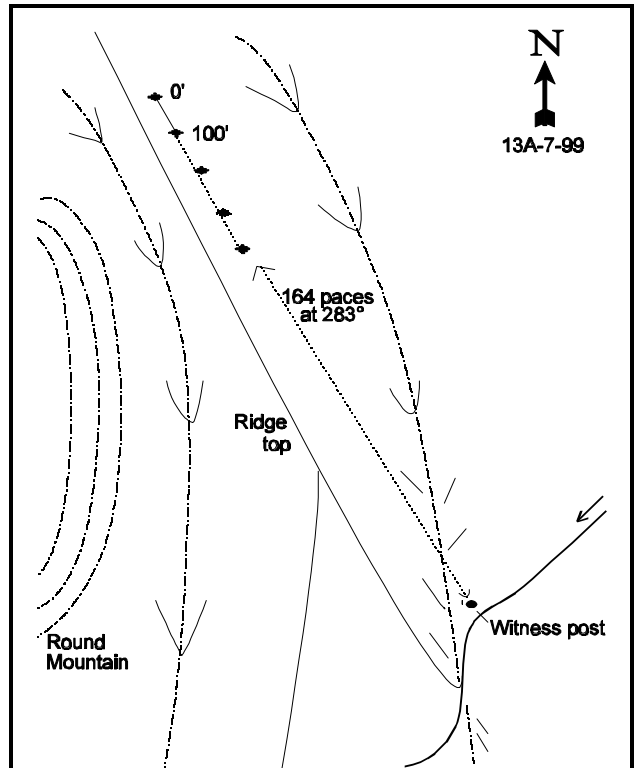
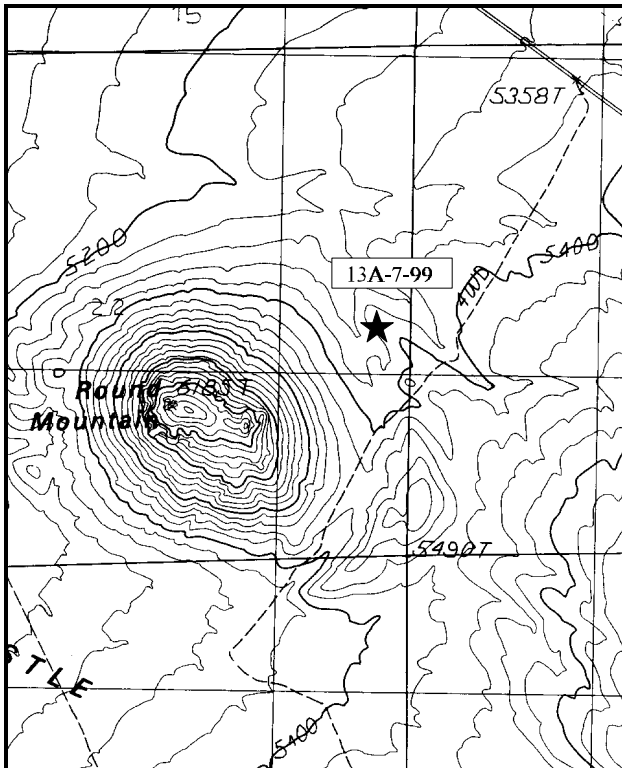
Range type: Blackbrush .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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°) down and across the draw to the top of a sage-blackbrush ridge. The 0-foot baseline stake is a short fencepost marked with a red browse tag #7837.



Map Name: Warner Lake

Diagrammatic Sketch

Township 25S , Range 23E , Section 22

UTM 4275165.472 N , 643305.147 E

## DISCUSSION

### Trend Study No. 13A-7 (33-7)

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 transects on the study area indicated use to be 2 elk days use/acre (5 edu/ha) and 78 deer days use/acre (193 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 below. 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 rock cover present. Current rock-pavement totals are quite high at almost 50%.

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, now it only makes up 13% of the browse cover. The blackbrush, which is more adapted to the high soil temperatures and drought, made up 46% of the browse cover in 1994, now it makes up 52% of the browse cover. Together on average, these two species contribute 57% of the total vegetative cover. However, total vegetative cover is less than 30%. 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, now 56% show heavy use. Percent decadence has been above 50% since 1994. Since 1994, more than 40% of the decadent plants have been classified as dying. This population is not displaying traits of a stable population. From 1994 to 1999, the population has decreased by 26%. With a reproductive potential of zero and the percent young age class at only 1%, there are no replacements coming in the near future. The blackbrush show moderate to heavy use. Their population has also declined by 15% since 1994. This is a much better trend than that for Wyoming big sagebrush which obviously was more effected by the extended drought and high soil temperatures than the blackbrush. However, the trend for browse on this site is still down. Juniper and a few pinyon trees are found in the washes and slopes of Round Mountain.

Herbaceous vegetation (grasses and forbs) are not an important component of this community for on average they only make up 22% of the total vegetative cover. Over 96% of the grass cover is contributed by annual grasses, mostly cheatgrass. Perennial grasses are few. Mutton bluegrass is found mostly growing in the protection of shrub crowns. Total forb cover in 1999 was less than 1%. There were 14 species of forbs found in 1994, now only 8 can be found, of which only 3 species are perennial.

The rocky nature of the site explains why there is almost 50% cover for rock and pavement. Percent bare ground was fairly low, but only because of the high cover value for rock and pavement. The proportion of the plant cover provided by the herbaceous understory is very low leaving the soil unprotected from high intensity summer storms.

### 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 percent bare ground has increased to 24%. 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 is zero, and the percentage of young plants 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.

TREND ASSESSMENT

soil - slightly down

browse - down

herbaceous understory - down

1999 TREND ASSESSMENT

The trend for soils would be slightly down because of continuing increase in percent rock cover. 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 is zero, and the percentage of young plants 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.

TREND ASSESSMENT

soil - slightly down

browse - down

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 13A, Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
G	Bromus tectorum (a)	-	<sub>a</sub> 214	<sub>b</sub> 327	-	72	96	3.00	6.42
G	Poa fendleriana	-	3	4	-	3	3	.01	.04
G	Sitanion hystrix	-	<sub>b</sub> 4	<sub>a</sub> -	-	3	-	.04	-
G	Vulpia octoflora (a)	-	<sub>b</sub> 145	<sub>a</sub> 75	-	54	30	.32	.22
Total for Annual Grasses		0	359	402	0	126	126	3.31	6.65
Total for Perennial Grasses		0	7	4	0	6	3	0.05	0.04
Total for Grasses		0	366	406	0	132	129	3.37	6.69
F	Arabis spp.	14	3	1	6	2	1	.01	.00
F	Astragalus moencopensis	-	1	-	-	1	-	.00	-
F	Astragalus spp.	<sub>a</sub> 6	<sub>b</sub> 71	<sub>a</sub> 10	3	34	6	.17	.03
F	Castilleja chromosa	-	2	-	-	1	-	.01	-
F	Descurainia pinnata (a)	-	<sub>b</sub> 25	<sub>a</sub> -	-	10	-	.05	-
F	Draba reptans (a)	-	<sub>b</sub> 190	<sub>a</sub> 10	-	80	5	.42	.02
F	Eriogonum cernuum (a)	-	2	-	-	1	-	.00	-
F	Erigeron pumilus	1	-	-	1	-	-	-	-
F	Gilia spp. (a)	-	<sub>b</sub> 106	<sub>a</sub> 10	-	40	5	.20	.05

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	Holosteum umbellatum (a)	-	a-	b11	-	-	4	-	.02
F	Lappula occidentalis (a)	-	b11	a-	-	5	-	.02	-
F	Penstemon pachyphyllus	3	-	-	1	-	-	-	-
F	Physaria spp.	-	4	-	-	2	-	.03	-
F	Plantago patagonica (a)	-	b20	a11	-	9	4	.04	.02
F	Senecio multilobatus	-	20	8	-	10	5	.67	.05
F	Sisymbrium altissimum (a)	-	9	3	-	4	2	.02	.01
F	Streptanthus cordatus	-	15	-	-	7	-	.43	-
Total for Annual Forbs		0	363	45	0	149	20	0.77	0.12
Total for Perennial Forbs		24	116	19	11	57	12	1.34	0.08
Total for Forbs		24	479	64	11	206	32	2.11	0.21

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

#### BROWSE TRENDS --

Herd unit 13A, Study no: 7

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

#### CANOPY COVER --

Herd unit 13A, Study no: 7

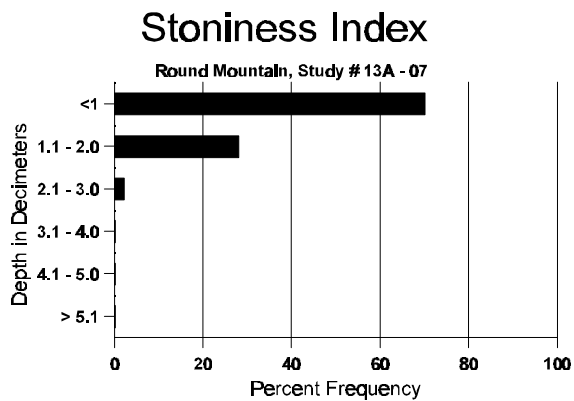
Species	Percent Cover '09
Juniperus osteosperma	4

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

Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	324	344	8.25	22.44	29.63
Rock	361	298	32.00	30.60	23.46
Pavement	360	325	16.75	10.05	25.93
Litter	372	338	29.50	20.06	23.24
Cryptogams	121	71	.25	1.23	1.47
Bare Ground	359	253	13.25	24.26	8.07

SOIL ANALYSIS DATA --  
Herd Unit 13A, Study # 07, Study Name: Round Mountain

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.6	69.2 (10.8)	7.8	58.9	19.8	21.3	1.9	60.4	48.0	0.4



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

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'04	'09	
Rabbit	8	9	N/A
Elk	-	3	2 (5)
Deer	49	40	78 (193)



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

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	2	-	-	-	-	2	-	-	-	40	-	-	2
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	4	-	-	-	-	-	-	-	-	-	-	4	80			4
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		100%			00%			67%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'94	0		0%			
												'99	120		67%			
Artemisia tridentata wyomingensis																		
S	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	1	10	21	-	-	-	-	-	-	32	-	-	-	2133			32
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	-	-	-	-	1	-	-	-	-	1	-	-	-	20			1
M	87	-	5	19	-	-	-	-	-	-	24	-	-	-	1600	16	27	24
	94	26	9	1	-	-	-	-	-	-	31	-	5	-	720	18	36	36
	99	-	9	12	-	6	11	-	-	-	38	-	-	-	760	18	29	38
D	87	1	9	6	-	-	-	-	-	-	14	-	1	1	1066			16
	94	43	19	2	2	2	-	-	-	-	36	-	4	28	1360			68
	99	1	9	8	4	2	13	3	-	-	24	-	-	16	800			40
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	800			40
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	840			42
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		33%			64%			03%			-55%							
'94		28%			03%			35%			-26%							
'99		34%			56%			20%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	4799	Dec:	22%			
												'94	2140		64%			
												'99	1580		51%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Atriplex canescens</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	27	43	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	0		-		
												'99	0		-		
<i>Coleogyne ramosissima</i>																	
S	87	1	-	-	-	-	-	-	-	-	1	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	40			2
Y	87	6	1	4	-	-	-	-	-	-	11	-	-	733			11
	94	1	-	-	-	-	-	-	-	-	1	-	-	20			1
	99	1	1	-	-	-	-	-	-	-	2	-	-	40			2
M	87	1	4	10	-	-	-	-	-	-	15	-	-	1000	12	16	15
	94	141	27	1	-	11	-	-	-	-	159	-	21	3600	13	26	180
	99	81	40	12	37	-	-	-	-	-	170	-	-	3400	16	30	170
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	18	-	-	4	3	-	-	-	-	25	-	-	500			25
	99	1	-	-	1	-	-	1	-	-	2	-	-	60			3
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		19%			54%			00%			+58%						
'94		20%			.48%			10%			-15%						
'99		23%			07%			.57%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	1733	Dec:	0%		
												'94	4120		12%		
												'99	3500		2%		
<i>Ephedra viridis</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	20			1
	99	3	-	-	-	-	-	-	-	-	3	-	-	60			3
M	87	-	-	1	-	-	-	-	-	-	1	-	-	66	4	2	1
	94	-	1	-	-	-	-	-	-	-	1	-	-	20	19	22	1
	99	-	-	1	-	-	-	-	-	-	1	-	-	20	25	31	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			100%			00%			-39%						
'94		50%			00%			00%			+50%						
'99		00%			25%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-		
												'94	40		-		
												'99	80		-		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4											
<i>Gutierrezia sarothrae</i>																
S	87	6	-	-	-	-	-	-	6	-	-	-	400		6	
	94	122	19	-	3	-	-	-	-	144	-	-	-	2880	144	
	99	8	-	-	-	-	-	-	-	8	-	-	-	160	8	
Y	87	24	2	7	-	-	-	-	-	33	-	-	-	2200	33	
	94	31	-	-	-	-	-	-	-	31	-	-	-	620	31	
	99	42	-	-	-	-	-	-	-	42	-	-	-	840	42	
M	87	35	2	-	-	-	-	-	-	37	-	-	-	2466	8 6	37
	94	67	-	-	1	-	-	-	-	68	-	-	-	1360	9 11	68
	99	129	-	-	1	-	-	-	-	130	-	-	-	2600	7 10	130
D	87	2	-	-	-	-	-	-	-	-	-	-	2	133	2	
	94	11	1	-	-	-	-	-	-	10	-	-	2	240	12	
	99	6	-	-	-	-	-	-	-	3	-	-	3	120	6	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	380	19	
	99	-	-	-	-	-	-	-	-	-	-	-	-	340	17	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		06%		10%		03%		-54%								
'94		.90%		00%		02%		+38%								
'99		00%		00%		02%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	4799	Dec:	3%			
										'94	2220		11%			
										'99	3560		3%			
<i>Juniperus osteosperma</i>																
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
	99	1	-	-	-	-	-	-	-	1	-	-	-	20	1	
Y	87	1	-	-	-	-	-	-	-	1	-	-	-	66	1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
	99	2	-	-	-	-	-	-	-	2	-	-	-	40	2	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
	99	1	-	-	-	-	-	-	-	1	-	-	-	20	1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		00%		00%		00%										
'94		00%		00%		00%										
'99		00%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	66	Dec:	-			
										'94	0		-			
										'99	60		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4	5	6	7	8	9	1	2	3	4							
Opuntia spp.																					
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0			
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0			
	'99	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	20	12	7	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>										
'87		00%			00%			00%													
'94		00%			00%			00%													
'99		00%			00%			00%													
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-						
												'94	0		-						
												'99	20		-						

Trend Study 13A-8-99

Study site name: Black Ridge .

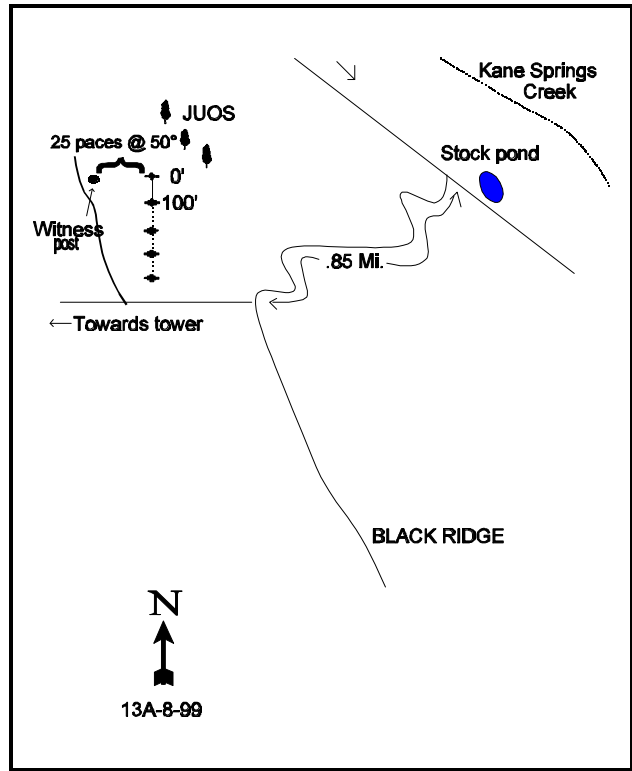
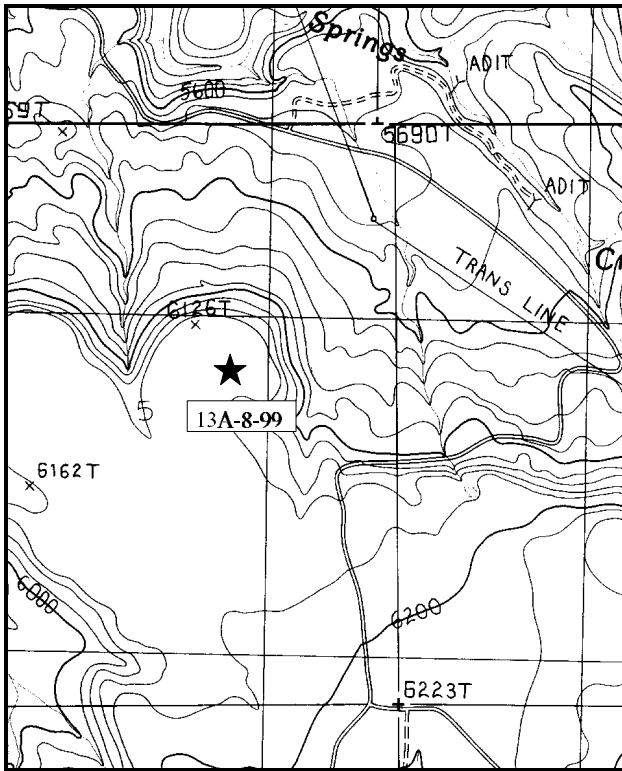
Range type: Chained, Seeded, P-J .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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 4.5 miles on the main road to the top of the ridge. Turn right onto a faint dirt road bearing west towards the relay tower. Go 0.15 miles to a faint fork. Bear right and continue 0.3 miles. Stop by a witness post on the right side of the road. The baseline starts 25 paces away from the witness post at 50°M. The 0-foot stake is tagged #7173.



Map Name: Kane Springs

Diagrammatic Sketch

Township 28S , Range 23E , Section 5

UTM 4250519.850 N , 638718.050 E

## DISCUSSION

### Trend Study No. 13A-8 (33-8)

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 ½ 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, had been 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 area during the spring, as they move up the mountain to the U.S. Forest Service administered lands. Pellet group surveys of the area in 1999 indicate the following use: 20 cow days use/acre (49 cdu/ha) and 94 deer days use/acre (232 ddu/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. There are no gullies or other evidence of significant water caused erosion. Wind erosion does cause soil movement on this site due to the high percentage of unprotected, loose sandy soil. 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 where 10 ppm is thought to be the minimum for normal plant development) and the moderately high soil temperatures (69°F at 17 inches). These higher soil temperatures and early spring use by livestock will severely limit the persistence of cool season grasses. These site features favor winter annuals like cheatgrass.

Wyoming big sagebrush is unquestionably the dominant browse over a large area. In 1994, the sagebrush provided almost 15% cover with an estimated population of 4,180 plants/acre. They currently provide only about 12% cover and their numbers have decreased by 21% to 3,300 plants/acre. Young plants were surprisingly abundant (72% of the population) in 1987, now they have gone from 6% (1994) to 4% (1999) of the population. Biotic potential (proportion of seedlings to population) was moderately high in 1987 (36%). This has gone from 25% (1994) to zero in 1999. Twelve percent of the population had exhibited heavy use in 1987. This has now gone from 4% (1994) to 42% in 1999. Those individuals displaying poor vigor have increased from 1% (1987) up to 18% (1994), to where it is now down to 4% (1999). Percent decadence had increased significantly from 3% (1987) to 23% (1994). It is currently at 13%. The one parameter that best illustrates the effect of long term drought to this low elevation sagebrush community is the ratio of dead to live plants which is one dead for every eight live plants. How can one get a real handle on what is happening to this sagebrush community? The following four basic parameters show fundamentally what is happening to this community: strip frequency is down, population is down by 21%, cover values are down, and average crown diameter is reduced. Trend for Wyoming big sagebrush is down. A nearby clump of mature juniper shows pronounced highlining, but there is visibly very little evidence of invading young trees on this dry site.

The seeding had established a fair stand of crested wheatgrass, although it has significantly decreased in nested frequency value with the prolonged drought from 1987 through 1994. Although this trend continues, it is at a slower rate. 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, now they make up 39% of the grass cover. Forbs are almost nonexistent contributing less than 1% of the vegetative cover in 1994. Only one species was sampled in 1999, occurring in only a single quadrat. On average, Wyoming big sagebrush and crested wheatgrass make up 88% of the total vegetative cover.

Percent litter cover has continually decreased since 1987. With the continuing drought, it is at its all time low of 16%. Percent bare soil is at its highest since 1987 at 61%. Total vegetative cover is fairly low for this type of site, but soil erosion is still quite low because of the level terrain.

## 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 rates 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.

### TREND ASSESSMENT

soil - stable, but poor condition

browse - down

herbaceous understory - stable, but poor condition

## 1999 TREND ASSESSMENT

The trend 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 down for perennials as well as for annuals. Only a single forb was found on this site in 1999.

### TREND ASSESSMENT

soil - slightly down, continued poor condition

browse - down

herbaceous understory - down, very poor condition

## HERBACEOUS TRENDS --

Herd unit 13A, Study no: 8

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	<sub>b</sub> 169	<sub>a</sub> 142	<sub>a</sub> 145	72	56	60	5.48	3.14
G	Aristida longiseta	<sub>a</sub> -	<sub>b</sub> 8	<sub>ab</sub> 4	-	3	1	.09	.03
G	Bromus tectorum (a)	-	192	197	-	68	66	1.47	2.03
G	Sitanion hystrix	<sub>b</sub> 21	<sub>c</sub> 43	<sub>a</sub> 4	12	18	2	.11	.01
G	Vulpia octoflora (a)	-	<sub>b</sub> 91	<sub>a</sub> 9	-	37	4	.23	.02
Total for Annual Grasses		0	283	206	0	105	70	1.71	2.05
Total for Perennial Grasses		190	193	153	84	77	63	5.69	3.18
Total for Grasses		190	476	359	84	182	133	7.40	5.24
F	Astragalus amphioxys	1	-	-	1	-	-	-	-
F	Descurainia pinnata (a)	-	3	-	-	1	-	.00	-
F	Eriogonum cernuum (a)	-	<sub>b</sub> 47	<sub>a</sub> -	-	19	-	.12	-
F	Eriogonum ovalifolium	5	-	-	2	-	-	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	Lappula occidentalis (a)	-	<sub>b</sub> 5	<sub>a</sub> -	-	4	-	.02	-
F	Machaeranthera grindelioides	<sub>b</sub> 15	<sub>a</sub> 4	<sub>a</sub> 1	6	2	1	.01	.00
Total for Annual Forbs		0	55	0	0	24	0	0.15	0
Total for Perennial Forbs		21	4	1	9	2	1	0.01	0.00
Total for Forbs		21	59	1	9	26	1	0.16	0.00

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

#### BROWSE TRENDS --

Herd unit 13A, Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		'04	'99	'04	'99
B	Artemisia tridentata wyomingensis	78	75	14.63	11.89
B	Atriplex canescens	0	0	-	-
B	Ephedra viridis	0	0	-	-
B	Gutierrezia sarothrae	0	0	-	-
B	Opuntia spp.	2	1	.38	-
B	Sclerocactus	0	0	-	-
Total for Browse		80	76	15.01	11.89

#### BASIC COVER --

Herd unit 13A, Study no: 8

Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	323	287	7.00	20.77	16.72
Rock	24	-	0	.05	0
Pavement	53	54	0	.12	.28
Litter	389	350	40.50	29.28	15.99
Cryptogams	44	57	.75	.41	1.38
Bare Ground	351	372	51.75	54.25	60.84

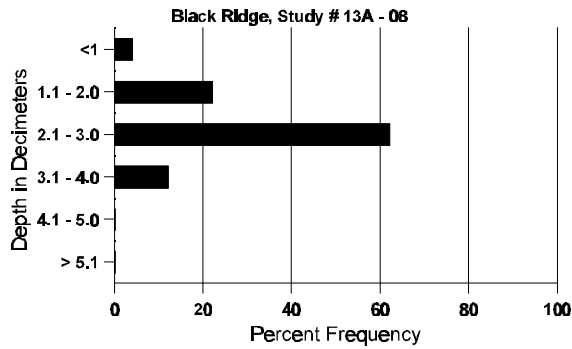
#### SOIL ANALYSIS DATA --

Herd Unit 13A, Study # 08, Study Name: Black Ridge

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.7	68.8 (17.1)	7.5	56.9	19.8	23.3	10.4	5.8	19.2	0.4



# Stoniness Index



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

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	04	09	
Rabbit	59	17	N/A
Deer	45	29	94 (232)
Cattle	-	-	20 (49)

## BROWSE CHARACTERISTICS -- Herd unit 13A, Study no: 8

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
<i>Artemisia tridentata wyomingensis</i>																		
S	'87	84	-	-	-	-	-	1	-	-	80	5	-	-	2833		85	
	'94	51	-	-	2	-	-	-	-	53	-	-	-	1060		53		
	'99	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	'87	115	50	2	-	-	-	1	-	-	166	1	1	-	5600		168	
	'94	13	-	-	-	-	-	-	-	13	-	-	-	260		13		
	'99	2	3	1	-	-	-	-	-	6	-	-	-	120		6		
M	'87	-	38	21	-	-	-	-	-	54	3	2	-	1966	23	33	59	
	'94	117	24	3	-	2	-	-	-	134	-	12	-	2920	19	32	146	
	'99	2	78	49	-	-	8	-	-	137	-	-	-	2740	19	30	137	
D	'87	-	2	6	-	-	-	-	-	7	1	-	-	266		8		
	'94	36	5	6	-	3	-	-	-	22	3	18	7	1000		50		
	'99	1	9	8	-	-	4	-	-	15	-	-	7	440		22		
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	'94	-	-	-	-	-	-	-	-	-	-	-	-	520		26		
	'99	-	-	-	-	-	-	-	-	-	-	-	-	320		16		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		38%			12%			01%			-47%							
'94		16%			04%			18%			-21%							
'99		55%			42%			04%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	7832	Dec:	3%				
											'94	4180		24%				
											'99	3300		13%				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Atriplex canescens</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	24	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	0		-			
<i>Ephedra viridis</i>																		
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	33	20	22	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		100%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'94	0		-			
												'99	0		-			
<i>Gutierrezia sarothrae</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	12	13	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'94	0		-			
												'99	0		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total										
		1	2	3	4		1	2											
Opuntia spp.																			
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
	'94	3	-	-	-	-	-	-	-	3	-	-	-	60	5	25	3		
	'99	1	-	-	-	-	-	-	-	1	-	-	-	20	5	5	1		
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	0			0		
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0			0		
	'99	-	-	-	-	-	-	-	-	-	-	-	-	20			1		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'87		00%		00%		00%													
'94		00%		00%		00%										-67%			
'99		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-	'94	60	-	'99	20	-
Sclerocactus																			
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0	2	3	0		
	'99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'87		00%		00%		00%													
'94		00%		00%		00%													
'99		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-	'94	0	-	'99	0	-

Trend Study 13A-9-99

Study site name: Taylor Flat .

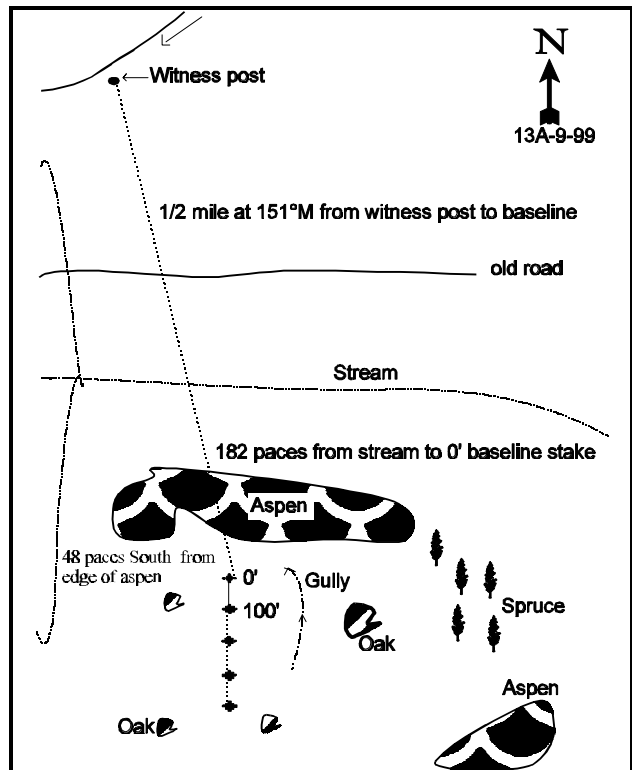
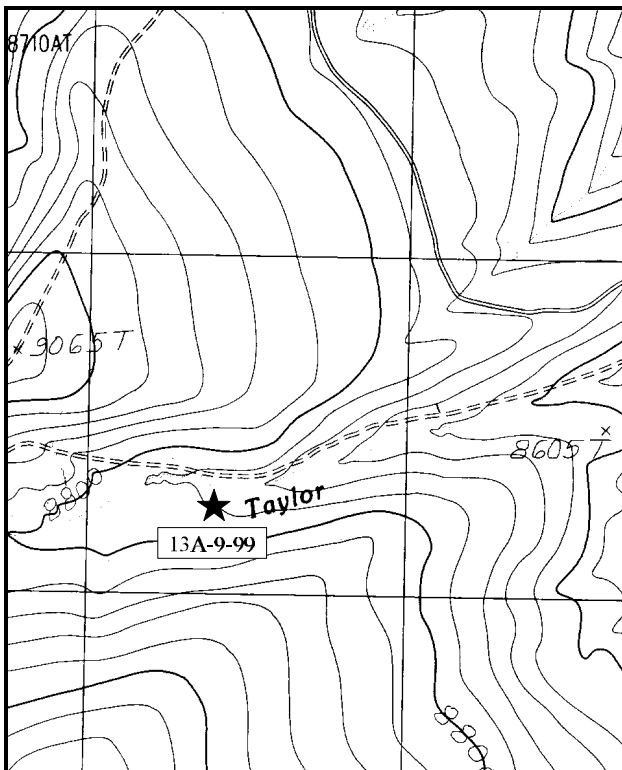
Range type: Snowberry .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

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 go 0.55 miles to a fork. Turn right off the main road and go 1.3 miles to the top of a little knob. Stay straight at the fork and continue 0.15 miles to a witness post. From here, you can see the area of the transect on the ridge to the south. It is located about half way up the slope just above a large patch of aspens. From the witness post, walk approximately one-half mile down the slope, across a stream and up the other side at a bearing of 151°M.



Map Name: Mount Waas

Diagrammatic Sketch

Township 26S , Range 25E , Section 16

UTM 4267847.441 N, 659765.227 E

## DISCUSSION

### Trend Study No. 13A-9 (33-9)

The Taylor Flat study is located on the slopes above Taylor Flat, in the headwaters of Taylor Creek. It is considered an important big game summer range, especially for elk as a calving area. It is on the large block of state land on the northeast side of the LaSal Mountains. The area is grazed by cattle, horses, and sheep on a rotation system. Pellet group studies done on the immediate area showed 11 elk days use/acre (27 edu/ha) and 23 cow days use/acre (57 cdu/ha). The vegetation on these slopes is predominately a mixture of aspen, clumps of oak, and open meadows dominated by snowberry or Rocky Mountain iris. The snowberry-forb type sampled by the study is on a 5-11% northwest-facing slope at an elevation of 9,000 feet.

The soil is a moderately deep (effective rooting depth of almost 20 inches) clay loam with a high percentage of rock. It is a moderately acidic soil with a pH of 5.9. The sandstone rock varies in size from small cobbles in the surface layer to large lichen-covered boulders. Several gullies on the hillside show evidence of continued soil loss, as does the stream in the valley bottom with recent cutting and bank losses. The soil has a rather high erosion potential. However, current soil protection is adequate to keep soil movement to a minimum except within the already established gullies.

Snowberry is the dominant shrub on the site, contributing 73% of the browse cover in 1994 and 1999. More than 80% of the population are mature plants with most showing only light use. No large, mature oak clumps were sampled, but some young trees are increasing into the open areas. The mature plants do not produce much available forage, but the young available sprouts are often browsed. The other shrubs sampled include Woods rose and shrubby cinquefoil which appear to have young increasing populations.

The herbaceous understory is very dense and diverse, contributing an average of 77% of the total vegetative cover at the site. There are 16 species of grasses on the site, with Thurber fescue and Kentucky bluegrass providing on average 63% of the grass cover. Forbs dominate the herbaceous understory providing an average 64% of the herbaceous cover. More than 30 species of forbs were sampled on the transect in 1999. The more palatable forbs such as dandelion, peavine, lupine, and Oregon fleabane had been selectively grazed by elk. The iris, a very common increaser on this site, is considered worthless as a forage plant and poisonous to livestock. In many places this vigorously spreading rhizomatous plant is becoming quite dense. Overall, the forb and grass population is vigorous, diverse, and dense keeping percent bare ground low at only about 3%. The major concern with this site is that 76% of the herbaceous cover is provided by increaser weedy species.

The dense herbaceous understory certainly helps stabilize the soil on this hillside. Vegetative cover is excellent on this site with litter cover at 65%. Most of the bare soil is caused by burrowing mammals.

### 1994 TREND ASSESSMENT

Soil trend for this site is stable with excellent vegetative cover and litter cover and very little bare soil. Much of the eroding gullies will probably have to have some kind of treatment to stabilize them. The browse trend is stable, but not key for this summer range. The trend for grasses is slightly improved, while the trend for the forbs is slightly down with the extended drought since 1985.

#### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable for grasses and slightly down for forbs, overall trend is stable

## 1999 TREND ASSESSMENT

Soil trend for this site is slightly improved with increases in litter cover and vegetative cover and a decrease in percent bare soil. Many of the eroding gullies should probably have some kind of treatment to help stabilize them. The browse trend is stable, but not key for this summer range. The trend for grasses is stable, while the trend for the forbs is slightly up from the nested values of 1994 and forbs make up 69% of the herbaceous cover.

### TREND ASSESSMENT

soil - slightly improved

browse - stable

herbaceous understory - stable for grasses and slightly up for forbs, overall trend is stable to slightly up

### HERBACEOUS TRENDS --

Herd unit 13A, Study no: 9

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
G	Agropyron trachycaulum	a62	ab65	b91	25	29	42	.49	.96
G	Bromus anomalus	a-	ab3	b22	-	3	9	.04	.72
G	Bromus carinatus	b88	a7	a26	34	2	12	.01	.19
G	Carex spp.	b108	a65	a55	41	24	24	1.28	.89
G	Danthonia californica	a-	b51	a-	-	21	-	.73	-
G	Festuca ovina	a30	c88	b51	13	35	19	1.69	1.11
G	Festuca thurberi	a-	b127	b107	-	46	40	8.10	3.51
G	Koeleria cristata	a-	b24	a5	-	10	2	.10	.03
G	Melica spp.	b13	a-	a-	5	-	-	-	-
G	Muhlenbergia spp.	a-	a-	b13	-	-	6	-	.06
G	Phleum alpinum	a-	ab1	b5	-	1	3	.00	.04
G	Phleum pratense	32	35	37	11	14	15	.70	.80
G	Poa arida	c265	b85	a33	104	30	14	2.69	.75
G	Poa pratensis	a33	b170	c277	10	53	82	4.01	9.52
G	Sitanion hystrix	a-	b8	ab3	-	4	1	.04	.00
G	Stipa columbiana	a-	b9	ab2	-	5	1	.24	.04
G	Stipa comata	a3	b16	a-	1	6	-	.15	-
G	Stipa lettermani	a-	b25	c46	-	8	15	.11	1.61
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		634	779	773	244	291	285	20.44	20.27
Total for Grasses		634	779	773	244	291	285	20.44	20.27
F	Achillea millefolium	b231	a171	b237	79	70	85	1.77	4.91
F	Agoseris glauca	-	6	4	-	2	2	.01	.18
F	Allium geeyeri	b93	a11	a8	41	5	4	.03	.04

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	<i>Antennaria parvifolia</i>	b74	a21	a24	29	8	12	.28	.47
F	<i>Androsace septentrionalis</i> (a)	-	a1	b20	-	1	8	.00	.04
F	<i>Arabis</i> spp.	b13	a-	a4	7	-	2	-	.03
F	<i>Arenaria congesta</i>	b107	ab82	a59	42	36	28	1.03	.36
F	<i>Aster</i> spp.	a-	b34	c75	-	14	35	.29	1.35
F	<i>Calochortus gunnisoni</i>	21	13	21	12	6	10	.03	.08
F	<i>Castilleja linariaefolia</i>	-	-	3	-	-	1	-	.03
F	<i>Cerastium arvense</i>	b92	b92	a35	43	35	16	.40	1.24
F	<i>Cirsium</i> spp.	-	-	-	-	-	-	.00	.03
F	<i>Clematis hirsutissima</i>	1	1	-	1	1	-	.03	-
F	<i>Comandra pallida</i>	27	22	32	13	9	13	.09	.26
F	<i>Crepis acuminata</i>	b25	a-	b7	10	-	3	-	.04
F	Cruciferae	b28	a1	a-	12	1	-	.00	-
F	<i>Delphinium nuttallianum</i>	b42	a-	a-	22	-	-	-	-
F	<i>Epilobium brachycarpum</i> (a)	-	-	2	-	-	1	-	.03
F	<i>Eriogonum elatum</i>	-	2	-	-	1	-	.00	-
F	<i>Erigeron flagellaris</i>	a13	a8	b48	6	6	19	.08	1.31
F	<i>Erigeron</i> spp.	b102	b40	a-	43	15	-	.66	-
F	<i>Eriogonum racemosum</i>	b6	ab5	a-	3	2	-	.06	-
F	<i>Erigeron speciosus</i>	ab132	b141	a100	53	55	40	1.29	2.56
F	<i>Galium boreale</i>	b164	a106	ab128	60	43	48	.93	.73
F	<i>Geranium caespitosum</i>	11	12	20	9	7	10	.14	.22
F	<i>Haplopappus croceus</i>	b13	a-	a-	6	-	-	-	-
F	<i>Helenium hoopesii</i>	a-	b46	b55	-	20	28	1.34	2.45
F	<i>Heuchera parvifolia</i>	11	19	16	5	7	9	.18	.24
F	<i>Iris missouriensis</i>	a115	b215	b227	44	74	77	11.19	11.29
F	<i>Lathyrus lanszwertii</i>	b183	a125	b179	70	46	66	2.30	5.34
F	<i>Lewisia pygmaea</i>	b6	ab1	a-	3	1	-	.00	-
F	<i>Linum lewisii</i>	12	5	10	5	4	6	.02	.11
F	<i>Lomatium</i> spp.	b58	ab45	a25	32	22	13	.19	.19
F	<i>Lupinus argenteus</i>	8	12	5	6	6	2	.34	.18
F	<i>Lupinus sericeus</i>	b30	a4	a-	12	2	-	.03	-
F	<i>Osmorhiza</i> spp.	2	-	-	2	-	-	-	-
F	<i>Penstemon</i> spp.	b22	a-	a-	13	-	-	-	-
F	<i>Phacelia</i> spp.	b6	a-	a-	4	-	-	-	-
F	<i>Potentilla anersina</i>	-	-	3	-	-	1	-	.00
F	<i>Polygonum douglasii</i> (a)	-	b10	a-	-	5	-	.02	-
F	<i>Potentilla gracilis</i>	b116	ab97	a72	49	43	34	.90	.80
F	<i>Senecio integerrimus</i>	b135	a6	25	60	2	13	.03	.15
F	<i>Sedum lanceolatum</i>	b25	a-	a-	10	-	-	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	Taraxacum officinale	<sub>b</sub> 262	<sub>a</sub> 187	<sub>a</sub> 226	86	67	79	3.15	7.36
F	Thlaspi spp.	-	-	3	-	-	1	-	.00
F	Thermopsis montana	25	47	24	9	17	11	2.26	2.18
F	Tragopogon dubius	3	5	-	2	2	-	.01	-
F	Unknown forb-perennial	138	-	-	62	-	-	-	-
F	Vicia americana	<sub>b</sub> 61	<sub>a</sub> 27	<sub>a</sub> 32	25	13	14	.17	.48
F	Wyethia amplexicaulis	6	1	-	2	1	-	.00	-
Total for Annual Forbs		0	11	22	0	6	9	0.03	0.07
Total for Perennial Forbs		2419	1610	1707	992	643	682	29.36	44.74
Total for Forbs		2419	1621	1729	992	649	691	29.39	44.81

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

#### BROWSE TRENDS --

Herd unit 13A, Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'04	'99	'04	'99
B	Amelanchier utahensis	1	4	-	.06
B	Chrysothamnus viscidiflorus	0	0	-	-
B	Potentilla fruticosa	17	18	1.81	2.14
B	Quercus gambelii	0	18	2.04	2.48
B	Rosa woodsii	16	12	.23	.30
B	Symphoricarpos oreophilus	76	76	10.98	13.53
Total for Browse		110	128	15.07	18.52

#### CANOPY COVER --

Herd unit 13A, Study no: 9

Species	Percent Cover '09
Quercus gambelii	2

#### BASIC COVER --

Herd unit 13A, Study no: 9

Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	388	392	21.25	62.43	75.76
Rock	69	62	7.25	3.33	4.00
Pavement	15	35	0	.03	.22
Litter	373	384	60.50	49.25	64.97
Cryptogams	13	55	.75	.07	1.87
Bare Ground	179	95	10.25	7.42	3.17

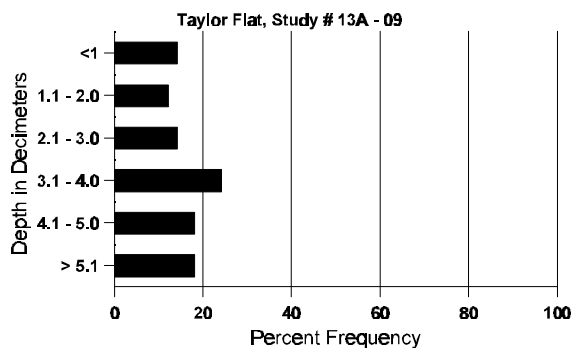


SOIL ANALYSIS DATA --

Herd Unit 13A, Study # 09, Study Name: Taylor Flat

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.2	48.6 (18.1)	5.9	34.9	27.8	37.3	5.5	9.2	188.8	0.4

### Stoniness Index



PELLET GROUP DATA --

Herd unit 13A, Study no: 9

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'94	'99	
Rabbit	1	-	N/A
Elk	4	7	11 (27)
Deer	1	2	0
Cattle	-	6	23 (57)

BROWSE CHARACTERISTICS --

Herd unit 13A, Study no: 9

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total			
		1	2	3	4						
Amelanchier utahensis											
Y	'87	-	-	-	-	-	-	-	0	-	0
	'94	-	-	-	-	-	-	-	0	-	0
	'99	-	2	-	-	-	-	-	2	-	2
M	'87	-	-	-	-	-	-	-	0	-	0
	'94	1	-	-	-	-	-	-	1	17	18
	'99	-	1	1	-	-	-	-	2	15	16
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%					
'94		00%		00%		00%		+75%			
'99		75%		25%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-		
						'94	20		-		
						'99	80		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	23	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	0		-			
<i>Potentilla fruticosa</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	9	-	-	3	-	-	2	-	-	14	-	-	-	280			14
	99	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	18	15	1
	94	25	-	-	-	-	-	-	-	-	25	-	-	-	500	15	28	25
	99	34	-	-	-	-	-	-	-	-	34	-	-	-	680	16	27	34
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+66%							
'94		00%			00%			00%			+17%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	266	Dec:	-			
												'94	780		-			
												'99	940		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
S	87	25	-	-	-	-	-	-	-	-	25	-	-	-	1666		25	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	87	44	3	1	-	-	-	-	-	-	48	-	-	-	3200		48	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	-	-	16	-	-	15	-	-	35	-	-	-	700		35	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	15	2	-	-	-	-	-	11	-	27	-	1	-	560	54 34	28	
D	87	1	-	1	-	-	-	-	-	-	2	-	-	-	133		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	2	-	-	-	-	2	40		2		
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	80		4		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		06%			04%			00%										
'94		00%			00%			00%										
'99		03%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	3333	Dec:	4%				
											'94	0		0%				
											'99	1300		3%				
Rosa woodsii																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	87	12	-	-	-	-	-	-	-	12	-	-	-	800		12		
	94	8	-	-	6	-	-	1	-	15	-	-	-	300		15		
	99	18	-	-	-	-	-	-	-	18	-	-	-	360		18		
M	87	1	-	-	-	-	-	-	-	1	-	-	-	66	15 10	1		
	94	19	-	-	3	-	-	-	-	22	-	-	-	440	12 8	22		
	99	5	-	-	1	-	-	-	-	6	-	-	-	120	16 12	6		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-15%							
'94		00%			00%			00%			-35%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	866	Dec:	-				
											'94	740		-				
											'99	480		-				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4											
Symphoricarpos oreophilus																
S	87	11	-	-	-	-	-	-	11	-	-	-	733		11	
	94	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	1	-	-	20		1	
Y	87	64	11	-	-	-	-	-	-	72	1	2	-	5000		75
	94	22	-	-	-	-	-	-	-	22	-	-	-	440		22
	99	25	1	-	-	-	-	-	-	26	-	-	-	520		26
M	87	32	52	2	-	-	-	-	-	84	-	2	-	5733	22 32	86
	94	190	-	2	-	-	-	1	-	193	-	-	-	3860	16 25	193
	99	159	12	-	6	-	-	-	-	176	-	1	-	3540	18 30	177
D	87	2	-	-	-	-	-	-	-	2	-	-	-	133		2
	94	1	-	-	2	-	-	-	-	1	-	-	2	60		3
	99	1	-	-	-	-	-	-	-	-	-	-	1	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'87		39%			01%			02%			-60%					
'94		00%			.91%			.91%			- 6%					
'99		06%			00%			.98%								
Total Plants/Acre (excluding Dead & Seedlings)										'87	10866	Dec:	1%			
										'94	4360		1%			
										'99	4080		0%			

Trend Study 13A-10-99

Study site name: Upper Fisher Valley .

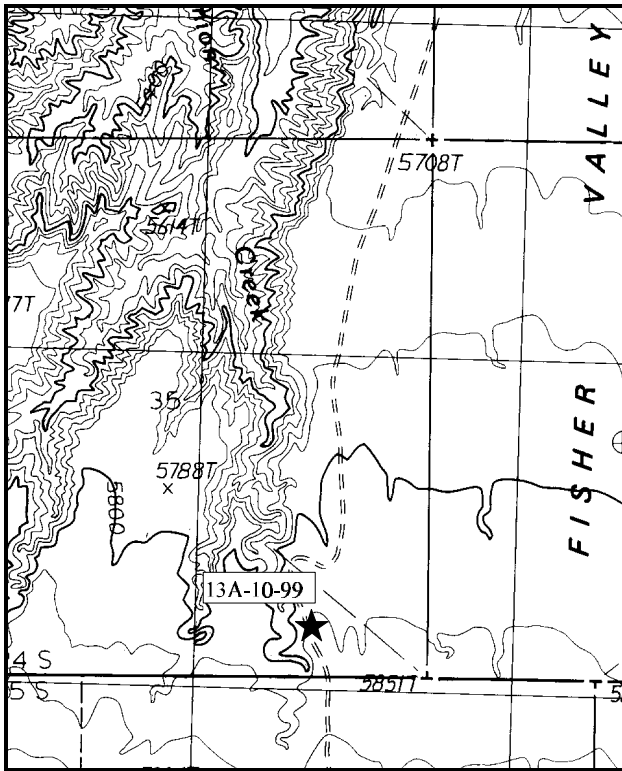
Range type: Big Sagebrush .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

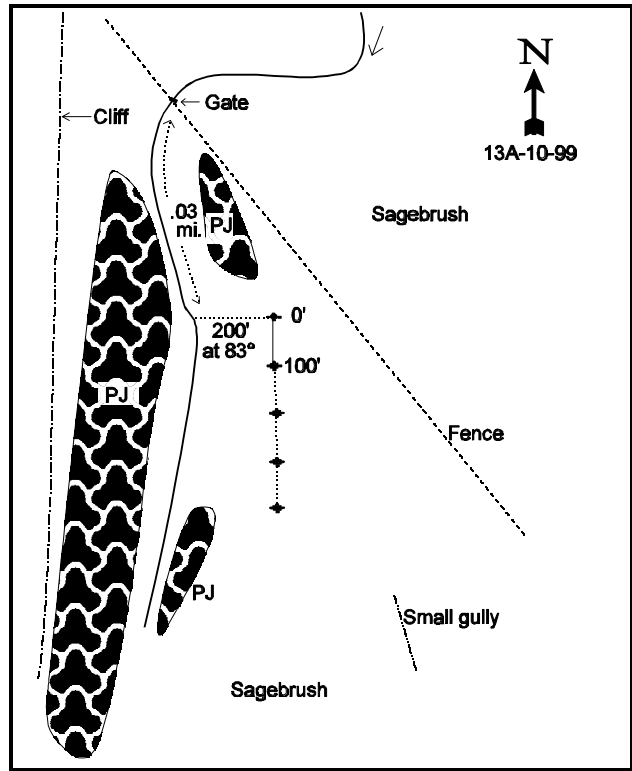
LOCATION DESCRIPTION

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 1-foot tall green fence posts. The 0-foot baseline stake is tagged #7861.



Map Name: Fisher Valley

Township 24S , Range 24E , Section 35



Diagrammatic Sketch

UTM 4281334.079 N , 653351.968 E

## DISCUSSION

### Trend Study No. 13A-10 (33-10)

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 indicated that there were 26 cow days use/acre (64 cdu/ha) and 40 deer days use/acre (99 ddu/ha). 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 little desirable understory.

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) where 10 ppm is considered necessary for normal plant development. It is not rocky, but appears to have a carbonate layer at approximately 8-10 inches below the surface. One of the major limiting factors on the site is the relatively high soil temperatures (over 71°F at 14 inches) which can be very limiting when coupled with long term drought. This warm environment would be especially conducive for the dominance of winter annuals on this site. 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.

Wyoming big sagebrush is the dominant browse species as it made up 90% of the browse cover and 59% of the total vegetative cover in 1994. That has now changed to 75% of the browse cover and 48% of the total vegetative cover. Broom snakeweed was quite abundant in 1987, then its density fell significantly to 5,720 plants/acre. Currently, it has surpassed the 1987 density and is estimated at 13,220 plants/acre. This weedy increaser is again a dominant part of the understory. Broom snakeweed is not utilized, while the Wyoming big sagebrush is usually moderately hedged. In 1987, the sagebrush population exhibited characteristics of an apparently increasing population with a majority of the individuals being classified as seedlings or young. The vigor of 15% of the plants was affected by a high density of insect galls. The indications are currently showing that the sagebrush trend is down; its density is decreasing; biotic potential has gone from 49% in 1987, to 22% in 1994, to zero in 1999; strip frequency has gone down while that of broom snakeweed has increased; and the percentage of decadent plants classified as dying has increased from 31% to 65%. There are a few 8-10 foot tall junipers established on the flat. 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.

A fair stand of crested wheatgrass was sampled on the site in 1987. Trend for crested wheatgrass was up in 1994. Since then, its cover has decreased substantially along with nested frequency values. In 1994, it made up 25% of the grass cover, now it only makes up 7% of the grass cover. The dominant grass now is Sandberg bluegrass which makes up 71% of the grass cover. Other perennial grass species sampled on site included galleta, bottlebrush squirreltail, and blue grama. Annual grasses present on the site include cheatgrass and sixweeks fescue. Forbs are an insignificant source of forage on this site. There are several small species present, but none of which are very abundant. Ground cover is poor with percent bare ground almost at 50%. Litter cover is found mainly under the shrubs and it was very low in 1994 and 1999 at 24% and 17% respectively.

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 to slightly improving with the increases for two of the perennial grasses, but the forbs are still almost nonexistent on this site with the extended drought.

TREND ASSESSMENT

soil - stable to slightly improving, but still very poor condition

browse - up

herbaceous understory - stable to slightly improving

1999 TREND ASSESSMENT

Soil trend on this site is slightly improving, but still in very poor condition. This improved condition is brought about mostly because of the significant increase in cryptogamic cover, from 1% to 11%. 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, biotic potential going from 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 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%.

TREND ASSESSMENT

soil - slightly improving, but still very poor condition

browse - down

herbaceous understory - down and very poor

HERBACEOUS TRENDS --

Herd unit 13A, Study no: 10

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'84	'89
G	Agropyron cristatum	a <sup>63</sup>	b <sup>105</sup>	a <sup>72</sup>	27	42	32	2.48	.65
G	Agropyron intermedium	a <sup>-</sup>	a <sup>-</sup>	b <sup>7</sup>	-	-	3	-	.04
G	Bouteloua gracilis	a <sup>-</sup>	a <sup>-</sup>	b <sup>7</sup>	-	-	3	-	.04
G	Bromus tectorum (a)	-	106	104	-	42	43	.88	.38
G	Hilaria jamesii	94	93	79	41	40	37	.96	.80
G	Poa secunda	a <sup>224</sup>	ab <sup>246</sup>	b <sup>256</sup>	84	86	86	3.77	6.50
G	Sitanion hystrix	b <sup>24</sup>	b <sup>6</sup>	a <sup>7</sup>	10	2	3	.01	.21

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
G	<i>Stipa comata</i>	<sub>b</sub> 7	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
G	<i>Vulpia octoflora</i> (a)	-	76	61	-	32	27	.16	.55
Total for Annual Grasses		0	182	165	0	74	70	1.03	0.94
Total for Perennial Grasses		412	450	428	165	170	164	7.23	8.25
Total for Grasses		412	632	593	165	244	234	8.27	9.19
F	<i>Astragalus amphioxys</i>	<sub>b</sub> 7	<sub>ab</sub> 4	<sub>a</sub> -	3	2	-	.01	-
F	<i>Calochortus nuttallii</i>	1	-	-	1	-	-	-	-
F	Cruciferae	1	-	-	1	-	-	-	-
F	<i>Draba reptans</i> (a)	-	22	9	-	9	4	.04	.02
F	<i>Erigeron pumilus</i>	6	10	12	3	5	5	.02	.05
F	<i>Gilia</i> spp. (a)	-	5	-	-	2	-	.01	-
F	<i>Leucelene ericoides</i>	-	1	2	-	1	1	.00	.03
F	<i>Lesquerella</i> spp.	-	-	1	-	-	1	-	.00
F	<i>Oenothera albicaulis</i> (a)	1	-	-	1	-	-	-	-
F	<i>Phlox austromontana</i>	<sub>a</sub> 21	<sub>ab</sub> 21	<sub>b</sub> 31	11	9	14	.81	.65
F	<i>Ranunculus testiculatus</i> (a)	-	<sub>b</sub> 14	<sub>a</sub> -	-	6	-	.05	-
F	<i>Sphaeralcea coccinea</i>	<sub>b</sub> 62	<sub>a</sub> 22	<sub>a</sub> 5	25	11	3	.05	.01
F	<i>Tragopogon dubius</i>	4	-	-	2	-	-	-	-
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
Total for Annual Forbs		1	41	9	1	17	4	0.10	0.01
Total for Perennial Forbs		103	58	51	47	28	24	0.90	0.75
Total for Forbs		104	99	60	48	45	28	1.01	0.77

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

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

Type	Species	Strip Frequency		Average Cover %	
		'04	'99	'04	'99
B	<i>Artemisia nova</i>	0	0	-	-
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	85	78	15.69	13.69
B	<i>Atriplex canescens</i>	0	1	-	-
B	<i>Gutierrezia sarothrae</i>	78	86	.85	3.98
B	<i>Juniperus osteosperma</i>	0	1	.88	.66
B	<i>Opuntia</i> spp	0	0	-	-
B	<i>Pinus edulis</i>	0	0	.00	-
Total for Browse		163	166	17.43	18.34



CANOPY COVER --

Herd unit 13A, Study no: 10

Species	Percent Cover '99
Juniperus osteosperma	.40

BASIC COVER --

Herd unit 13A, Study no: 10

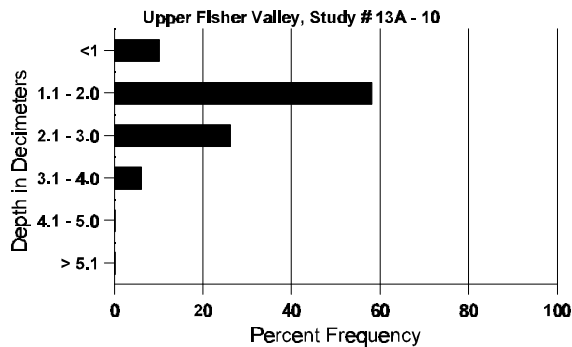
Cover Type	Nested Frequency		Average Cover %		
	'84	'99	'87	'94	'99
Vegetation	317	309	8.00	23.64	25.24
Rock	2	-	0	.00	0
Pavement	3	3	0	.00	.00
Litter	391	358	32.25	24.45	17.47
Cryptogams	148	221	1.00	1.28	10.75
Bare Ground	366	341	58.75	57.47	48.54

SOIL ANALYSIS DATA --

Herd Unit 13A, Study # 10, Study Name: Upper Fisher Valley

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.9	71.2 (15.3)	6.8	58.9	15.8	25.3	1.6	7.8	73.6	0.4

### Stoniness Index



PELLET GROUP DATA --

Herd unit 13A, Study no: 10

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'99	
Rabbit	68	30	N/A
Deer	53	28	40 (99)
Cattle	1	11	26 (64)

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

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia nova																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	5	11	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	0		-			
Artemisia tridentata wyomingensis																		
S	87	46	1	-	-	-	-	-	-	-	46	1	-	-	3133			47
	94	67	-	-	1	-	-	-	-	-	61	-	-	7	1360			68
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	38	9	-	-	-	-	1	-	-	34	13	1	-	3200			48
	94	36	-	-	-	-	-	-	-	-	35	1	-	-	720			36
	99	10	4	-	-	-	-	-	-	-	14	-	-	-	280			14
M	87	16	24	1	-	-	-	-	-	-	35	5	1	-	2733	21	25	41
	94	222	19	-	-	-	-	-	5	-	215	8	19	4	4920	20	30	246
	99	104	107	10	-	-	-	-	-	-	221	-	-	-	4420	22	34	221
D	87	1	5	-	-	-	-	-	-	-	5	1	-	-	400			6
	94	26	3	-	-	-	-	-	-	-	18	-	2	9	580			29
	99	7	8	2	-	-	-	-	-	-	6	-	-	11	340			17
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		40%			01%			02%			- 2%							
'94		07%			00%			11%			-19%							
'99		47%			05%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	6333	Dec:	6%			
												'94	6220		9%			
												'99	5040		7%			
Atriplex canescens																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	43	66	0
	99	-	5	-	-	-	-	-	-	-	5	-	-	-	100	-	-	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	100		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total			
		1	2	3	4						
<i>Gutierrezia sarothrae</i>											
S	87	39	-	-	-	-	-	39		39	
	94	20	-	-	-	1	-	21		21	
	99	3	-	-	-	-	-	3		3	
Y	87	76	1	2	-	-	-	79		79	
	94	42	-	-	7	-	-	49		49	
	99	194	-	-	-	-	-	194		194	
M	87	111	-	-	-	1	-	111	11	9	112
	94	228	1	-	6	-	-	234	7	7	235
	99	451	-	-	1	-	-	452	10	10	452
D	87	7	-	-	-	-	-	5	-	2	7
	94	2	-	-	-	-	-	1	-	1	2
	99	15	-	-	-	-	-	6	-	9	15
X	87	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	400			20
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>						
'87		.50%	01%	02%	-57%						
'94		.34%	00%	.69%	+57%						
'99		00%	00%	01%							
Total Plants/Acre (excluding Dead & Seedlings)					'87	13198	Dec:	4%			
					'94	5720		1%			
					'99	13220		2%			
<i>Juniperus osteosperma</i>											
S	87	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	1		1	
M	87	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	1	-	-	1
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>						
'87		00%	00%	00%							
'94		00%	00%	00%							
'99		00%	00%	00%							
Total Plants/Acre (excluding Dead & Seedlings)					'87	0	Dec:	-			
					'94	0		-			
					'99	20		-			
<i>Opuntia spp.</i>											
M	87	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	0	6	16	0
	99	-	-	-	-	-	-	0	9	12	0
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>						
'87		00%	00%	00%							
'94		00%	00%	00%							
'99		00%	00%	00%							
Total Plants/Acre (excluding Dead & Seedlings)					'87	0	Dec:	-			
					'94	0		-			
					'99	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus edulis																	
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'99	1	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	0		-		
												'99	0		-		

Trend Study 13A-11-99

Study site name: North Beaver Mesa .

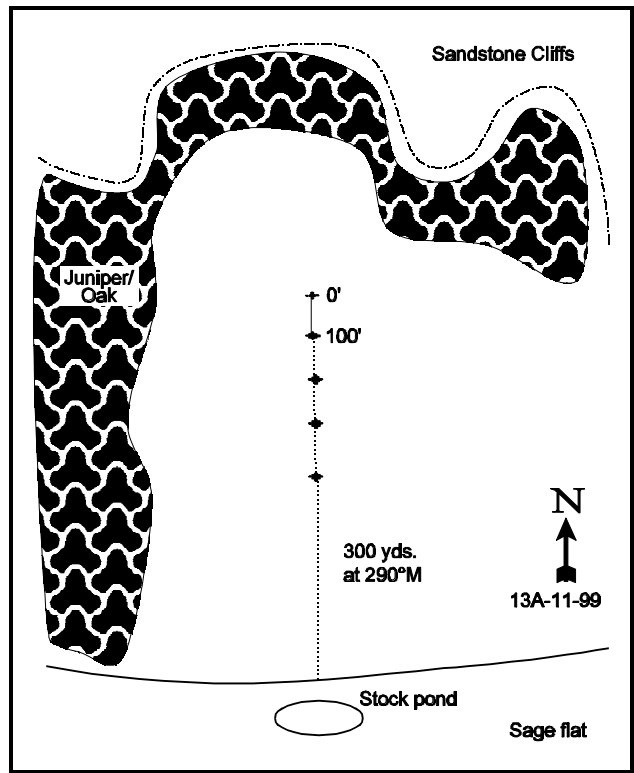
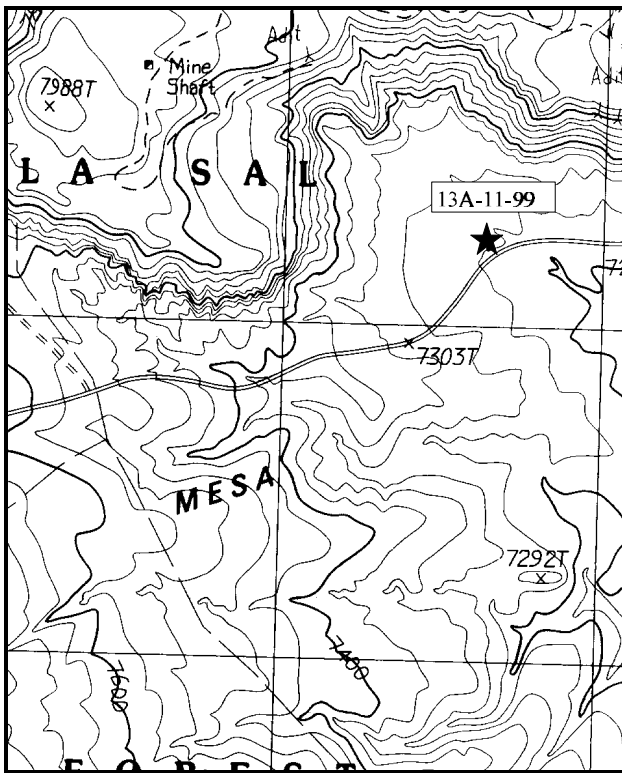
Range type: Big Sagebrush .

Compass bearing: frequency baseline 133°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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 towards an alcove. It is marked by 1-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 NE 1/4,10

UTM 4279392.142 N, 661326.424 E

## DISCUSSION

### Trend Study No. 13A-11 (33-11)

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. This was confirmed by 1994 pellet group frequency data showing that elk pellets had a 55% quadrat frequency, while deer had a frequency of 26%. Pellet group surveys in 1999 lent further support of this kind of use as they indicated there was 17 cow days use/acre (42 cdu/ha), 46 deer days use/acre (114 ddu/ha), and 155 elk days use/acre (383 edu/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. This could be a limiting factor for 10 ppm is thought to be the minimum for normal plant development. Livestock have a heavy impact on this soil for cattle trails and trampling have led to broken soil cover and soil movement.

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 method shows 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. In addition to Wyoming big sagebrush, nine other browse species were encountered on the site. 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. Wyoming big sagebrush (on average) makes up 85% of the browse cover, with a moderately high density of 8,200 plants per acre in 1999. Almost half of the population was classified as young in 1987, declining to 18% by 1994, then increasing to 22% in 1999. Biotic potential (percentage of number of seedlings to the population) in 1987 was fairly good at 7%, increasing to 26% in 1994. It has since decreased again down to 5% in 1999. Seed production was low when it was first read, yet the mature plants appeared vigorous. Hedging is light to moderate on most plants.

As elk range, the grass component is especially important with an average of 84% of the grass cover coming from the three seeded species. However, with the grass being heavily utilized by livestock (late spring and summer), vigor is reduced and little forage is left for winter use. This is especially noticeable when coupled with summer drought, as was apparent with the 1994 data when grass cover was almost 25% less than in 1999.

Forb diversity is good with as many as 25 species sampled in 1994, however together they only provide a little over 4% cover. The common hairy goldaster is the most abundant forb (making up more than 50% of the forb cover) and it also has been heavily utilized. There are randomly scattered patches of alfalfa which were seldom picked up in the sampling design.

Percent litter cover is moderately low. Disturbance, compaction, trampling, and trailing caused by livestock grazing has disturbed the soil cover and hindered the development of cryptogamic soil. Percent bare ground is moderately high at 30%.

## 1994 TREND ASSESSMENT

The trend for soil is slightly improved, but still only in fair condition. Percent bare ground has gone down to 30% 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 stable to 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 herbaceous understory is stable because much of the change in nested frequency values was from the annual species.

### TREND ASSESSMENT

soil - slightly improving, fair condition

browse - stable to slightly up

herbaceous understory - stable

## 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 stable to 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.

### TREND ASSESSMENT

soil - stable, fair to good condition

browse - stable to slightly up

herbaceous understory - stable

## HERBACEOUS TRENDS --

Herd unit 13A, Study no: 11

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	<sub>b</sub> 258	<sub>a</sub> 232	<sub>c</sub> 291	88	88	94	7.13	12.09
G	Agropyron intermedium	<sub>a</sub> 41	<sub>b</sub> 67	<sub>b</sub> 70	14	22	26	1.58	1.15
G	Bouteloua gracilis	5	8	5	2	3	3	.33	.30
G	Bromus inermis	24	13	14	10	4	5	.36	.24
G	Bromus tectorum (a)	-	42	36	-	15	12	1.66	.52
G	Sporobolus cryptandrus	<sub>a</sub> -	<sub>b</sub> 10	<sub>ab</sub> 4	-	5	2	.08	.01
G	Stipa comata	<sub>a</sub> -	<sub>b</sub> 6	<sub>ab</sub> 4	-	3	2	.01	.18
G	Vulpia octoflora (a)	-	2	-	-	1	-	.00	-
Total for Annual Grasses		0	44	36	0	16	12	1.66	0.52
Total for Perennial Grasses		328	336	388	114	125	132	9.50	13.98
Total for Grasses		328	380	424	114	141	144	11.16	14.51

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	Alyssum spp. (a)	-	3	-	-	1	-	.00	-
F	Arabis spp.	-	1	-	-	1	-	.00	-
F	Artemisia ludoviciana	a-	b <sup>9</sup>	ab <sup>3</sup>	-	3	1	.18	.03
F	Astragalus convallarius	8	16	12	4	9	4	.36	.07
F	Aster spp.	-	-	5	-	-	2	-	.01
F	Astragalus spp.	8	7	6	4	4	2	.02	.01
F	Castilleja linariaefolia	-	-	2	-	-	1	-	.00
F	Calochortus nuttallii	1	-	-	1	-	-	-	-
F	Collinsia parviflora (a)	-	b <sup>13</sup>	a-	-	5	-	.02	-
F	Cruciferae	b <sup>28</sup>	a-	a-	11	-	-	-	-
F	Delphinium nuttallianum	1	-	-	1	-	-	-	-
F	Draba reptans (a)	-	4	1	-	3	1	.01	.00
F	Eriogonum cernuum (a)	-	2	-	-	1	-	.00	-
F	Erigeron pumilus	25	14	18	14	7	9	.06	.19
F	Eriogonum racemosum	a <sup>27</sup>	b <sup>47</sup>	ab <sup>39</sup>	12	20	19	.30	.69
F	Euphorbia spp.	1	-	-	1	-	-	-	-
F	Fritillaria atropurpurea	a-	b <sup>10</sup>	a-	-	5	-	.02	-
F	Gayophytum ramosissimum (a)	-	3	-	-	2	-	.01	-
F	Heterotheca villosa	b <sup>214</sup>	a <sup>102</sup>	a <sup>78</sup>	81	47	40	2.76	2.44
F	Lactuca serriola	b <sup>4</sup>	a-	a-	3	-	-	-	-
F	Lepidium densiflorum (a)	-	3	-	-	1	-	.00	-
F	Lesquerella ludoviciana	3	2	3	1	2	1	.01	.00
F	Lithospermum ruderale	a-	b <sup>14</sup>	a-	-	7	-	.20	-
F	Machaeranthera canescens	15	26	16	8	11	8	.05	.31
F	Medicago sativa	a-	b <sup>10</sup>	ab <sup>4</sup>	-	4	1	.42	.18
F	Microsteris gracilis (a)	-	16	17	-	8	7	.04	.03
F	Oenothera coronopifolia	c <sup>39</sup>	b <sup>11</sup>	a-	15	6	-	.03	-
F	Oxybaphus linearis	-	1	-	-	1	-	.00	-
F	Petradoria pumila	1	-	-	1	-	-	-	-
F	Phlox longifolia	9	4	6	4	2	2	.01	.03
F	Polygonum douglasii (a)	-	1	8	-	1	3	.00	.01
F	Senecio multilobatus	3	-	-	1	-	-	-	-
F	Sphaeralcea coccinea	11	12	13	8	5	8	.05	.14
F	Tragopogon dubius	c <sup>17</sup>	b <sup>4</sup>	a-	10	3	-	.01	-
F	Trifolium spp.	4	-	-	1	-	-	-	-
F	Unknown forb-perennial	b <sup>11</sup>	a-	a-	6	-	-	-	-
Total for Annual Forbs		0	45	26	0	22	11	0.11	0.05
Total for Perennial Forbs		430	290	205	187	137	98	4.54	4.13
Total for Forbs		430	335	231	187	159	109	4.65	4.19

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



BROWSE TRENDS --

Herd unit 13A, Study no: 11

Type	Species	Strip Frequency		Average Cover %	
		'04	'99	'04	'99
B	Amelanchier utahensis	5	3	.15	.03
B	Artemisia frigida	2	4	.00	-
B	Artemisia tridentata wyomingensis	77	97	23.59	19.26
B	Atriplex canescens	2	2	-	.15
B	Chrysothamnus nauseosus	8	6	.49	.24
B	Eriogonum microthecum	11	14	.21	.25
B	Gutierrezia sarothrae	30	14	1.81	.57
B	Opuntia spp.	8	6	.11	.09
B	Pinus edulis	0	4	.53	2.07
B	Quercus gambelii	-	-	.85	-
Total for Browse		143	150	27.76	22.68

CANOPY COVER --

Herd unit 13A, Study no: 11

Species	Percent Cover '09
Pinus edulis	.80
Quercus gambelii	.40

BASIC COVER --

Herd unit 13A, Study no: 11

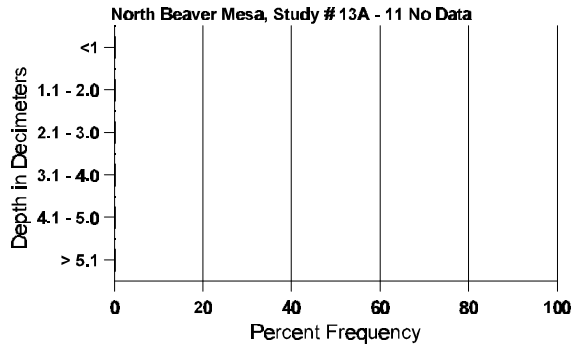
Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	319	342	15.75	40.55	40.91
Rock	4	3	0	.15	.15
Pavement	20	16	0	.42	.11
Litter	377	345	43.50	41.52	40.15
Cryptogams	68	90	3.50	1.58	3.35
Bare Ground	306	269	37.25	30.21	29.78

SOIL ANALYSIS DATA --

Herd Unit 13A, Study # 11, Study Name: North Beaver Mesa

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.1	55.4 (16.7)	7.4	70.9	11.8	17.3	1.6	8.9	92.8	0.4

# Stoniness Index



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

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	04	09	
Rabbit	19	5	N/A
Horse	-	1	N/A
Elk	55	52	155 (383)
Deer	26	20	46 (114)
Cattle	-	5	17 (42)

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

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4												
Amelanchier utahensis																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	1	3	-	-	-	60			3
	99	3	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	-	-	-	-	-	-	-	2	-	-	-	40	15	11	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	36	34	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			20%			00%			-40%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	100		-		
												'99	60		-		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4							
<i>Artemisia frigida</i>												
S	87	1	-	-	-	-	-	-	1	66		1
	94	-	-	-	-	-	-	-	0	0		0
	99	-	-	-	-	-	-	-	0	0		0
Y	87	8	-	1	-	-	-	-	9	600		9
	94	-	-	-	-	-	-	-	0	0		0
	99	-	-	-	-	-	-	-	0	0		0
M	87	-	-	-	-	-	-	-	-	0	-	0
	94	5	-	-	-	-	-	-	5	100	8	5
	99	3	-	-	2	-	-	-	5	100	10	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>		<u>%Change</u>		
'87		00%			11%			00%		-83%		
'94		00%			00%			00%		+ 0%		
'99		00%			00%			00%				
Total Plants/Acre (excluding Dead & Seedlings)									'87	600	Dec:	-
									'94	100		-
									'99	100		-
<i>Artemisia tridentata wyomingensis</i>												
S	87	11	-	-	-	-	-	-	9	1	1	11
	94	81	-	-	30	-	-	6	117	-	-	117
	99	15	8	-	-	-	-	-	23	-	-	23
Y	87	52	24	-	-	-	-	-	76	-	-	76
	94	39	9	-	8	-	-	-	56	-	-	56
	99	41	49	2	-	-	-	-	92	-	-	92
M	87	17	30	3	-	-	-	-	50	-	-	50
	94	134	71	10	-	-	-	-	202	-	13	215
	99	86	125	28	-	-	3	-	242	-	-	242
D	87	21	5	3	-	-	-	-	26	-	1	29
	94	20	14	2	-	-	-	-	16	-	9	36
	99	21	40	10	4	-	-	1	53	1	1	76
X	87	-	-	-	-	-	-	-	-	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	21
	99	-	-	-	-	-	-	-	-	-	-	33
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>		<u>%Change</u>		
'87		38%			04%			02%		-41%		
'94		31%			04%			11%		+25%		
'99		52%			10%			05%				
Total Plants/Acre (excluding Dead & Seedlings)									'87	10332	Dec:	19%
									'94	6140		12%
									'99	8200		19%

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Atriplex canescens</b>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	-	2	-	-	-	-	-	-	-	2	-	-	-	40	16	19	
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20	20	15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		67%			00%			00%			+25%							
'99		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	60		-			
												'99	80		-			
<b>Chrysothamnus nauseosus</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	3	-	-	-	-	-	-	-	-	2	-	1	-	60		3	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	87	2	-	1	-	-	-	-	-	-	1	-	2	-	200	34	25	
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160	29	26	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	20	32	
D	87	1	-	-	-	-	-	-	-	-	-	1	-	-	66		1	
	94	1	-	-	-	-	-	-	-	-	-	-	1	-	20		1	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		20%			20%			40%			-28%							
'94		00%			00%			17%			-17%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	332	Dec:	20%			
												'94	240		8%			
												'99	200		20%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total		
		1	2	3	4		1	2			
<i>Eriogonum microthecum</i>											
S	87	-	-	-	-	-	-	-	0		0
	94	2	1	-	-	-	-	-	60		3
	99	-	-	-	-	-	-	-	0		0
Y	87	9	-	-	-	-	-	-	600		9
	94	3	4	-	-	-	-	-	140		7
	99	4	-	-	-	-	-	-	80		4
M	87	-	-	-	-	-	-	-	0	-	0
	94	22	-	-	2	-	-	-	480	11	24
	99	14	1	4	2	-	-	-	420	7	21
D	87	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	0		0
	99	-	1	1	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%		+ 3%			
'94		13%		00%		00%		-13%			
'99		07%		19%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	600	Dec:	0%		
						'94	620		0%		
						'99	540		7%		
<i>Gutierrezia sarothrae</i>											
S	87	-	-	-	-	-	-	-	0		0
	94	20	-	-	-	-	-	-	400		20
	99	-	-	-	-	-	-	-	0		0
Y	87	9	-	-	-	-	-	-	600		9
	94	7	-	-	-	-	-	-	140		7
	99	8	-	-	-	-	-	-	160		8
M	87	1	-	-	-	-	-	-	66	6	1
	94	82	-	-	1	-	-	-	1660	10	83
	99	22	30	-	-	-	-	-	1040	8	52
D	87	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	20		1
	99	-	-	-	-	-	-	-	0		0
X	87	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	20		1
	99	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%		+63%			
'94		00%		00%		01%		-34%			
'99		50%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	666	Dec:	0%		
						'94	1820		1%		
						'99	1200		0%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	4	-	-	-	-	-	-	-	-	2	-	2	-	266	4 14	4	
	94	14	-	-	-	-	-	-	-	-	14	-	-	-	280	4 9	14	
	99	3	-	-	1	-	-	-	-	-	5	-	-	-	100	5 13	5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			50%			+ 5%							
'94		00%			00%			00%			-43%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	266	Dec:	-			
												'94	280		-			
												'99	160		-			
Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20	- -	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	80		-			

Trend Study 13A-12-99

Study site name: Polar Below Rim .

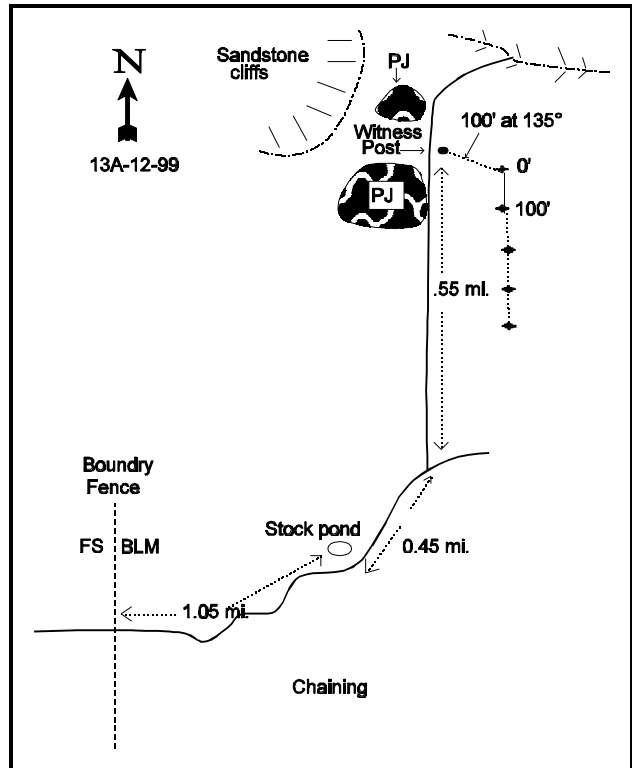
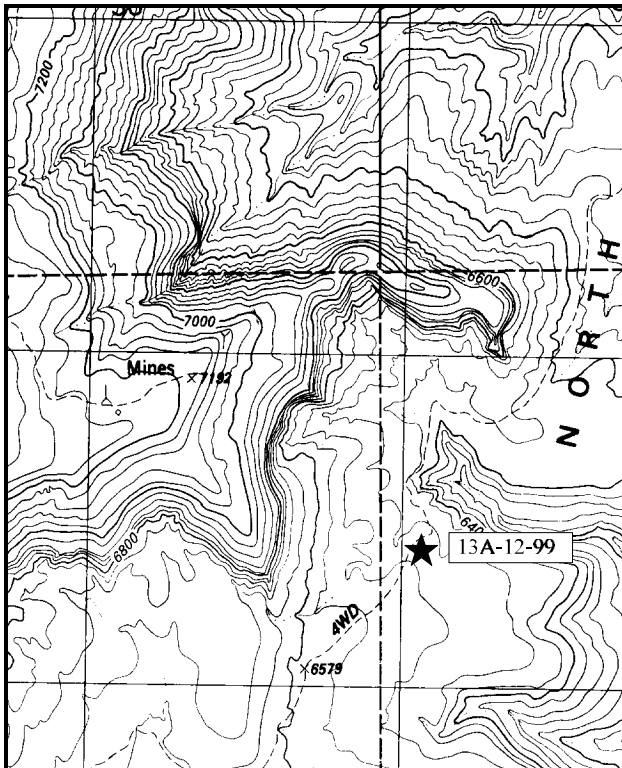
Range type: Chained, Seeded P-J .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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 cattleguard and 0.85 miles to a stockpond and study 13A-12-87. Continue 0.45 miles to a fork by another stockpond. Turn right, go 0.35 miles to an intersection. Turn left and proceed 0.6 miles to a boundary fence. Continue on the road 1.05 miles, winding through the large chaining, to a stock pond. Cross the pond and continue 0.45 miles to a fork. Keep left on the main road and continue 0.55 miles to a fence post on the right side of the road. The 0-foot baseline stake, tagged #7857, is 100 feet away at 135°.



Map Name: Dolores Point North

Diagrammatic Sketch

Township 25S , Range 25E , Section SE 1/4,1

UTM 4280296.225 N, 665003.451 E

## DISCUSSION

### Trend Study No. 13A-12 (33-12)

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 dense population of Wyoming big sagebrush (10,900 plants/acre) with a fair abundance of crested wheatgrass and some increase of pinyon trees. This BLM land is grazed by cattle and horses from winter to spring. It is thought to be used almost equally by deer and elk in the winter. The pellet group transects done on site in 1999 estimate there to be 52 cow days use/acre (128 cdu/ha), 13 deer days use/acre (32 ddu/ha), and 94 elk days use/acre (232 edu/ha).

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, where 10 ppm is thought to be minimal for normal plant development. The herbaceous species provide good protective cover from erosion by providing, on average, 58% of the total vegetative cover. There is little evidence of soil loss.

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% with the percent dead within the population being less than 1%. The percent young age class has varied greatly, however on average it has been 38% through all readings. Most of the population shows only light to moderate use. There are a few scattered fourwing saltbush and ephedra. 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.

Grasses are an important forage resource on this site and they also provide excellent soil stability (making up almost 50% of the total vegetative cover). The most common native, blue grama, provides on average almost 50% 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. Crested wheatgrass has only a moderate quadrat frequency which is low for a seeded area and provides on average only about 18% of the grass cover. Forbs, although fairly diverse, are not as important in terms of forage production as they only contribute on average about 10% of the total vegetative cover.

Percent bare ground has stayed fairly consistent between 40 and 38% through the years. There is no rock-pavement cover. Percent litter has decreased somewhat as expected with the extended drought, but stabilized at about 31%. There are no large exposed patches of bare ground due to good herbaceous cover. Most of the litter cover is debris from the two-way chaining.

### 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.



TREND ASSESSMENT

soil - slightly improved

browse - slightly improved

herbaceous understory - stable

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.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly down

HERBACEOUS TRENDS --

Herd unit 13A, Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'84	'89
G	Agropyron cristatum	139	145	126	57	51	48	3.17	3.07
G	Bouteloua gracilis	<sub>b</sub> 212	<sub>a</sub> 177	<sub>ab</sub> 201	73	63	73	6.89	9.97
G	Bromus tectorum (a)	-	53	40	-	20	17	.32	.50
G	Hilaria jamesii	22	22	13	13	8	6	.09	.13
G	Poa secunda	104	112	92	41	43	37	.97	2.25
G	Sitanion hystrix	<sub>b</sub> 35	<sub>a</sub> 17	<sub>a</sub> 15	16	7	6	.08	.13
G	Sporobolus cryptandrus	-	6	4	-	2	2	.18	.18
G	Stipa comata	<sub>b</sub> 183	<sub>b</sub> 201	<sub>a</sub> 101	65	76	44	3.44	1.04
G	Vulpia octoflora (a)	-	<sub>b</sub> 168	<sub>a</sub> 80	-	63	27	.44	1.30
Total for Annual Grasses		0	221	120	0	83	44	0.75	1.80
Total for Perennial Grasses		695	680	552	265	250	216	14.84	16.78
Total for Grasses		695	901	672	265	333	260	15.60	18.59
F	Astagalus cicer	39	52	43	18	27	22	.24	.21
F	Astragalus convallarius	-	5	2	-	2	1	.01	.03
F	Calochortus nuttallii	<sub>c</sub> 46	<sub>b</sub> 4	<sub>a</sub> -	26	3	-	.01	-
F	Castilleja spp.	<sub>a</sub> -	<sub>b</sub> 25	<sub>a</sub> -	-	11	-	.10	-
F	Draba reptans (a)	-	<sub>b</sub> 139	<sub>a</sub> -	-	60	-	.30	-
F	Erigeron pumilus	<sub>b</sub> 67	<sub>a</sub> 38	<sub>ab</sub> 58	33	20	28	.22	.92
F	Gilia spp. (a)	-	<sub>b</sub> 85	<sub>a</sub> -	-	41	-	.20	-
F	Lomatium spp.	3	-	-	1	-	-	-	-
F	Medicago sativa	6	4	2	3	2	2	.18	.21
F	Microsteris gracilis (a)	-	<sub>b</sub> 49	<sub>a</sub> 4	-	20	1	.10	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	<i>Oenothera albicaulis</i> (a)	<sub>b</sub> 5	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	<i>Phlox longifolia</i>	<sub>b</sub> 76	<sub>b</sub> 71	<sub>a</sub> 22	31	32	9	.18	.09
F	<i>Plantago patagonica</i> (a)	-	96	73	-	41	28	.20	.53
F	<i>Potentilla gracilis</i>	<sub>a</sub> -	<sub>b</sub> 38	<sub>a</sub> -	-	13	-	.26	-
F	<i>Sphaeralcea coccinea</i>	135	131	110	55	53	47	1.12	1.60
F	<i>Tragopogon dubius</i>	1	-	-	1	-	-	-	-
F	<i>Tragopogon porrifolius</i>	<sub>b</sub> 9	<sub>b</sub> 9	<sub>a</sub> -	4	3	-	.01	-
Total for Annual Forbs		5	369	77	3	162	29	0.81	0.53
Total for Perennial Forbs		382	377	237	172	166	109	2.37	3.07
Total for Forbs		387	746	314	175	328	138	3.18	3.61

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

#### BROWSE TRENDS --

Herd unit 13A, Study no: 12

Type	Species	Strip Frequency		Average Cover %	
		'04	'99	'04	'99
B	<i>Artemisia tridentata wyomingensis</i>	92	88	9.97	12.05
B	<i>Atriplex canescens</i>	1	2	1.00	.03
B	<i>Eriogonum microthecum</i>	7	4	.07	.03
B	<i>Gutierrezia sarothrae</i>	5	4	.15	.00
B	<i>Opuntia</i> spp.	20	20	.29	.05
B	<i>Pinus edulis</i>	0	4	1.27	5.05
B	<i>Sclerocactus whipplei</i>	0	8	.00	.03
Total for Browse		125	130	12.77	17.25

#### CANOPY COVER --

Herd unit 13A, Study no: 12

Species	Percent Cover '09
<i>Pinus edulis</i>	3

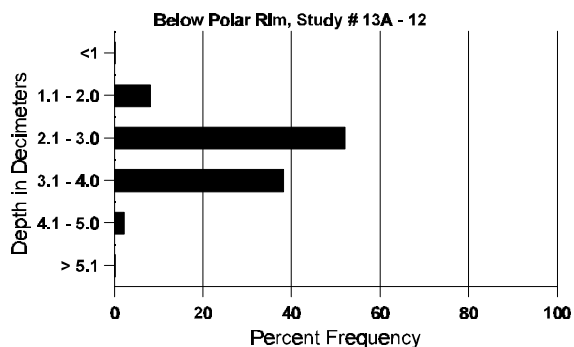
BASIC COVER --  
Herd unit 13A, Study no: 12

Cover Type	Nested Frequency		Average Cover %		
	'04	'99	'87	'94	'99
Vegetation	368	332	12.25	34.09	36.44
Rock	1	-	0	.00	0
Pavement	-	9	0	0	.01
Litter	391	343	42.25	30.93	31.25
Cryptogams	168	146	5.00	1.81	4.96
Bare Ground	352	321	40.50	38.21	38.89

SOIL ANALYSIS DATA --  
Herd Unit 13A, Study # 12, Study Name: Below Polar Rim

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.1	58.2 (16.2)	6.7	58.9	19.8	21.3	1.6	6.5	60.8	0.3

### Stoniness Index



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

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'04	'09	
Rabbit	30	22	N/A
Horse	-	2	N/A
Elk	39	37	94 (232)
Deer	8	18	13 (32)
Cattle	-	6	52 (128)

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

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total						
		1	2	3	4		1	2							
<i>Artemisia tridentata wyomingensis</i>															
S	87	8	-	-	-	-	-	-	7	1	-	-	533		8
	94	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	4	6	9	-	-	-	-	19	-	-	-	380		19
Y	87	77	5	-	-	-	-	-	79	2	1	-	5466		82
	94	11	-	-	-	-	-	-	5	-	2	4	220		11
	99	40	158	22	-	-	-	-	220	-	-	-	4400		220
M	87	4	18	7	-	-	-	-	29	-	-	-	1933	20 31	29
	94	644	11	-	-	-	-	-	599	1	52	3	13100	15 21	655
	99	143	84	47	-	-	2	-	273	2	-	1	5520	18 31	276
D	87	3	1	1	-	-	-	-	5	-	-	-	333		5
	94	24	-	-	-	-	-	-	17	-	2	5	480		24
	99	34	12	3	-	-	-	-	45	-	-	4	980		49
X	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	100		5
	99	-	-	-	-	-	-	-	-	-	-	-	120		6
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'87		21%		07%		.86%		+44%							
'94		02%		00%		10%		-21%							
'99		47%		14%		.91%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	7732	Dec:	4%		
										'94	13800		3%		
										'99	10900		9%		
<i>Atriplex canescens</i>															
S	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	94	-	2	-	-	-	-	-	2	-	-	-	40	23 27	2
	99	4	-	-	-	-	-	-	4	-	-	-	80	21 13	4
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'87		00%		00%		00%									
'94		00%		00%		00%									
'99		00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-		
										'94	40		-		
										'99	80		-		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total		
		1	2	3	4					
Eriogonum microthecum										
Y	87	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	0		0
	99	3	-	-	-	-	-	60		3
M	87	-	-	-	-	-	-	0	-	0
	94	18	-	-	-	-	-	360	4	18
	99	2	-	-	-	1	-	60	11	3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
'87		00%		00%		00%				
'94		00%		00%		00%		-67%		
'99		00%		00%		00%				
Total Plants/Acre (excluding Dead & Seedlings)							'87	0	Dec:	-
							'94	360		-
							'99	120		-
Gutierrezia sarothrae										
Y	87	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	0		0
	99	3	-	-	-	-	-	60		3
M	87	-	-	-	-	-	-	0	-	0
	94	4	-	-	-	-	-	80	8	4
	99	4	-	-	-	-	-	80	8	4
D	87	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	20		1
	99	-	-	-	-	-	-	0		0
X	87	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	20		1
	99	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
'87		00%		00%		00%				
'94		00%		00%		00%		+29%		
'99		00%		00%		00%				
Total Plants/Acre (excluding Dead & Seedlings)							'87	0	Dec:	0%
							'94	100		20%
							'99	140		0%

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total						
		1	2	3	4									
Opuntia spp.														
S	87	3	-	-	-	-	-	-	3	-	-	200		3
	94	1	-	-	-	-	-	-	1	-	-	20		1
	99	1	-	-	-	-	-	-	1	-	-	20		1
Y	87	6	-	-	-	-	-	-	6	-	-	400		6
	94	-	-	-	-	-	-	-	-	-	-	0		0
	99	9	-	-	-	-	-	-	9	-	-	180		9
M	87	11	-	-	-	-	-	-	8	1	2	733	3 13	11
	94	27	3	-	-	-	-	-	28	2	-	600	3 9	30
	99	16	-	-	-	-	-	-	16	-	-	320	4 9	16
D	87	2	-	-	-	-	-	-	-	-	2	133		2
	94	1	-	-	-	-	-	-	1	-	-	20		1
	99	3	-	-	-	-	-	-	-	-	3	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>				
'87		00%		00%		21%				-51%				
'94		10%		00%		00%				-10%				
'99		00%		00%		11%								
Total Plants/Acre (excluding Dead & Seedlings)										'87	1266	Dec:	11%	
										'94	620		3%	
										'99	560		11%	
Pinus edulis														
S	87	2	-	-	-	-	-	-	2	-	-	133		2
	94	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	1	-	-	20		1
M	87	-	-	-	-	-	-	-	-	-	-	0	- -	0
	94	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	3	-	-	-	-	-	1	4	-	-	80	- -	4
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>				
'87		00%		00%		00%								
'94		00%		00%		00%								
'99		00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-	
										'94	0		-	
										'99	100		-	

A Y G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Sclerocactus whipplei																		
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1	4	0
	'99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	1	2	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	200		-			

**\*\*\*THIS SITE WAS DROPPED\*\*\***

Trend Study 13A-13-99

Study site name: Beaver Canyon .

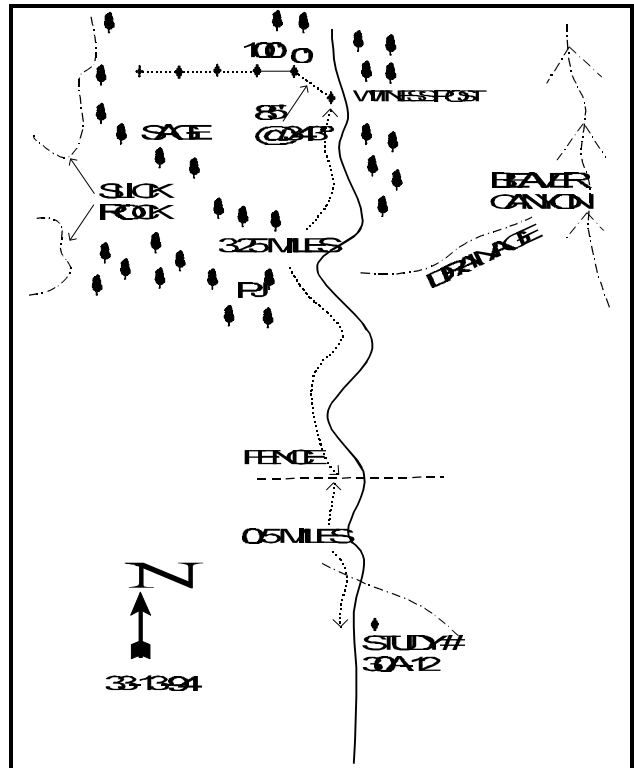
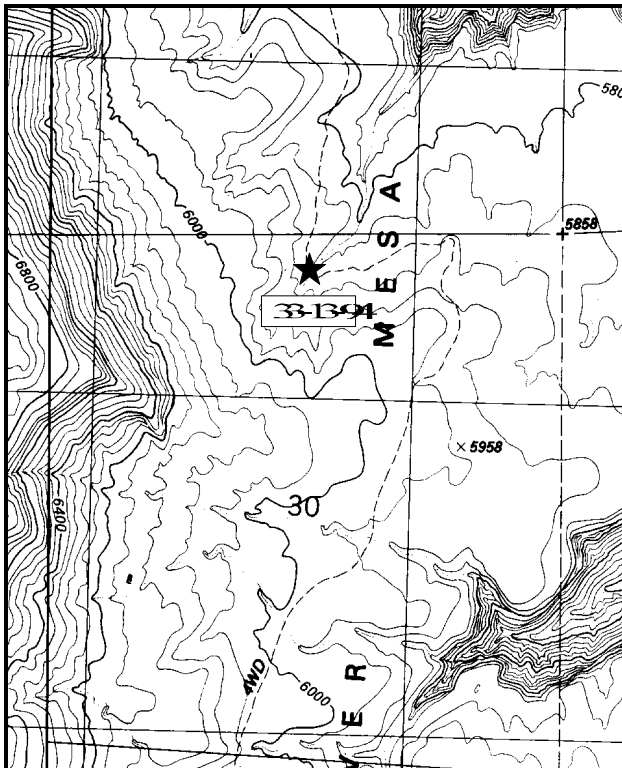
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 278 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From transect 13A-12-94, continue along the North Beaver Mesa Road for 0.5 miles to a gate. Continue 3.25 miles to the transect witness post located just off the left side of the road. The 0-foot baseline stake, a 1-foot tall fence post tagged #7819, is 85 feet from the witness post on a bearing of 343°.



Map Name: Dolores Point North

Diagrammatic Sketch

Township 24S , Range 26E , Section 30



## DISCUSSION

### Trend Study No. 13A-13 (33-13)

This site has been dropped, however the text is included in case there is some need for this summary of data collected in 1987 and 1994. The study sampled a sagebrush opening in the pinyon-juniper which is representative of the vegetation on the low, northern portion of Beaver Mesa. This area is used by deer and elk in severe winters. There is also some livestock use in the winter.

The study is on a gently east facing slope (5%) with an elevation of 6,100 feet. Soil on the site appears to be moderately deep, loose, and sandy. The soil surface is characterized by small mounds of soil and vegetation, with surrounding soil 3-4 inches lower due to soil loss. Small gullies are common. Patches of cryptogamic soil are effective in holding some of the soil in place. Erosion is especially severe in the surrounding mature pinyon-juniper woodlands which have very little herbaceous cover.

Similar to the rest of North Beaver Mesa, the key browse species is Wyoming big sagebrush. In 1994, it had a moderate stand density of 4,060 plants per acre with a cover value of approximately 10%. A majority of the plants were smaller than normal, but generally appear to be healthy mature plants. Thirty-eight percent of the sagebrush population were classified as decadent in 1987, however, in 1994 this decreased to 32%. Twenty-two percent of the population showed heavy use in the past, now only 11% show heavy use. Overall, use appears to be light during the recent winter, but past use appears to have been more heavy. Overall degree of hedging is moderate. Occasional fourwing saltbush plants are heavily hedged, exhibiting vigorous leader growth in 1987. Winterfat is even more uncommon. There are a few conifers in the opening. The commonly encountered increaser species included broom snakeweed and pricklypear cactus.

Grass cover is spotty with a low density. However, perennial species such as needle-and-thread, galleta, crested wheatgrass, blue grama, Sandberg bluegrass, and bottlebrush squirreltail were the perennial species most often encountered on this site. The annual grasses on the site (cheatgrass and sixweeks fescue) made up 21% of the total grass cover. These annuals appear mostly as randomly associated patches. Small desert forbs are fairly numerous, but provide very little forage as together they only contribute 2% of the cover.

The presence of soil-stabilizing cryptogams is reflected in their 5% cover value. Vegetative cover is fair at 31%, with 64% of this cover coming from herbaceous species. Litter cover is quite low at only 21%, although percent bare ground has decreased from 56% to 45%.

### 1994 TREND ASSESSMENT

The trend for soils is improving, but they are still only in fair condition. An improvement in percentage of herbaceous cover would greatly improve the soil trend. The slight decline in density of Wyoming big sagebrush is more reflective of the larger sample size used during the 1994 reading. Percent decadency of sagebrush has decreased and proportion classified as heavily hedged have also declined. However, those plants expressing poor vigor have increased. Overall, the browse trend is stable. The poor vigor of sagebrush will improve with an end to the extended drought especially hard felt in the southeastern part of the state. The herbaceous understory is stable as perennial grasses have slightly increased. Forbs have slightly decreased nested frequency values, but the forbs only make up about 10% of the total herbaceous cover.

#### TREND ASSESSMENT

soil - improving, but still only in fair condition because percent bare ground is still high at 45%

browse - stable

herbaceous understory - stable

Trend Study 13A-14-99

Study site name: Lower Lackey Fan .

Range type: Sage-Grass (sprayed) .

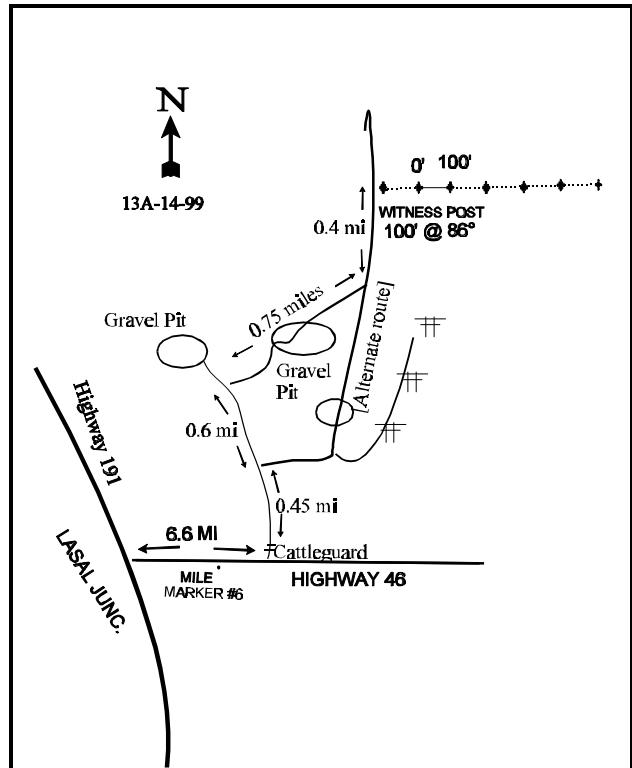
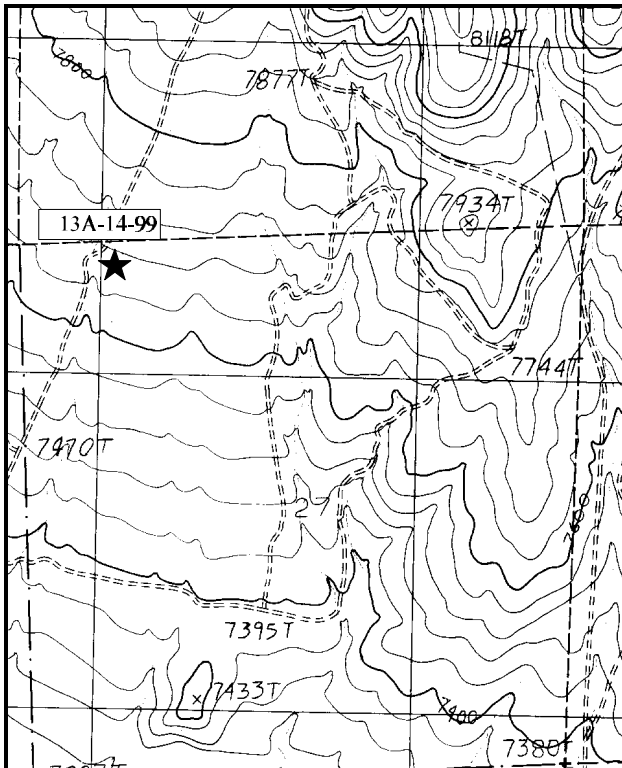
Compass bearing: frequency baseline 86°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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 stay left on the main road. Continue 0.60 miles to where the road splits towards several gravel pits. Take the right fork and follow the road on the edge of the pit to where the road goes up and out of the pit. From here, travel 0.4 miles to a fork. Turn left and continue another 0.4 miles to a 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.

\*\*\*If there is no access through the gravel pit, an alternate exists. Refer to map below for this route\*\*\*



Map Name: LaSal West

Diagrammatic Sketch

Township 28S , Range 24E , Section 27

UTM 4243960.231 N, 650438.169 E

## DISCUSSION

### Trend Study No. 13A-14 (33-14)

The Lower Lacky Fan site is a new study (1994) that is located on the lower southwest slopes of the LaSal Mountains at 7,700 feet in elevation. It is on a fairly flat ridge with scattered pinyon (6 trees/acre and average diameter of almost 4 inches) and juniper (6 trees/acre and average diameter of 5.75 inches) 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 transects read on site in 1999 showed 12 cow days use/acre (30 cdu/ha), 20 deer days use/acre (49 ddu/ha), and 34 elk days use/acre (84 edu/ha).

The site has a moderately deep (effective rooting depth of almost 11 inches), reddish-brown, sandy clay loam soil with abundant rock in the profile and on the surface. The soil reaction is neutral (7.2 pH). Phosphorous could be a limiting factor on the site as it is 8.1 ppm where 10 ppm is considered minimal for normal plant development. The soil has a combined rock cover of 19% (rock 16% and pavement 3%) with a relatively low litter cover (37%). Percent bare ground (24%) 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 scattered pinyon and juniper provides some valuable cover for wintering animals during critical periods of winter. The key browse species is Wyoming big sagebrush with a moderate density of 3,880 plants/acre (1999). The population appears to be in a slightly downward trend with biotic potential going from 86% to 14%, percent young declining from 36% to 19%, and the percentage of mature plants increasing to 52%. Additionally, the proportion of the population that is classified as dead has gone from 5% to 14%, and the population has decreased by 21%. Strip frequency also shows this trend with a decrease from 86% in 1994 to 73% in 1999. A very low density of bitterbrush are scattered throughout the community. The increaser, broom snakeweed, in 1994 showed indications that it was increasing. Its density has increased greatly since then. Its estimated density has gone from 1,800 plants/acre to 20,060 plants/acre. Another way to interpret the changes is to look at how the proportion of the browse cover contributed by Wyoming big sagebrush and broom snakeweed has changed. Sagebrush made up 82% of the browse cover in 1994, now it only makes up 42%. For broom snakeweed, it initially contributed 6% of the browse cover, now it makes up 35% of the browse cover.

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 a little more than half as much cover as the Wyoming big sagebrush in 1994, now contributes more cover than sagebrush. Cheatgrass increased in nested frequency in 1999, but not significantly. Forbs were diverse in 1994, although nearly half were small, annual species. Only 5 species were sampled in 1999. All together, forbs provided only 2% of the plant cover in 1994, now they provide less than 1% cover.

### 1994 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 the excellent biotic potential, good age class distribution and moderately low percentage of decadent plants. The herbaceous understory is stable, but the percentage of annual grass should be watched closely, for any increase would indicate a downward trend for the site.

TREND ASSESSMENT

soil - stable, but only fair condition

browse - up, but any increases for broom snakeweed should be watched closely

herbaceous understory - stable, annual grasses should be monitored closely

1999 TREND ASSESSMENT

The trend for soil is slightly improved, but still in poor condition. The decrease in bare soil is mostly because of increases in cheatgrass and snakeweed cover, both increasers. The browse trend has taken an unexpected turn downward as sagebrush has experienced decreases in cover, biotic potential, 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.

TREND ASSESSMENT

soil - slightly improved, but only fair condition

browse - down, but any further increases of broom snakeweed should be monitored closely

herbaceous understory - up, however annual grasses should be monitored closely

HERBACEOUS TRENDS --

Herd unit 13A, Study no: 14

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'94	'99	'94	'99	'94	'99
G	Agropyron cristatum	225	*309	67	86	7.54	10.15
G	Bromus tectorum (a)	175	206	50	59	3.18	3.51
G	Vulpia octoflora (a)	-	*8	-	4	-	.02
Total for Annual Grasses		175	214	50	63	3.18	3.53
Total for Perennial Grasses		225	309	67	86	7.54	10.15
Total for Grasses		400	523	117	149	10.73	13.69
F	Astragalus convallarius	24	*3	13	2	.14	.01
F	Chenopodium spp. (a)	11	*-	5	-	.02	-
F	Comandra pallida	24	*-	12	-	.06	-
F	Collinsia parviflora (a)	26	*4	8	1	.09	.00
F	Cryptantha nevadensis	39	*-	12	-	.06	-
F	Cryptantha spp.	20	*-	9	-	.04	-
F	Dalea searlsiae	2	-	1	-	.00	-
F	Descurainia pinnata (a)	14	*-	5	-	.02	-
F	Draba nemorosa (a)	42	*-	16	-	.08	-
F	Erigeron pumilus	-	-	-	-	-	.00

Type	Species	Nestled Frequency		Quadrat Frequency		Average Cover %	
		'94	'99	'94	'99	'94	'99
F	Gayophytum ramosissimum (a)	22	*-	9	-	.04	-
F	Gilia spp. (a)	18	*-	8	-	.04	-
F	Heterotheca villosa	-	4	-	2	-	.03
F	Ipomopsis aggregata	2	1	1	1	.00	.00
F	Machaeranthera spp	1	-	1	-	.00	-
F	Microsteris gracilis (a)	60	6	20	3	.32	.01
F	Oxybaphus linearis	2	-	2	-	.01	-
F	Phlox longifolia	3	-	2	-	.01	-
F	Ranunculus testiculatus (a)	158	*-	44	-	.73	-
F	Salsola iberica (a)	3	-	2	-	.01	-
F	Schoenrambe linifolia	27	*-	10	-	.07	-
F	Sisymbrium altissimum (a)	-	-	-	-	.00	-
F	Sphaeralcea coccinea	5	*-	1	-	.38	-
F	Tragopogon dubius	5	-	3	-	.01	-
F	Trifolium spp.	3	-	1	-	.03	-
Total for Annual Forbs		354	10	117	4	1.37	0.01
Total for Perennial Forbs		157	8	68	5	0.84	0.05
Total for Forbs		511	18	185	9	2.22	0.07

\* Indicates significant difference at % = 0.10

#### BROWSE TRENDS --

Herd unit 13A, Study no: 14

Type	Species	Strip Frequency		Average Cover %	
		'94	'99	'94	'99
B	Artemisia tridentata wyomingensis	86	73	12.07	9.84
B	Chrysothamnus depressus	0	1	-	-
B	Eriogonum microthecum	1	0	-	-
B	Gutierrezia sarothrae	37	73	.82	8.06
B	Juniperus osteosperma	0	1	-	-
B	Leptodactylon pungens	0	0	-	-
B	Pinus edulis	0	1	-	3.75
B	Purshia tridentata	1	4	.15	.15
B	Quercus gambelii	-	-	-	.15
B	Yucca spp.	6	7	1.60	1.31
Total for Browse		131	160	14.64	23.26

CANOPY COVER --

Herd unit 13A, Study no: 14

Species	Percent Cover	
	'94	'99
Pinus edulis	-	5
Quercus gambelii	-	4

BASIC COVER --

Herd unit 13A, Study no: 14

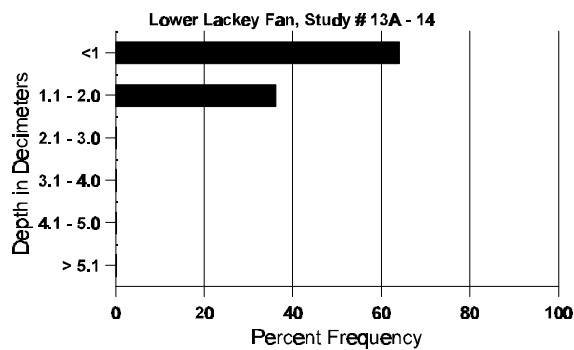
Cover Type	Nested Frequency		Average Cover %	
	'94	'99	'94	'99
Vegetation	423	417	27.73	34.18
Rock	270	248	12.83	15.93
Pavement	242	220	1.11	3.06
Litter	479	451	31.20	36.69
Cryptogams	14	71	.06	1.40
Bare Ground	370	329	28.67	23.90

SOIL ANALYSIS DATA --

Herd Unit 13A, Study # 14, Study Name: Lower Lackey Fan

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.7	61.8 (12.5)	7.2	52.9	25.8	21.3	2.1	8.1	76.8	0.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 13A, Study no: 14

Type	Quadrat Frequency		Days Use per Acre (Hectare) 09
	'94	'99	
Rabbit	17	21	N/A
Elk	30	21	34
Deer	1	16	20
Cattle	-	8	12

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

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																		
S	94	177	35	-	-	-	-	-	-	-	147	-	-	65	4240		212	
	99	20	8	-	-	-	-	-	-	-	28	-	-	-	560		28	
Y	94	84	4	-	-	-	-	-	-	-	88	-	-	-	1760		88	
	99	27	8	-	1	-	-	-	-	-	35	-	1	-	720		36	
M	94	90	12	4	1	-	-	-	-	-	99	1	7	-	2140	25 36	107	
	99	30	54	17	-	-	-	-	-	-	99	2	-	-	2020	20 28	101	
D	94	46	4	-	-	1	-	-	-	-	20	5	-	26	1020		51	
	99	6	35	8	2	4	1	1	-	-	47	-	-	10	1140		57	
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	700		35	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		09%			02%			13%			-21%							
'99		52%			13%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	4920	Dec:	21%			
												'99	3880		29%			
<i>Chrysothamnus depressus</i>																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	6	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-			
												'99	20		-			
<i>Eriogonum microthecum</i>																		
M	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	9 11	2	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	40	Dec:	-			
												'99	0		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																		
S	94	86	-	-	-	-	-	-	-	-	86	-	-	-	1720		86	
	99	44	-	-	-	-	-	-	-	-	44	-	-	-	880		44	
Y	94	26	-	-	-	-	-	-	-	-	26	-	-	-	520		26	
	99	281	5	-	-	-	-	-	-	-	286	-	-	-	5720		286	
M	94	61	-	-	-	-	-	-	-	-	61	-	-	-	1220	10	10	61
	99	701	-	-	-	-	-	-	-	-	701	-	-	-	14020	11	11	701
D	94	3	-	-	-	-	-	-	-	-	2	-	-	1	60		3	
	99	14	2	-	-	-	-	-	-	-	10	-	-	6	320		16	
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			01%			+91%							
'99		.69%			00%			.59%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	1800	Dec:	3%			
												'99	20060		2%			
<i>Juniperus osteosperma</i>																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-			
												'99	20		-			
<i>Leptodactylon pungens</i>																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	7	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-			
												'99	0		-			
<i>Pinus edulis</i>																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-			
												'99	20		-			



A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
M	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13	27	1
	99	1	-	3	-	-	-	-	-	-	4	-	-	-	80	17	35	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%			+75%							
'99		00%			75%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	20	Dec:	-			
												'99	80		-			
Yucca spp.																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	99	2	-	-	-	-	-	-	-	-	2	-	-	40			2	
M	94	18	-	-	-	-	-	-	-	-	18	-	-	360	24	38	18	
	99	20	-	-	-	-	-	-	-	-	20	-	-	400	18	29	20	
X	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	40			2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%			+18%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	360	Dec:	-			
												'99	440		-			

Trend Study 13A-15-99

Study site name: Hideout Mesa .

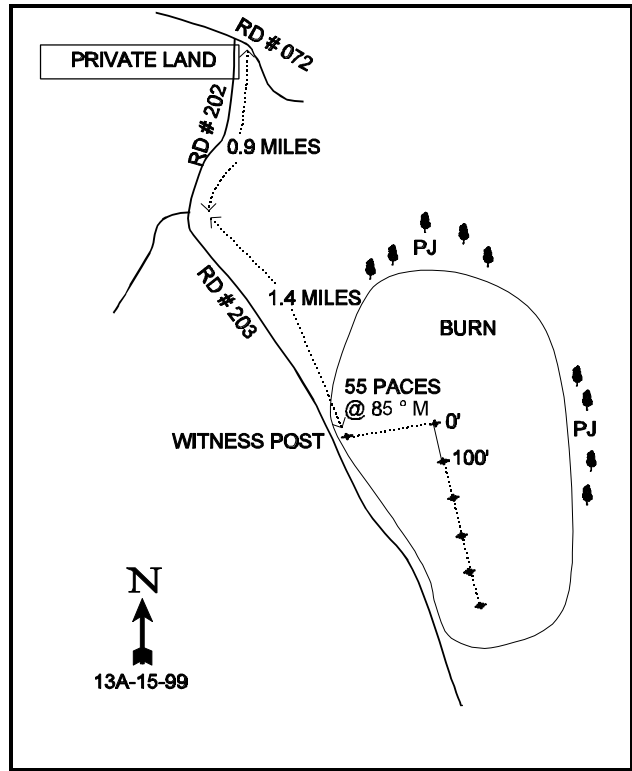
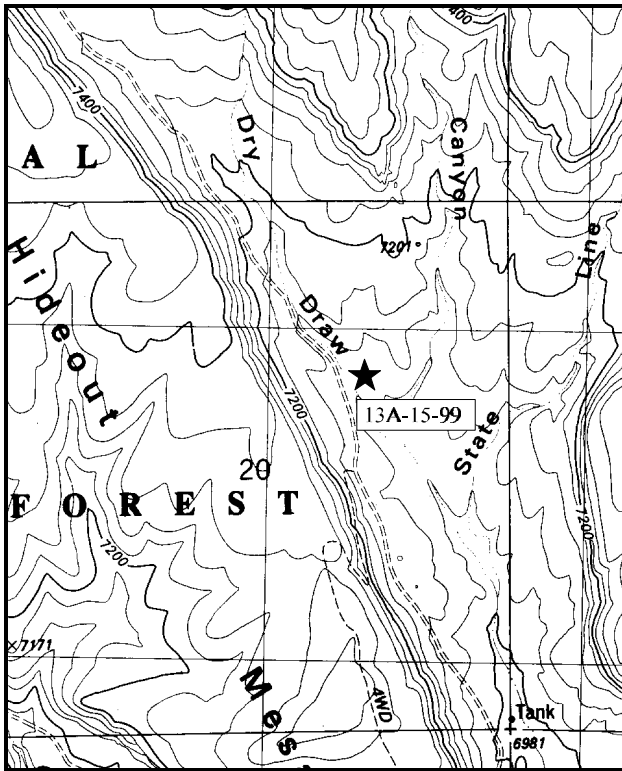
Range type: Sagebrush-Grass Burn .

Compass bearing: frequency baseline 155°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

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 #5.



Map Name: Ray Mesa

Diagrammatic Sketch

Township 28S , Range 26E , Section 20

UTM 4246849.514 N , 668313.714 E

## DISCUSSION

### Trend Study No. 13A-15 (33-15)

Hideout Mesa is a site that was selected because of its 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 had recently been burned. Pellet group transects that were read in 1999 show cow use at 50 cow days use/acre (124 cdu/ha), deer days use/acre at 11 (27 ddu/ha), and elk days use/acre at 36 (89 edu/ha). There are two well worn livestock trails that run through the site.

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 60% 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. Most of the species appear to be stable to slightly increasing in density. The most important species of concern is mountain big sagebrush which appears to be increasing in numbers and on average provides 77% of the browse cover. The biotic potential (proportion of seedlings to the population) for this population was 196% in 1994, but only 3% in 1999. Percent young age class has gone from 27% up to 54%. Percent decadence has decreased from 17% down to 13%. Strip frequency has also indicated an increase in abundance. This all leads to a continuing increase in sagebrush numbers.

The herbaceous understory is diverse with 13 species of grasses and 35 species of forbs being identified in 1994 and 1999. Four species of grass (western wheatgrass, blue grama, prairie junegrass, and needle-and-thread grass) made up 88% of the grass cover in 1994. In 1999, these species only made up 72% of the grass cover. With little late summer precipitation, blue grama was not as productive as in 1994. However, cheatgrass has increased and more than compensated for this loss in cover. This is not a preferred phenomenon. However, this 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. Now they make up more than 18% 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 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. Percent bare ground is fairly high at 32%, 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.

#### TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - stable to up

## 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.

### TREND ASSESSMENT

soil - stable

browse - continued up, especially for sagebrush

herbaceous understory - stable to up

### HERBACEOUS TRENDS --

Herd unit 13A, Study no: 15

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'94	'99	'94	'99	'94	'99
G	Agropyron smithii	276	252	80	77	4.98	3.68
G	Bouteloua gracilis	58	50	19	18	1.16	.72
G	Bromus tectorum (a)	26	*127	8	38	.04	2.81
G	Carex spp.	1	5	1	3	.00	.02
G	Hilaria jamesii	6	4	3	1	.19	.03
G	Koeleria cristata	216	169	75	61	3.82	4.17
G	Oryzopsis hymenoides	3	9	1	3	.18	.09
G	Poa fendleriana	29	45	10	14	.12	.46
G	Poa pratensis	5	*-	3	-	.01	-
G	Poa secunda	-	*56	-	20	-	.59
G	Sitanion hystrix	54	*25	20	14	.95	.19
G	Sporobolus cryptandrus	-	*9	-	4	-	.04
G	Stipa comata	51	*86	23	32	1.24	2.47
G	Vulpia octoflora (a)	3	4	1	2	.00	.03
Total for Annual Grasses		29	131	9	40	0.04	2.85
Total for Perennial Grasses		699	710	235	247	12.69	12.50
Total for Grasses		728	841	244	287	12.74	15.35
F	Agoseris glauca	-	2	-	1	-	.00
F	Alyssum spp. (a)	4	*-	3	-	.01	-
F	Androsace septentrionalis (a)	-	*45	-	20	-	.10
F	Artemisia ludoviciana	29	23	10	8	.53	.57
F	Astragalus miser	9	3	3	1	.39	.03
F	Castilleja linariaefolia	6	*-	3	-	.06	-
F	Cirsium undulatum	4	1	2	1	.03	.00

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'94	'99	'94	'99	'94	'99
F	<i>Comandra pallida</i>	94	*-	35	-	.69	-
F	<i>Collinsia parviflora</i> (a)	39	*1	15	1	.07	.00
F	<i>Crepis acuminata</i>	-	1	-	1	-	.03
F	<i>Cryptantha</i> spp.	6	*-	3	-	.02	-
F	<i>Cymopterus</i> spp.	4	-	1	-	.00	-
F	<i>Descurainia pinnata</i> (a)	3	*-	2	-	.01	-
F	<i>Draba nemorosa</i> (a)	75	*11	32	7	.16	.03
F	<i>Erigeron</i> spp.	8	*-	4	-	.02	-
F	<i>Erigeron pumilus</i>	42	*14	18	5	.09	.08
F	<i>Eriogonum racemosum</i>	11	6	6	5	.17	.05
F	<i>Gayophytum ramosissimum</i> (a)	4	-	1	-	.00	-
F	<i>Gilia</i> spp. (a)	148	*1	59	1	.32	.00
F	<i>Grindelia squarrosa</i>	41	*-	16	-	.15	-
F	<i>Heterotheca villosa</i>	12	11	5	4	.08	.36
F	<i>Ipomopsis aggregata</i>	10	*-	4	-	.02	-
F	<i>Lappula occidentalis</i> (a)	13	12	8	6	.04	.03
F	<i>Linum lewisii</i>	4	7	2	3	.01	.06
F	<i>Lupinus</i> spp.	4	1	2	1	.01	.03
F	<i>Machaeranthera canescens</i>	27	*6	13	2	.06	.01
F	<i>Microsteris gracilis</i> (a)	38	*114	14	42	.09	.36
F	<i>Oenothera pallida</i>	5	7	2	2	.03	.03
F	<i>Orthocarpus</i> spp. (a)	-	4	-	1	-	.00
F	<i>Penstemon</i> spp.	20	29	9	14	.07	1.27
F	<i>Penstemon pachyphyllus</i>	2	5	1	3	.00	.01
F	<i>Penstemon thompsoniae</i>	14	-	9	-	.70	-
F	<i>Phlox longifolia</i>	36	*19	17	7	.08	.03
F	<i>Plantago patagonica</i> (a)	77	*50	29	16	.32	.10
F	<i>Polygonum douglasii</i> (a)	28	38	10	19	.05	.09
F	<i>Ranunculus testiculatus</i> (a)	2	-	2	-	.01	-
F	<i>Sphaeralcea coccinea</i>	129	132	50	52	1.72	1.23
F	<i>Trifolium</i> spp.	11	*2	4	1	.02	.00
F	<i>Zigadenus paniculatus</i>	6	8	3	4	.01	.02
Total for Annual Forbs		431	276	175	113	1.09	0.74
Total for Perennial Forbs		534	277	222	115	5.02	3.86
Total for Forbs		965	553	397	228	6.12	4.60

\* Indicates significant difference at % = 0.10

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

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

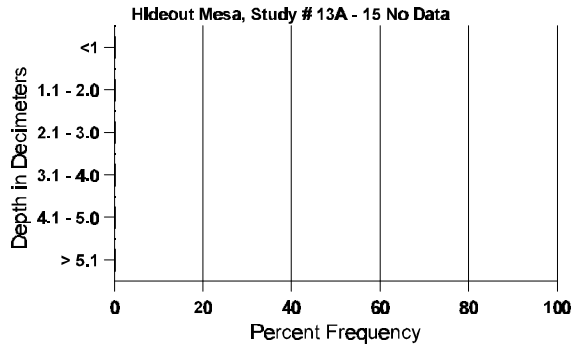
BASIC COVER --  
Herd unit 13A, Study no: 15

Cover Type	Nested Frequency		Average Cover %	
	'94	'99	'94	'99
Vegetation	438	429	29.71	35.97
Rock	17	28	.06	.89
Pavement	22	59	.04	.13
Litter	497	422	43.97	32.96
Cryptogams	79	251	1.32	9.93
Bare Ground	436	366	32.34	32.75

SOIL ANALYSIS DATA --  
Herd Unit 13A, Study # 15, Study Name: Hideout Mesa

Effective rooting depth (cm)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.0	61.6 (11.2)	7.2	50.9	28.6	20.6	2.2	18.6	227.2	0.5

# Stoniness Index



## PELLET GROUP FREQUENCY --

Herd unit 13A, Study no: 15

Type	Quadrat Frequency		Days Use per Acre (Hectare) '99
	'94	'99	
Rabbit	42	11	N/A
Elk	17	20	36
Deer	6	17	11
Cattle	-	5	50

## BROWSE CHARACTERISTICS --

Herd unit 13A, Study no: 15

A G E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
M	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	20	24	1
	'99	-	-	1	-	-	-	-	-	-	1	-	-	-	20	30	28	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>% Change</u>						
'94		00%			00%			00%				+ 0%						
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	20	Dec:	-			
												'99	20		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		5	6		7	8	9	1	2	3	4	
<i>Artemisia frigida</i>																	
S	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	99	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8
Y	94	24	-	-	-	-	-	-	-	-	24	-	-	-	480		24
	99	57	4	-	-	-	-	-	-	-	61	-	-	-	1220		61
M	94	149	-	-	5	-	-	-	-	-	154	-	-	-	3080	8 11	154
	99	171	14	2	-	-	-	-	-	-	187	-	-	-	3740	6 6	187
D	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5
	99	2	1	-	1	-	-	-	-	-	1	-	-	3	80		4
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%			+27%						
'99		08%			.79%			01%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	3660	Dec:	3%			
											'99	5040		2%			
<i>Artemisia tridentata vaseyana</i>																	
S	94	278	-	-	172	-	-	-	-	-	450	-	-	-	9000		450
	99	8	-	-	2	-	-	-	-	-	10	-	-	-	200		10
Y	94	61	-	-	2	-	-	-	-	-	63	-	-	-	1260		63
	99	161	11	3	-	-	-	-	-	-	175	-	-	-	3500		175
M	94	119	6	-	2	-	-	-	-	-	94	-	33	-	2540	20 24	127
	99	76	30	3	-	-	-	-	-	-	109	-	-	-	2180	24 31	109
D	94	36	4	-	-	-	-	-	-	-	29	-	-	11	800		40
	99	28	11	2	-	-	-	-	-	-	35	-	2	4	820		41
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	2760		138
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	2320		116
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		04%			00%			19%			+29%						
'99		16%			02%			02%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	4600	Dec:	17%			
											'99	6500		13%			
<i>Atriplex canescens</i>																	
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2
M	94	3	-	-	1	-	-	-	-	-	3	1	-	-	80	21 16	4
	99	2	1	-	-	-	2	-	-	-	5	-	-	-	100	22 20	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%			+43%						
'99		29%			29%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	80	Dec:	-			
											'99	140		-			



A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Chrysothamnus depressus</b>																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	12	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-			
												'99	60		-			
<b>Chrysothamnus nauseosus</b>																		
M	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	29	32	2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	27	32	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%			-50%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	40	Dec:	-			
												'99	20		-			
<b>Chrysothamnus viscidiflorus viscidiflorus</b>																		
S	94	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	94	7	-	-	-	-	-	-	-	-	5	-	-	2	140			7
	99	10	-	-	1	-	-	-	-	-	11	-	-	-	220			11
M	94	52	-	-	-	-	-	-	-	-	52	-	-	-	1040	7	15	52
	99	66	3	-	-	-	-	-	-	-	69	-	-	-	1380	6	10	69
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			03%			+26%							
'99		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	1180	Dec:	-			
												'99	1600		-			
<b>Coryphantha vivipara arizonica</b>																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	3	4	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-			
												'99	60		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Eriogonum microthecum</i>																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120	9 11	6	
	99	6	4	-	-	-	-	-	-	-	10	-	-	-	200	7 6	10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%			+60%							
'99		27%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	120	Dec:	-			
												'99	300		-			
<i>Gutierrezia sarothrae</i>																		
S	94	5	-	-	1	-	-	-	-	-	6	-	-	-	120		6	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	94	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	94	28	-	-	8	-	-	-	-	-	36	-	-	-	720	7 11	36	
	99	29	-	-	-	-	-	-	-	-	29	-	-	-	580	6 6	29	
D	94	4	-	-	-	-	-	-	-	-	2	-	-	2	80		4	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			05%			-14%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	840	Dec:	10%			
												'99	720		6%			
<i>Opuntia spp.</i>																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	94	4	1	-	-	-	-	-	-	-	5	-	-	-	100	3 9	5	
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	4 10	6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		13%			00%			00%			-13%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	160	Dec:	-			
												'99	140		-			
<i>Pinus edulis</i>																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-			
												'99	20		-			

## SUMMARY

### WILDLIFE MANAGEMENT UNIT 13A (33, 30A) - 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 25%, but browse is still limited on Buck Hollow where total browse cover is only 4% and 93% of the cover comes from pinyon. There is generally light to moderate use. Vegetative trends are stable to up. 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% of the browse cover in 1999. Diversity and density of desirable browse are limited on this area. Vegetative trend is 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 deleted in 1999. There is good winter range for deer and especially elk on the chaining at below Polar Rim (site #12). Soil trend appears stable, while the browse trend is stable and the herbaceous understory slightly down but still provides abundant grass forage. The North Beaver Mesa site (#11) receives moderately heavy use by both cattle and elk. Soil trend is stable. Browse trend is stable to slightly up.

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, and even with mostly light use, 34% of the population is dead. Grass cover for this site is only about 7%, however 96% of this cover is contributed by cheatgrass. The browse population has gone down to only 1,580 plants/acre. Trend is down for all measured 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 4% of the grass cover at this time. The major concern for this site is that broom snakeweed has increased from 5,720 to 13,220 plants/acre. Soil trend is generally stable to slightly improving with large increases in cryptogamic cover (1% to 11%).

Another three studies were done on summer range. One was at East LaSal Pass (#2) which shows relatively little big game use. Soil and vegetative trends are stable. On Bald Mesa (#6), the black sagebrush appears stable, and it has a dense understory of grass and forb species. Abundant shrub and herbaceous forage is available. The state land around Taylor Flat (#9) is heavily used by domestic livestock. It appears that shrubs and the undesirable iris are increasing to the detriment of grasses on the study site. Currently, 76% of the herbaceous cover is contributed by weedy increaser species. Under current management, long-term range compositional trend is down. Overall soil trend is stable.

Two additional sites (Lower Lucky 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 Lucky Fan 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. Another area of concern for this site is the phenomenal increase in the broom snakeweed population. Hideout Mesa is located within the southeast lower benches of the LaSal Mountains. Cattle use on the site is heavy, with moderate to light use respectively 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 roller-chopper treatments and seedings should be jointly funded to help mitigate costs.

Site	Category	1994	1999
13A-1 Two Mile chaining	soil	-	+
	browse	0/-	-
	herbaceous understory	-	+
13A-2 East Lasal Pass	soil	0	0
	browse	0	0
	herbaceous understory	0	0
13A-3 Buck Hollow	soil	0	+
	browse	0	0
	herbaceous understory	0	0
13A-4 Slaughter Flat	soil	0	-
	browse	-	-
	herbaceous understory	0	-
13A-5 Amasas Back	soil	0/+	0
	browse	0/+	-
	herbaceous understory	-	-
13A-6 Bald Mesa	soil	0	0
	browse	0	0
	herbaceous understory	-	-
13A-7 Round Mountain	soil	-	-
	browse	-	-
	herbaceous understory	-	-
13A-8 Black Ridge	soil	0	-
	browse	-	-
	herbaceous understory	0	-

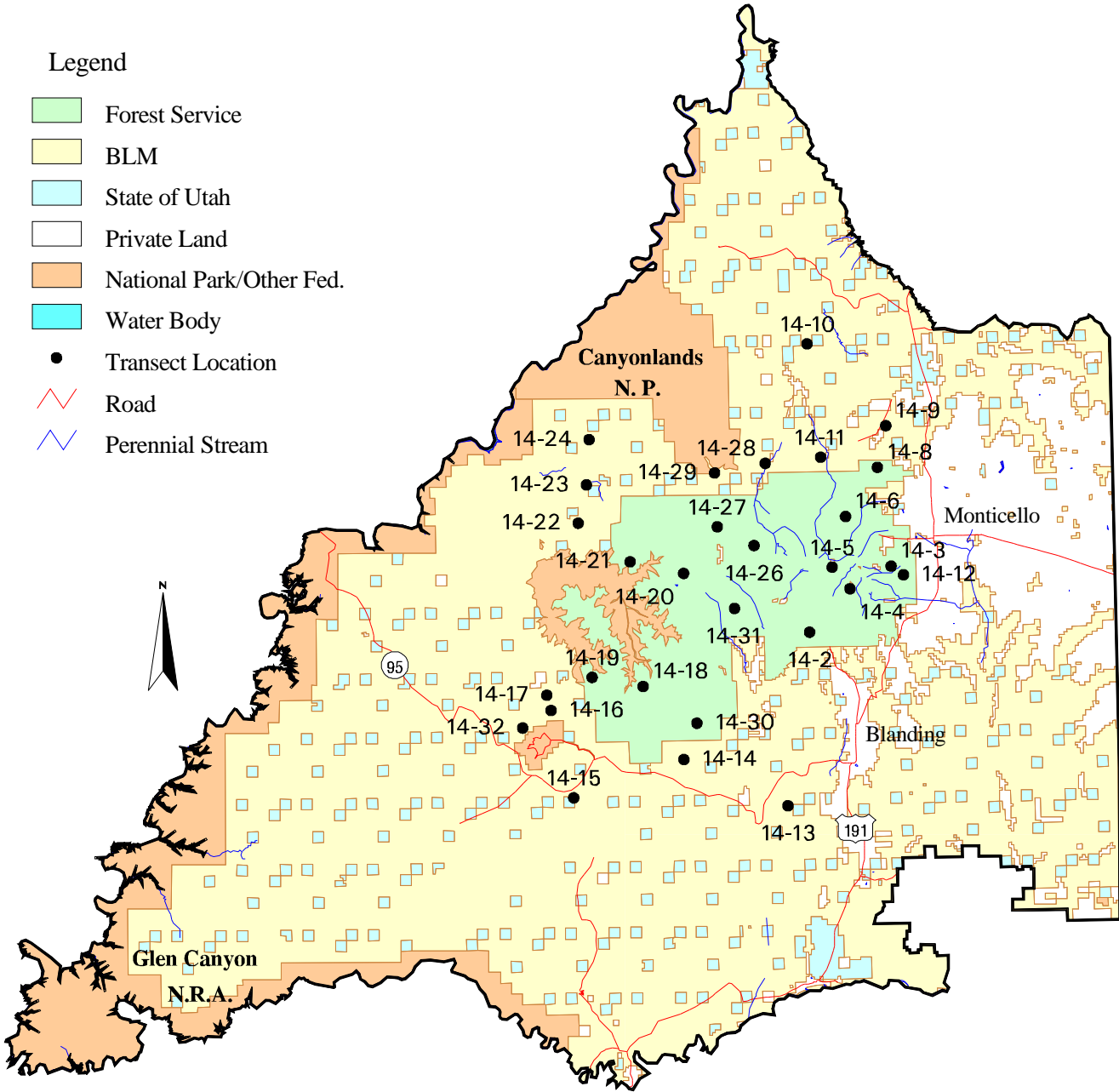
Site	Category	1994	1999
13A-9 Taylor Flat	soil	0	+
	browse	0	0
	herbaceous understory	0	0/+
13A-10 Upper Fisher Valley	soil	0/+	+
	browse	+	-
	herbaceous understory	0/+	-
13A-11 North Beaver Mesa	soil	+	0
	browse	0/+	0/+
	herbaceous understory	0	0
13A-12 Below Polar Rim	soil	+	0
	browse	+	0
	herbaceous understory	0	-
13A-13 Beaver Canyon	soil	+	Site Dropped
	browse	0	
	herbaceous understory	0	
13A-14 Lower Lackey Fan	soil	0	+
	browse	+	-
	herbaceous understory	0	+
13A-15 Hideout Mesa	soil	0	0
	browse	+	+
	herbaceous understory	0/+	0/+

(0) = stable, (+) = up, (-) = down, (0/+) = stable to up, (0/-) = stable to down

# Management Unit 14

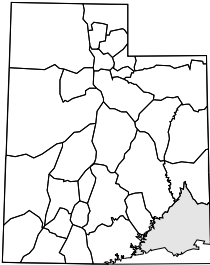
## Legend

- Forest Service
- BLM
- State of Utah
- Private Land
- National Park/Other Fed.
- Water Body
- Transect Location
- Road
- Perennial Stream



Map Scale 1:945,636  
(1" = 14.9 miles)

## Unit Location



## WILDLIFE MANAGEMENT UNIT 14 (35 & 36) - SAN JUAN

### Boundary Description

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

### Management Unit Description

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

### Abajo Mountains

The San Juan-Blue Mountain portion of unit 14 covers a large portion of the eastern side of San Juan County in southeastern Utah. It is a climatically and topographically diverse area. Elevation ranges from 4,500 feet near Bluff to 11,445 feet on Abajo Peak. The Abajo Mountains, found in the west-central part of the unit, contain the unit's summer range. These mountains typically have steep slopes and rugged canyons which have well developed 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 Cotton-wood, 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 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 dominant topographic feature. Horse Mountain, found at the north end of Elk Ridge, is the highest point at approximately 9,200 feet. Elk Ridge itself is relatively level and ranges from 8,600 feet at the north end to 8,400 feet at the south end. Surrounding the steep slopes below Elk Ridge are numerous flats which provide most of the winter range on the unit. These flats are at elevations of 5,000 to 6,000 feet and dissected by numerous deep slickrock canyons which end at the San Juan and Colorado Rivers at about 4,000 feet. The most prominent drainages are South Cottonwood Wash, Butler Wash, and Comb Wash which drain into the San Juan River; and Beef Basin Wash, Dark Canyon, White Canyon, and North Cottonwood Wash which drain into the Colorado River. Two small communities, Bluff and Mexican Hat, are located along the unit's southern boundary. The unit boundaries encompass Natural Bridges National Monument and part of Canyonlands National Park.

The 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 Musclove (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* species and *Bouteloua gracilis*, 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 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 problem 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 down, 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 extended drought since 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 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 enclosure on one area demonstrated healthier sagebrush with a good understory of cool season grasses which supports the belief that continuous and excessive 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 1,200 wintering elk (1,000 west of Highway US-191 and 200 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 four 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, eleven trend studies were reread on the Abajo Mountain portion of unit 14.

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 for and added to the monitoring schedule. All of these study sites were reread in 1992 and 1998. A few sites were also read in 1994, including a new trend study site which was established at Lower Deer Flat.

Trend Study 14-1-99

Study site name: Alkali Point .

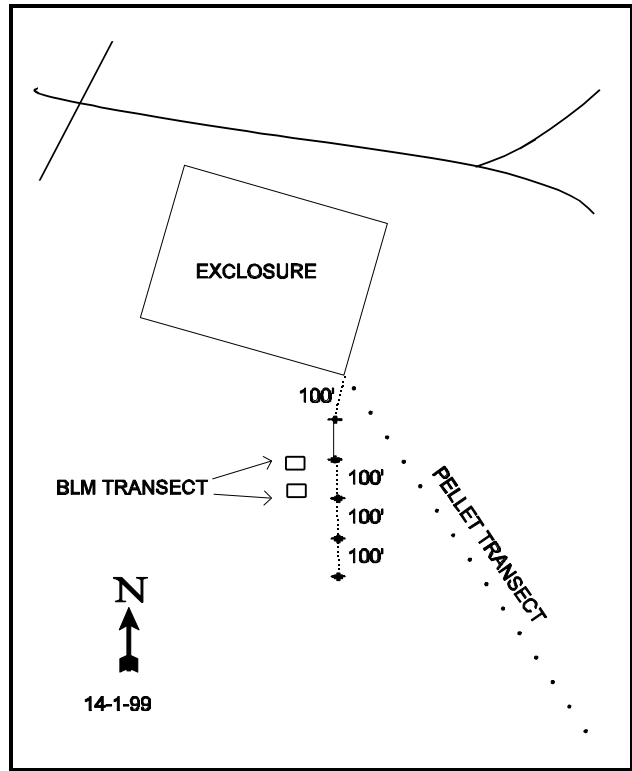
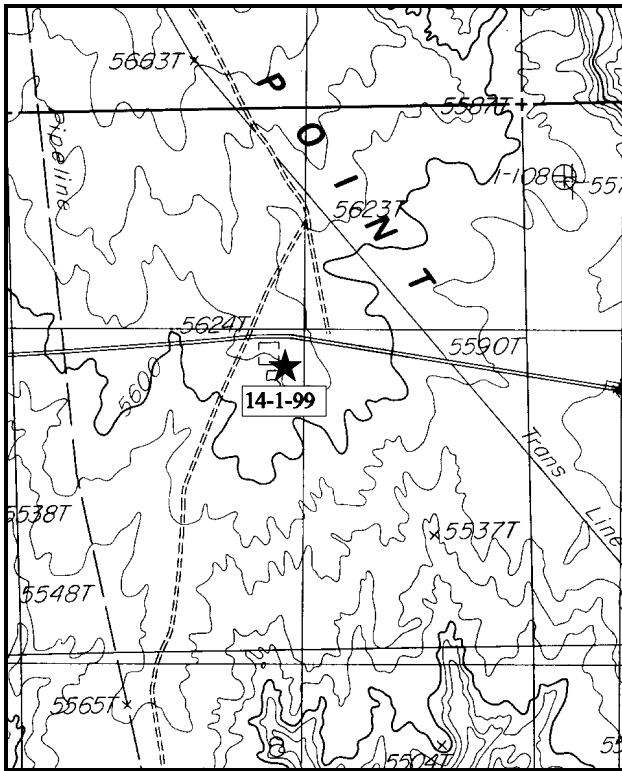
Range type: Big Sagebrush .

Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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-191. Go 1.15 miles. Turn right (south) on county road #206 and travel along the main gravel road 7.0 miles to a fork. Stay right (passing the turnoff to “mustang”, county road #207) and proceed 1.8 miles to another fork. Stay left and go 5 miles. Stop at the northeast corner of the enclosure. 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

UTM 4152865.177 N , 649931.177 E

## DISCUSSION

### Trend Study No. 14-1 (35-1)

The Alkali Point study is within an area that is considered an important wintering area for deer moving southwest off the Abajo Mountains. The long, flat tablelands are cut by intermittent-flow canyons which supports a pinyon-juniper woodland with extensive openings created by chaining treatments in the early 1960's. The study site is in a chained opening dominated by Wyoming big sagebrush with a sparse herbaceous understory which has become increasingly dominated by cheatgrass. There is no evidence of seeded species. There is a BLM enclosure and transect 100 feet to the north of the trend study site. The site drains to the south and has a slope of about 5% at an elevation of 5,600 feet and western aspect. 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 estimate 135 deer days use/acre (333 deer days use/ha). Human activity includes gas and oil exploration and 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 low at 5.8 ppm and 54.4 ppm respectively. Levels of phosphorus less than 10 ppm and potassium levels less than 70 ppm have been determined to be limiting to 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 with increases in cheatgrass cover. Litter is centered mostly under the shrubs. Rock and pavement are scarce and combine to produce less than 1% of the ground cover.

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 poor 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 due to the much larger sample used in 1994, but it is apparent that the population is declining. Dead plants, first counted in 1994, totaled 860 plants/acre. Data from 1999 estimate 2,160 plants/acre with 1,300 dead plants. Percent decadency is currently extremely high at 80%, an increase from 65% in 1986. 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. Leader growth and seed production are poor. Sagebrush in the nearby livestock enclosure also showed moderate to heavy utilization in 1999. Leader growth and seed production was also poor in the enclosure. Further evidence that much of the problem is with the extended drought and competition with the dense understory of cheatgrass. Sagebrush cover appeared lower in the enclosure with a more complete cover of cheatgrass and the annual forb storksbill in the understory.

More numerous and also more vigorous than the sagebrush is broom snakeweed. It currently provides 13% of the total browse cover. There were 7,240 plants per acre estimated in 1994 with a high biotic potential of 33%. Density declined in 1999, but young plants are numerous and make up 14% of the population. 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, however 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 currently provides 92% of the grass cover and 90% of the total herbaceous cover. Sixweeks fescue remained at a similar frequency compared to 1994, while bottlebrush squirreltail declined significantly in nested frequency. Forbs are scarce and currently ('99) provide less than 1% cover and cutleaf filaree provides 92% of the forb cover.

### 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 appeared to be dying. Density has declined, although some of the change may be due mostly 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 7,240 plants/acre in 1994. There were many seedlings encountered in 1994 (2,380 plants/acre), which would indicate an 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.

#### TREND ASSESSMENT

soil - down

browse - down

herbaceous understory - stable but in poor condition

### 1999 TREND ASSESSMENT

The soil trend is 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%.

#### TREND ASSESSMENT

soil - up

browse - down

herbaceous understory - down and dominated by cheatgrass

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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
G	Bromus tectorum (a)	-	<sub>a</sub> 287	<sub>b</sub> 388	-	99	100	3.65	22.55
G	Hilaria jamesii	5	11	6	3	5	3	.12	.16
G	Oryzopsis hymenoides	<sub>a</sub> -	<sub>b</sub> 9	<sub>b</sub> 6	-	3	3	.19	.04
G	Sitanion hystrix	<sub>b</sub> 111	<sub>b</sub> 105	<sub>a</sub> 16	60	53	9	1.42	.20
G	Vulpia octoflora (a)	-	171	159	-	67	57	.36	1.65
Total for Annual Grasses		0	458	547	0	166	157	4.01	24.21
Total for Perennial Grasses		116	125	28	63	61	15	1.74	0.40
Total for Grasses		116	583	575	63	227	172	5.75	24.62
F	Astragalus convallarius	13	9	6	6	4	3	.02	.01
F	Astragalus mollissimus	<sub>b</sub> 4	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	Astragalus spp.	<sub>a</sub> -	<sub>b</sub> 48	<sub>a</sub> -	-	23	-	.12	-
F	Cryptantha spp.	<sub>a</sub> -	<sub>b</sub> 13	<sub>a</sub> -	-	7	-	.06	-
F	Cymopterus acaulis	-	2	-	-	1	-	.00	-
F	Erodium cicutarium (a)	-	<sub>a</sub> 7	<sub>b</sub> 49	-	2	18	.01	.33
F	Euphorbia fendleri	<sub>b</sub> 13	<sub>a</sub> -	<sub>a</sub> -	4	-	-	-	-
F	Gilia spp. (a)	-	4	-	-	2	-	.01	-
F	Lappula occidentalis (a)	-	<sub>b</sub> 26	<sub>a</sub> -	-	10	-	.05	-
F	Navarretia intertexta (a)	-	<sub>b</sub> -	<sub>a</sub> 7	-	-	3	-	.01
F	Orthocarpus spp. (a)	<sub>b</sub> 6	<sub>c</sub> 60	<sub>a</sub> -	3	30	-	.25	-
F	Phlox longifolia	-	2	-	-	2	-	.01	-
F	Plantago patagonica (a)	-	7	2	-	3	1	.04	.00
F	Sphaeralcea coccinea	<sub>b</sub> 5	<sub>b</sub> 17	<sub>a</sub> -	3	7	-	.80	-
Total for Annual Forbs		6	104	58	3	47	22	0.35	0.35
Total for Perennial Forbs		35	91	6	16	44	3	1.01	0.01
Total for Forbs		41	195	64	19	91	25	1.37	0.37

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

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

T y p e	Species	Strip Frequency		Average Cover %	
		'94	'99	'84	'99
B	Artemisia tridentata wyomingensis	65	67	11.27	8.68
B	Chrysothamnus nauseosus	4	0	-	-
B	Echinocereus spp.	0	1	-	.00
B	Gutierrezia sarothrae	74	61	2.88	1.33
B	Juniperus osteosperma	-	-	.63	.00
B	Opuntia spp.	5	0	.03	-
Total for Browse		148	129	14.82	10.02

CANOPY COVER --  
Herd unit 14 , Study no: 1

Species	Percent Cover '99
Juniperus osteosperma	.60

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

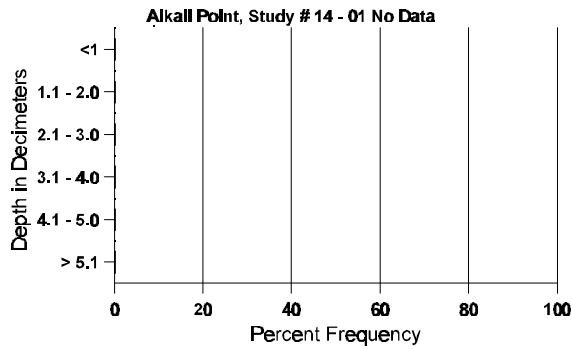
Cover Type	Nested Frequency		Average Cover %		
	'84	'99	'86	'94	'99
Vegetation	327	383	3.00	22.54	32.62
Rock	14	12	1.00	.03	.68
Pavement	13	11	.25	.20	.02
Litter	389	352	45.75	24.08	41.93
Cryptogams	128	56	8.00	1.78	1.97
Bare Ground	375	284	42.00	52.84	30.11

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 01, Study Name: Alkali Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	73.0 (15.6)	7.4	62.9	14.6	22.6	1.7	5.8	54.4	0.4



# Stoniness Index



## PELLET GROUP DATA --

Herd unit 14 , Study no: 1

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	04	09	
Rabbit	67	36	N/A
Elk	6	-	-
Deer	43	37	135 (333)
Cattle	-	5	2 (5)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 1

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches)		Total							
		1	2	3	4		Ht. Cr.									
Artemisia tridentata wyomingensis																
S	86	-	-	-	-	-	-	-	-	0			0			
	94	6	-	-	-	-	-	-	-	6	-	-	120	6		
	99	-	-	-	-	-	-	-	-	-	-	-	0	0		
M	86	-	5	18	-	-	-	-	-	18	4	1	1533	22	23	23
	94	20	16	12	1	-	-	-	-	33	-	11	980	23	35	49
	99	-	5	10	-	1	6	-	-	22	-	-	440	26	33	22
D	86	-	3	40	-	-	-	-	-	29	1	-	2866			43
	94	58	18	6	2	1	-	-	-	35	-	4	1700			85
	99	-	38	19	-	12	15	2	-	67	-	-	1720			86
X	86	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	860			43
	99	-	-	-	-	-	-	-	-	-	-	-	1300			65
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'86		12%		88%		21%		-39%								
'94		26%		13%		49%		-19%								
'99		52%		46%		18%										
Total Plants/Acre (excluding Dead & Seedlings)										'86	4399	Dec:	65%			
										'94	2680		63%			
										'99	2160		80%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4							
Chrysothamnus nauseosus												
S	86	-	-	-	-	-	-	-	-	0		0
	94	2	-	-	-	-	-	-	-	40		2
	99	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	0	-	0
	94	4	-	-	-	-	-	-	-	80	-	4
	99	-	-	-	-	-	-	-	-	0	-	0
D	86	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	0		0
X	86	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	40		2
	99	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'94		00%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'86	0	Dec:	0%		
							'94	100		20%		
							'99	0		0%		
Echinocereus spp.												
M	86	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	0	-	0
	99	1	-	-	-	-	-	-	-	20	8 13	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'94		00%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'86	0	Dec:	-		
							'94	0		-		
							'99	20		-		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																	
S	86	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	94	119	-	-	-	-	-	-	-	-	119	-	-	-	2380		119
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
Y	86	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4
	94	80	-	-	-	-	-	-	-	-	80	-	-	-	1600		80
	99	31	-	-	1	-	-	-	-	-	32	-	-	-	640		32
M	86	83	1	2	-	-	-	-	-	-	86	-	-	-	5733	8 9	86
	94	251	-	-	-	-	-	-	-	-	251	-	-	-	5020	8 9	251
	99	182	14	-	-	-	-	-	-	-	196	-	-	-	3920	9 9	196
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	20	-	-	11	-	-	-	-	-	4	-	-	5	620		31
	99	3	2	-	-	-	-	-	-	-	3	-	1	1	100		5
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		01%			02%			00%			+17%						
'94		00%			00%			01%			-36%						
'99		07%			00%			.85%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	5999	Dec:	0%			
											'94	7240		9%			
											'99	4660		2%			
<i>Opuntia spp.</i>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	94	3	-	-	1	-	-	-	-	-	4	-	-	-	80	2 4	4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	0%			
											'94	120		17%			
											'99	0		0%			



## DISCUSSION

### Trend Study No. 14-2 (35-2)

This transect is located in Brushy Basin, part of the rolling country south of the Abajo Mountains. 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. The study is in the foothills at an elevation of 7,400 feet. It has a slope of approximately 10%, with a south-southeast exposure. Seasonally, the washes in the area drain southward. Water is available in a stock pond about 0.2 of a mile down the road.

The Brushy Basin unit is one of three units on a rest-rotation grazing system on the Camp Jackson Allotment. The current agreement is 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, and pinyon-juniper-sagebrush is generally a spring and fall use area for deer. A pellet group transect on the site estimates 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. Cattle pats appear to be from last fall.

This transition zone site has variable soils, generally deep loam surface soils with clay loam subsoil. Soil at the site is moderately deep 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 currently ('99) makes up 54% of the ground cover, with most of the litter as persistent debris left from the chaining. However, ground cover is extremely variable as erosion appears to be a problem within the scattered open bare interspaces. There are some small gullies on the site and evidence of some sheet erosion. Roads and trails in the area exhibit active soil movement from high intensity summer storm events.

Visually, there is a dominant over story of Utah serviceberry and pinyon-juniper with mountain big sagebrush-bitterbrush and a fairly good grass understory. The key browse species, considering numbers and use, 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 has remained similar in 1999 at 100 plants/acre. Use is currently moderate on available plants, but many are only partly available due to their height. 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 however with a biotic potential (proportion of seedlings to the population) of 57%. Data from 1999 shows a slight increase in sagebrush density to 2,920 plants/acre. The stand still has a large portion of young plants and will likely expand further in the future. Seedlings are numerous with a biotic potential of 56% and young plants account for 45% of the population. These plants show mostly light hedging since 1986.

Bitterbrush is not abundant and scattered throughout the site. It has a prostrate growth form which received very heavy use in 1986. Density increase 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 has remained normal with no decadent plants sampled in 1999.

Broom snakeweed's density has decreased significantly from 7,932 plants/acre in 1986 to only 540 plants/acre in 1994, a decrease of 93%. The current ('99) population of 580 plants/acre appears to have a stable age structure. Dwarf rabbitbrush density has decreased from 6,966 plants/acre to only 120 plants /acre, a 98% decrease. It appears that some of the change in density may have been due to identification problems with mat penstemon. Data from 1999 estimate a population of 800 plants/acre with a large proportion consisting of seedlings and young with may indicate an expanding population. Pinyon pine are present in the chaining at an estimated density of 87 trees/acre in 1994. Junipers were less prevalent at 48 trees/acre in

1994. Tree density and size have increased. Current density is estimated at 95 pinyon and 37 juniper trees/acre. Average diameter of pinyon is nearly 4 inches while that of juniper is nearly 4 ½ inches. Twenty percent of the juniper trees sampled consist of mature trees which were knocked down (tipped over) by the chaining but still living.

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 extended drought has also been with us since 1986, exacerbating the grazing effects and competition with browse species. The most common grasses are intermediate wheatgrass, crested wheatgrass, and muttongrass. Nested frequency for perennial grasses have decreased significantly between 1986 and 1994, while nested frequency for forbs increased substantially. However, grasses accounted for 73% of the herbaceous cover while forbs only made up 27%. Sum of nested frequency of grasses and forbs declined slightly between 1994 and 1999. The most abundant forbs are spring parsley, mat penstemon, and one flower helianthella. The variety of native forbs found on the site provide some spring forage, but none are very numerous. The seeded yellow sweet clover was heavily utilized in 1994.

#### 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 (carbohydrate reserves) with the low increaser subshrubs by not overgrazing. With a high percent litter cover, the soil trend is 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.

#### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - down, mostly because of the large loss of grasses to drought

#### 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. 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.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - down slightly

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
G	Agropyron cristatum	<sub>b</sub> 198	<sub>a</sub> 76	<sub>a</sub> 112	69	31	47	1.57	2.71
G	Agropyron intermedium	<sub>ab</sub> 410	<sub>b</sub> 218	<sub>a</sub> 152	152	78	59	7.75	3.11
G	Bromus inermis	<sub>b</sub> 26	<sub>a</sub> -	<sub>a</sub> -	12	-	-	-	-
G	Bromus japonicus (a)	-	1	6	-	1	2	.00	.03
G	Bromus tectorum (a)	-	-	2	-	-	1	-	.00
G	Carex spp.	<sub>b</sub> 80	<sub>a</sub> 43	<sub>a</sub> 22	34	18	9	.76	.41
G	Koeleria cristata	-	3	1	-	1	1	.03	.00
G	Oryzopsis hymenoides	-	1	3	-	1	1	.01	.03
G	Poa fendleriana	<sub>b</sub> 120	<sub>a</sub> 90	<sub>a</sub> 87	46	37	37	1.19	.85
G	Sitanion hystrix	<sub>b</sub> 38	<sub>ab</sub> 27	<sub>a</sub> 6	18	10	4	.24	.02
G	Stipa spp.	2	-	-	1	-	-	-	-
Total for Annual Grasses		0	1	8	0	1	3	0.00	0.03
Total for Perennial Grasses		874	458	383	332	176	158	11.55	7.15
Total for Grasses		874	459	391	332	177	161	11.56	7.19
F	Allium spp.	-	2	3	-	1	1	.00	.00
F	Arabis spp.	<sub>a</sub> -	<sub>ab</sub> 1	<sub>b</sub> 7	-	1	3	.00	.04
F	Astragalus miser	5	4	4	3	3	3	.21	.21
F	Cirsium spp.	3	6	10	2	3	4	.01	.12
F	Crepis acuminata	<sub>a</sub> -	<sub>ab</sub> 2	<sub>b</sub> 8	-	1	4	.00	.04
F	Cymopterus spp.	<sub>a</sub> -	<sub>b</sub> 43	<sub>b</sub> 41	-	17	20	.33	.50
F	Eriogonum elatum	-	3	-	-	2	-	.03	-
F	Eriogonum racemosum	4	4	10	2	3	5	.04	.07
F	Helianthella uniflora	<sub>a</sub> -	<sub>b</sub> 6	<sub>b</sub> 13	-	3	6	.09	.42
F	Hymenoxys acaulis	-	8	6	-	3	3	.21	.09
F	Lappula occidentalis (a)	-	3	-	-	1	-	.00	-
F	Lactuca serriola	<sub>a</sub> -	<sub>b</sub> 9	<sub>a</sub> -	-	3	-	.02	-
F	Lesquerella fendleri	16	25	19	9	11	10	.05	.05
F	Lupinus spp.	<sub>a</sub> -	<sub>a</sub> 1	<sub>b</sub> 7	-	1	4	.15	.19

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
F	<i>Machaeranthera grindelioides</i>	<sub>b</sub> 8	<sub>a</sub> -	<sub>ab</sub> 5	3	-	2	-	.06
F	<i>Melilotus officinalis</i>	<sub>a</sub> -	<sub>b</sub> 16	<sub>a</sub> 5	-	6	2	1.01	.04
F	<i>Medicago sativa</i>	-	-	3	-	-	2	.15	.03
F	<i>Penstemon caespitosus</i>	<sub>a</sub> -	<sub>b</sub> 47	<sub>b</sub> 53	-	19	21	1.43	1.88
F	<i>Pedicularis centranthera</i>	<sub>a</sub> -	<sub>b</sub> 7	<sub>a</sub> -	-	3	-	.31	-
F	<i>Penstemon pachyphyllus</i>	8	3	6	5	1	3	.03	.06
F	<i>Phlox longifolia</i>	-	6	-	-	2	-	.01	-
F	<i>Polygonum douglasii</i> (a)	-	<sub>a</sub> 6	<sub>b</sub> 22	-	2	10	.01	.05
F	<i>Tragopogon dubius</i>	3	8	1	2	5	1	.05	.00
F	<i>Trifolium gymnocarpon</i>	-	<sub>b</sub> 3	<sub>a</sub> 3	-	1	1	.15	.00
F	Unknown forb-perennial	<sub>b</sub> 9	<sub>a</sub> -	<sub>a</sub> -	5	-	-	-	-
Total for Annual Forbs		0	9	22	0	3	10	0.01	0.05
Total for Perennial Forbs		56	204	204	31	89	95	4.33	3.84
Total for Forbs		56	213	226	31	92	105	4.35	3.89

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

#### BROWSE TRENDS --

Herd unit 14 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'94	'99	'94	'99
B	<i>Amelanchier utahensis</i>	7	5	3.05	3.33
B	<i>Artemisia tridentata vaseyana</i>	36	50	5.21	6.88
B	<i>Cercocarpus montanus</i>	1	2	-	-
B	<i>Chrysothamnus depressus</i>	6	13	.15	.45
B	<i>Chrysothamnus nauseosus</i>	1	0	-	-
B	<i>Echinocereus engelmannii</i>	0	0	-	-
B	<i>Gutierrezia sarothrae</i>	15	13	.49	.21
B	<i>Juniperus osteosperma</i>	0	2	.81	1.16
B	<i>Juniperus osteosperma</i> (chained)	0	0	-	-
B	<i>Opuntia</i> spp.	3	4	.15	.38
B	<i>Pinus edulis</i>	0	1	.94	3.52
B	<i>Purshia tridentata</i>	23	18	2.91	3.42
B	<i>Quercus gambelii</i>	0	3	1.00	.76
B	<i>Yucca</i> spp.	1	1	.63	.00
Total for Browse		93	112	15.37	20.13



CANOPY COVER --  
Herd unit 14 , Study no: 2

Species	Percent Cover 09
Amelanchier utahensis	4
Juniperus osteosperma	1
Pinus edulis	2

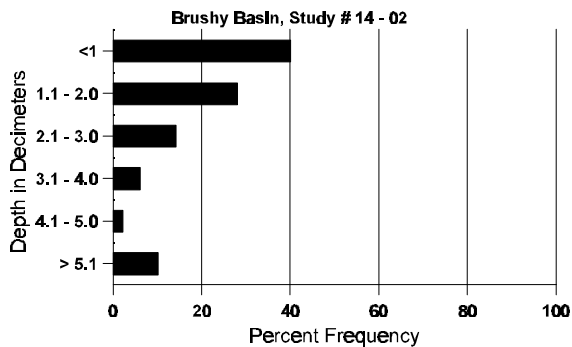
BASIC COVER --  
Herd unit 14 , Study no: 2

Cover Type	Nested Frequency		Average Cover %		
	04	09	'86	'94	'99
Vegetation	306	276	4.75	31.59	30.04
Rock	147	126	4.50	4.86	6.09
Pavement	123	133	.75	.30	1.18
Litter	383	384	73.50	43.61	53.56
Cryptogams	8	6	.25	.04	.06
Bare Ground	254	253	16.25	20.18	27.41

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 02, Study Name: Brushy Basin

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.6	62.4 (18.1)	6.6	46.9	10.6	42.6	2.9	6.8	102.4	0.6

### Stoniness Index



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

Type	Quadrat Frequency	
	04	09
Rabbit	6	30
Elk	3	6
Deer	5	17
Cattle	-	4

Pellet Transect Days Use/Acre (ha) 09
N/A
15 (37)
14 (35)
33 (81)

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

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Amelanchier utahensis</i>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	7	-	-	-	-	-	-	-	-	7	-	-	-	140	81	91	7
	99	1	-	-	-	3	-	-	1	-	5	-	-	-	100	74	75	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%			-29%							
'99		60%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	140		-			
												'99	100		-			
<i>Artemisia tridentata vaseyana</i>																		
S	86	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	94	156	-	-	-	-	-	-	-	-	156	-	-	-	3120		156	
	99	189	-	-	-	-	-	-	-	-	189	-	-	-	3780		189	
Y	86	67	11	-	-	-	-	-	-	-	67	-	10	1	2600		78	
	94	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	99	65	1	-	-	-	-	-	-	-	66	-	-	-	1320		66	
M	86	15	6	1	-	-	-	-	-	-	19	1	2	-	733	14	22	22
	94	97	-	1	2	-	-	-	-	-	89	-	11	-	2000	25	29	100
	99	53	14	2	2	-	-	-	-	-	71	-	-	-	1420	23	38	71
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	99	8	-	-	1	-	-	-	-	-	9	-	-	-	180		9	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		17%			01%			13%			-30%							
'94		00%			.86%			09%			+21%							
'99		10%			01%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	3333	Dec:	0%			
												'94	2320		8%			
												'99	2920		6%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Cercocarpus montanus</b>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	-	1	-	-	20	47	45	1
	99	-	-	2	-	-	-	-	-	-	2	-	-	-	40	43	43	2
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%			+50%							
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	20		-			
												'99	40		-			
<b>Chrysothamnus depressus</b>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	17	-	-	-	-	-	-	-	-	17	-	-	-	340			17
Y	86	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	32	-	-	-	-	-	-	-	-	32	-	-	-	640			32
M	86	204	-	-	-	-	-	-	-	-	204	-	-	-	6800	2	11	204
	94	4	-	-	-	-	1	-	-	-	5	-	-	-	100	6	15	5
	99	4	2	-	-	-	-	-	-	-	6	-	-	-	120	6	15	6
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	1	-	-	-	1	-	-	-	-	-	-	2	40			2
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			-98%							
'94		00%			00%			00%			+85%							
'99		08%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	6966	Dec:	0%			
												'94	120		0%			
												'99	800		5%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus nauseosus</i>																	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	9	3	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'94	20		-		
												'99	0		-		
<i>Echinocereus engelmannii</i>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	4	8	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'94	0		-		
												'99	0		-		
<i>Gutierrezia sarothrae</i>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1
Y	86	25	-	-	-	-	-	-	-	-	-	-	-	833			25
	94	4	-	-	-	-	-	-	-	-	-	-	-	80			4
	99	4	-	-	-	-	-	-	-	-	-	-	-	80			4
M	86	209	-	-	-	-	-	-	-	-	-	-	-	6966	6	6	209
	94	23	-	-	-	-	-	-	-	-	-	-	-	460	8	9	23
	99	23	-	-	-	-	-	-	-	-	-	-	-	460	7	10	23
D	86	4	-	-	-	-	-	-	-	-	-	-	-	133			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	-	2	-	40			2
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			-93%						
'94		00%			00%			00%			+ 7%						
'99		00%			00%			07%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	7932	Dec:	2%		
												'94	540		0%		
												'99	580		7%		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	40		-			
Juniperus osteosperma (chained)																		
D	86	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	66	Dec:	100%			
												'94	0		0%			
												'99	0		0%			
Opuntia spp.																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	9	3
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	13	3
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	99	1	-	-	-	-	-	-	-	-	-	-	1	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			25%			+ 0%							
'99		00%			00%			25%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'94	80		25%			
												'99	80		25%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total							
		1	2	3	4		1	2								
Pinus edulis																
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	1	-	-	-	-	1	-	-	-	20		1
Y	86	3	-	-	-	-	-	-	-	3	-	-	-	100		3
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	1	-	-	-	-	-	-	-	1	-	-	-	20	-	1
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'86		00%		00%		00%										
'94		00%		00%		00%										
'99		00%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'86	100	Dec:	-			
										'94	0		-			
										'99	20		-			
Purshia tridentata																
S	86	5	-	-	-	-	-	-	-	5	-	-	-	166		5
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	4	-	-	-	-	4	-	-	-	80		4
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	1	2	1	-	-	-	-	-	4	-	-	-	80		4
M	86	-	-	1	-	-	-	-	-	1	-	-	-	33	15 35	1
	94	27	1	-	-	-	-	-	-	28	-	-	-	560	12 34	28
	99	3	3	9	1	2	1	-	-	19	-	-	-	380	13 38	19
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	3	-	-	-	-	-	-	-	3	-	-	-	60		3
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'86		00%		100%		00%		+95%								
'94		03%		00%		00%		-28%								
'99		30%		48%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'86	33	Dec:	0%			
										'94	640		9%			
										'99	460		0%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Quercus gambelii													
S	86	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	1	-	-	20		1
Y	86	-	8	1	-	-	-	-	-	-	300		9
	94	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	2	-	-	-	-	-	60		3
M	86	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	-	0	-	0
	99	-	-	-	2	-	-	-	3	-	100	50 35	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>		
'86		89%			11%			00%					
'94		00%			00%			00%					
'99		00%			00%			00%					
Total Plants/Acre (excluding Dead & Seedlings)										'86	300	Dec:	-
										'94	0		-
										'99	160		-
Yucca spp.													
M	86	-	-	-	-	-	-	-	-	-	0	-	0
	94	2	-	-	-	-	-	-	-	-	40	14 29	2
	99	-	-	-	-	-	-	-	-	-	0	-	0
D	86	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	1	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>		
'86		00%			00%			00%					
'94		00%			00%			100%			-50%		
'99		00%			00%			100%					
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	0%
										'94	40		0%
										'99	20		100%

Trend Study 14-3-99

Study site name: Gold Queen Basin .

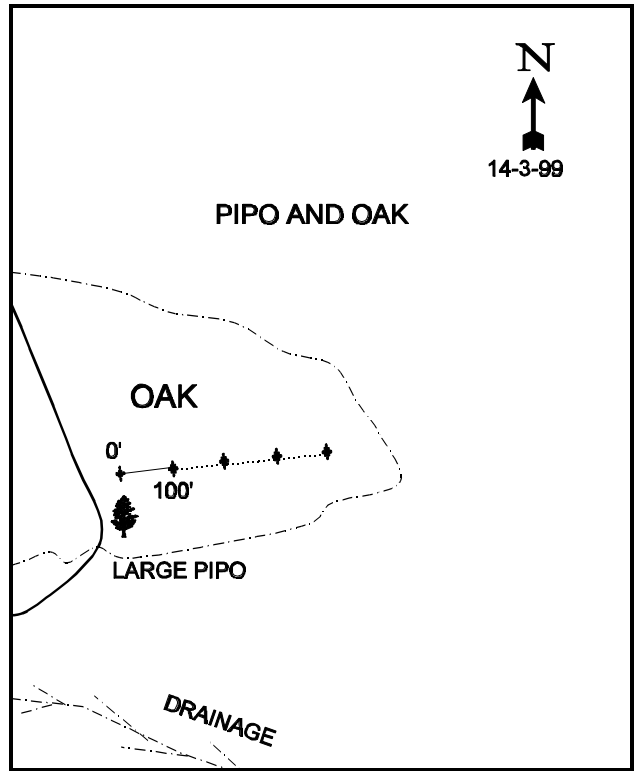
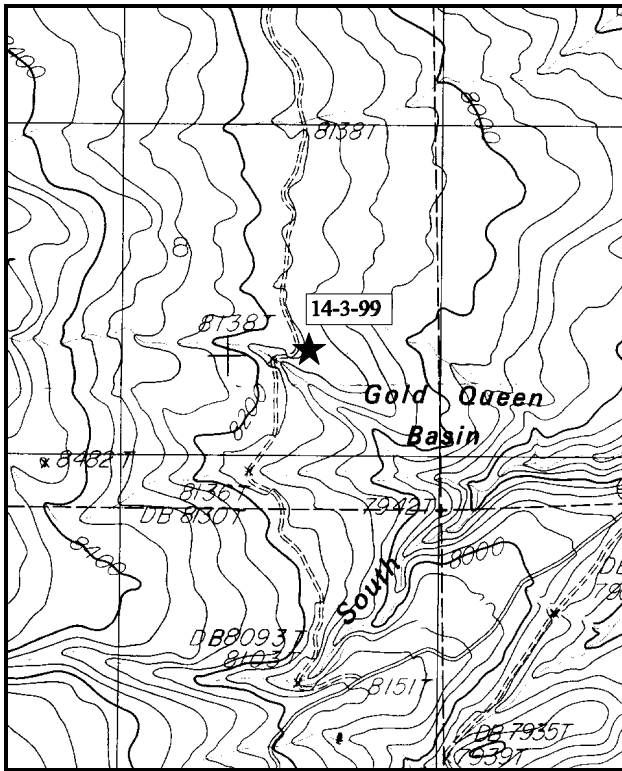
Range type: Gambel Oakbrush .

Compass bearing: frequency baseline 69°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction of the Blue Mountain Road (the road to Monticello Lake) and the South Creek Road on the west side of Monticello, travel southwest on the South Creek 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 pine tree.



Map Name: Abajo Peak

Diagrammatic Sketch

Township 34S , Range 23E , Section 8

UTM 4188336.123 N , 639565.736 E



## DISCUSSION

### Trend Study No. 14-3 (35-3)

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 18% slope. The site is an oakbrush-dominated opening surrounded by large ponderosa pines. Point quarter data from 1999 estimate 43 ponderosa pine, 19 pinyon, and 40 maple trees/acre. Average diameter is estimated at 14 inches for ponderosa pine and 2.4 inches for pinyon and only ½ of an inch for maple. Shrub density strip data estimated 100 ponderosa pine trees/acre, the majority (80%) consisting of young trees.

Deer and elk mostly use this area during the summer. Pellet group transect data from 1999 estimate 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 last fall, while the deer pellet groups were from this spring. Turkey scat was also observed on the site. Roads in the area are mainly a result of oil and gas leasing and mineral exploration. Now these roads are used for recreational activities.

Soil throughout the site appears to be moderately deep and rocky, especially at the beginning of the baseline. Estimated effective rooting depth is estimated at nearly 20 inches. Soil texture is a sandy clay loam with a slightly acid pH (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 20% 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 an important browse species on this sight which provided 36% of the total browse cover in 1999. It shows light use and good vigor with a high density of 8,260 plants/acre in 1999. Gambel oak is also common with an estimated density of 11,360 stems/acre in 1999. Plants vary in size from shorter growth forms near the beginning of the baseline to tall individuals further down the line. Oak was mistakenly not included in the shrub density strips in 1994, therefore no comparisons can be made. Other browse species, Utah serviceberry, Wyoming 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 currently ('99) provides 79% of the total grass cover. 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. Common species include, Western yarrow, pussytoes, spreading fleabane, littleflower collinsia, silky Lupine, thicketleaf 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 good. The two key browse species for the site 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 - improving and in very good condition

browse - stable

herbaceous understory - up

1999 TREND ASSESSMENT

Trend for soil is stable. There is excellent protective ground cover which keeps erosion to a minimum. Trend for browse is up 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

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
G	Agropyron intermedium	-	19	9	-	7	4	.13	.07
G	Agropyron smithii	<sub>a</sub> 37	<sub>b</sub> 90	<sub>b</sub> 67	14	34	27	.56	.91
G	Bromus inermis	<sub>a</sub> -	<sub>b</sub> 8	<sub>c</sub> 20	-	3	7	.16	.11
G	Carex spp.	3	6	1	1	2	1	.03	.00
G	Koeleria cristata	4	-	-	1	-	-	-	-
G	Phlox longifolia	-	2	-	-	1	-	.00	-
G	Poa bulbosa	<sub>a</sub> -	<sub>ab</sub> 2	<sub>b</sub> 7	-	1	3	.00	.18
G	Poa fendleriana	<sub>b</sub> 50	<sub>a</sub> 19	<sub>ab</sub> 39	19	9	13	.17	.45
G	Poa pratensis	284	267	263	94	88	84	6.32	6.22
G	Sitanion hystrix	<sub>c</sub> 29	<sub>b</sub> 12	<sub>a</sub> -	13	5	-	.10	-
G	Stipa columbiana	20	32	19	7	12	11	.38	.13
G	Stipa comata	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 11	-	-	7	-	.25
G	Stipa lettermani	-	3	-	-	1	-	.03	-
G	Unknown grass - perennial	2	-	-	2	-	-	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'86	'99
	Total for Annual Grasses	0	0	0	0	0	0	0	
	Total for Perennial Grasses	429	460	436	151	163	157	7.90	8.35
	Total for Grasses	429	460	436	151	163	157	7.90	8.35
F	<i>Achillea millefolium</i>	<sub>a</sub> 97	<sub>b</sub> 171	<sub>b</sub> 153	43	64	59	2.74	4.18
F	<i>Agoseris glauca</i>	<sub>a</sub> -	<sub>b</sub> 8	<sub>ab</sub> 6	-	3	2	.04	.18
F	<i>Antennaria neglecta</i>	62	39	38	25	16	17	1.40	1.14
F	<i>Androsace septentrionalis</i> (a)	-	-	2	-	-	1	-	.00
F	<i>Arabis</i> spp.	-	-	1	-	-	1	-	.00
F	<i>Arenaria congesta</i>	<sub>a</sub> 6	<sub>b</sub> 33	<sub>ab</sub> 18	3	14	9	.60	.58
F	<i>Artemisia michauxiana</i>	16	11	14	6	5	5	.07	.47
F	<i>Aster</i> spp.	-	-	3	-	-	1	-	.03
F	<i>Carduus nutans</i> (a)	-	3	-	-	1	-	.00	-
F	<i>Calochortus nuttallii</i>	-	1	-	-	1	-	.00	-
F	<i>Chenopodium</i> spp. (a)	-	-	5	-	-	2	-	.01
F	<i>Cirsium</i> spp.	2	5	-	1	2	-	.03	-
F	<i>Collomia linearis</i> (a)	-	<sub>a</sub> 4	<sub>b</sub> 20	-	1	7	.00	.11
F	<i>Collinsia parviflora</i> (a)	-	78	73	-	29	27	.19	.63
F	<i>Conioselinum scopulorum</i>	<sub>a</sub> -	<sub>ab</sub> 3	<sub>b</sub> 14	-	1	6	.00	.10
F	<i>Cymopterus</i> spp.	<sub>a</sub> -	<sub>b</sub> 6	<sub>a</sub> -	-	3	-	.04	-
F	<i>Delphinium nuttallianum</i>	<sub>a</sub> -	<sub>b</sub> 20	<sub>b</sub> 19	-	7	9	.03	.04
F	<i>Descurainia pinnata</i> (a)	-	3	-	-	2	-	.01	-
F	<i>Erigeron flagellaris</i>	<sub>b</sub> 122	<sub>a</sub> 83	<sub>a</sub> 75	45	33	29	.80	1.78
F	<i>Eriogonum racemosum</i>	16	2	14	6	2	5	.01	.07
F	<i>Erigeron speciosus</i>	<sub>b</sub> 9	<sub>b</sub> 15	<sub>a</sub> -	4	6	-	.08	-
F	<i>Gayophytum ramosissimum</i> (a)	-	23	17	-	9	7	.04	.03
F	<i>Lathyrus lanszwertii</i>	<sub>a</sub> 12	<sub>a</sub> 19	<sub>b</sub> 49	6	10	21	.07	.69
F	<i>Lappula occidentalis</i> (a)	-	1	-	-	1	-	.00	-
F	<i>Lathyrus pauciflorus</i>	<sub>b</sub> 15	<sub>b</sub> 12	<sub>a</sub> -	5	7	-	.11	-
F	<i>Ligusticum porteri</i>	3	-	-	1	-	-	-	-
F	<i>Lomatium dissectum</i>	<sub>a</sub> 3	<sub>b</sub> 31	<sub>a</sub> 10	1	12	7	2.10	.11
F	<i>Lupinus sericeus</i>	<sub>a</sub> 3	<sub>b</sub> 34	<sub>a</sub> 17	1	16	8	1.08	.43
F	<i>Lychnis drummondii</i>	7	-	-	2	-	-	-	-
F	<i>Microsteris gracilis</i> (a)	-	<sub>b</sub> 57	<sub>a</sub> 7	-	24	3	.12	.01
F	<i>Orobanche fasciculata</i>	-	-	6	-	-	2	-	.03
F	<i>Osmorhiza occidentalis</i>	-	-	2	-	-	1	-	.03
F	<i>Pedicularis</i> spp.	-	3	-	-	1	-	.00	-
F	<i>Penstemon thompsoniae</i>	28	19	17	10	7	7	.16	.30
F	<i>Phlox longifolia</i>	6	14	10	2	5	4	.10	.07
F	<i>Phlox</i> spp.	<sub>a</sub> -	<sub>b</sub> 22	<sub>b</sub> 29	-	8	9	.06	.17

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'04	'09
F	Polygonum douglasii (a)	-	<sub>b</sub> 45	<sub>a</sub> 21	-	15	8	.07	.09
F	Potentilla fruticosa	<sub>a</sub> -	<sub>b</sub> 29	<sub>a</sub> -	-	11	-	.27	-
F	Ranunculus spp.	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 11	-	-	5	-	.02
F	Sedum spp.	-	3	-	-	1	-	.00	-
F	Senecio integerrimus	19	10	19	10	4	9	.33	.09
F	Sedum lanceolatum	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 9	-	-	3	-	.01
F	Taraxacum officinale	<sub>a</sub> -	<sub>b</sub> 28	<sub>b</sub> 34	-	15	16	.32	.98
F	Tragopogon dubius	-	1	-	-	1	-	.00	-
F	Trifolium gymnocarpon	<sub>a</sub> 3	<sub>b</sub> 30	<sub>b</sub> 32	2	11	13	.59	.71
F	Unknown forb-perennial	<sub>a</sub> -	<sub>b</sub> 14	<sub>ab</sub> 6	-	7	2	.03	.15
F	Verbascum thapsus	-	-	2	-	-	1	-	.00
F	Wyethia amplexicaulis	-	-	2	-	-	1	-	.03
Total for Annual Forbs		0	214	145	0	82	55	0.46	0.89
Total for Perennial Forbs		429	666	610	173	273	252	11.16	12.47
Total for Forbs		429	880	755	173	355	307	11.62	13.36

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

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

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

CANOPY COVER --  
Herd unit 14 , Study no: 3

Species	Percent Cover '09
Pinus ponderosa	21
Quercus gambelii	23

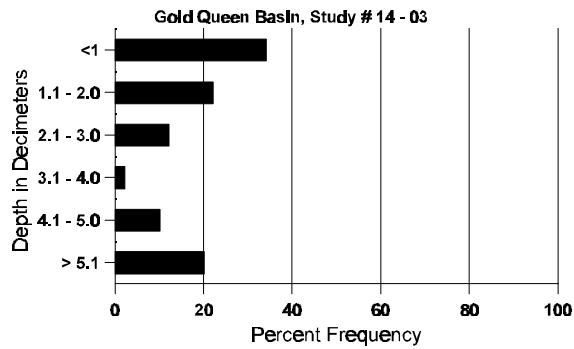
BASIC COVER --  
Herd unit 14 , Study no: 3

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'86	'94	'99
Vegetation	354	349	9.25	40.06	40.70
Rock	73	56	3.00	2.28	3.86
Pavement	5	13	0	.01	.09
Litter	391	392	79.00	62.72	66.68
Cryptogams	31	32	.25	.93	.89
Bare Ground	117	123	8.50	5.73	9.93

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 03, Study Name: Gold Queen Basin

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.8	49.4 (15.9)	6.2	46.9	30.6	22.6	3.4	19.1	134.4	0.5

### Stoniness Index



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

Type	Quadrat Frequency	
	'04	'09
Rabbit	1	8
Elk	-	-
Deer	3	7
Cattle	1	4

Pellet Transect Days Use/Acre (ha)
'09
N/A
10 (25)
19 (47)
5 (12)

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

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Acer grandidentatum</i>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	0		-			
<i>Amelanchier utahensis</i>																		
S	86	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	2	-	-	-	-	-	3	-	-	-	60	8	9	3
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%			-33%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	60		-			
												'99	40		-			
<i>Artemisia tridentata wyomingensis</i>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	0		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total			
		1	2	3	4						
<b>Chrysothamnus depressus</b>											
S	86	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	40		2	
Y	86	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	0		0	
	99	1	2	-	-	-	-	60		3	
M	86	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	20	5	16	1
	99	-	-	3	-	-	-	60	6	9	3
D	86	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	20		1	
	99	-	-	-	1	-	1	40		2	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'86		00%		00%		00%					
'94		00%		00%		00%		+75%			
'99		38%		38%		00%					
Total Plants/Acre (excluding Dead & Seedlings)							'86	0	Dec:	0%	
							'94	40		50%	
							'99	160		25%	
<b>Mahonia repens</b>											
S	86	-	-	-	-	-	-	0		0	
	94	-	-	-	1	-	-	20		1	
	99	2	-	-	-	-	-	40		2	
Y	86	-	-	-	-	-	-	0		0	
	94	51	-	-	1	-	-	1100		55	
	99	31	-	-	-	-	-	620		31	
M	86	-	-	-	-	-	-	0	-	-	0
	94	83	-	-	35	-	-	2360	5	7	118
	99	184	-	-	-	-	-	3680	4	7	184
D	86	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	20		1	
	99	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'86		00%		00%		00%					
'94		00%		00%		02%		+19%			
'99		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)							'86	0	Dec:	0%	
							'94	3480		1%	
							'99	4300		0%	

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Pinus ponderosa</b>																	
Y	86	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	66	Dec:	-		
												'94	0		-		
												'99	100		-		
<b>Purshia tridentata</b>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	22	20
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'94	0		-		
												'99	0		-		
<b>Quercus gambelii</b>																	
S	86	105	7	4	-	-	-	-	-	-	97	6	12	1	7733		116
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	74	-	-	-	-	-	-	-	-	74	-	-	-	1480		74
Y	86	78	24	35	-	-	-	-	-	-	80	15	40	2	9133		137
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	298	-	-	-	-	-	-	-	-	298	-	-	-	5960		298
M	86	5	-	1	-	-	-	-	1	-	-	5	2	-	466	127	49
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	249	-	-	-	-	-	-	8	-	257	-	-	-	5140	28	26
D	86	-	1	3	-	-	-	-	-	-	2	-	2	-	266		4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	13	-	-	-	-	-	-	-	-	10	-	-	3	260		13
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	820		41
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		17%			26%			31%									
'94		00%			00%			00%									
'99		00%			00%			.52%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	9865	Dec:	3%		
												'94	0		0%		
												'99	11360		2%		



A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Rosa woodsii																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	6	4	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			-40%							
'94		00%			00%			20%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	100		-			
												'99	60		-			
Symphoricarpos oreophilus																		
S	86	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	94	4	-	-	7	-	-	-	-	-	11	-	-	-	220		11	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	86	23	2	-	-	-	-	-	-	-	18	7	-	-	1666		25	
	94	28	-	-	4	2	-	5	-	-	39	-	-	-	780		39	
	99	149	4	-	-	-	-	-	-	-	153	-	-	-	3060		153	
M	86	29	23	-	-	-	-	-	-	-	46	6	-	-	3466	19	14	
	94	129	-	-	26	2	-	17	-	-	170	3	-	1	3480	16	29	
	99	258	-	-	-	-	-	-	-	-	259	-	-	-	5180	16	23	
D	86	2	2	-	-	-	-	-	-	-	1	3	-	-	266		4	
	94	1	-	-	-	1	-	-	-	-	2	-	-	-	40		2	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		33%			00%			00%			-20%							
'94		02%			00%			.46%			+48%							
'99		.96%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	5398	Dec:	5%			
												'94	4300		1%			
												'99	8260		0%			

Trend Study 14-4-99

Study site name: Camp Jackson Reservoir .

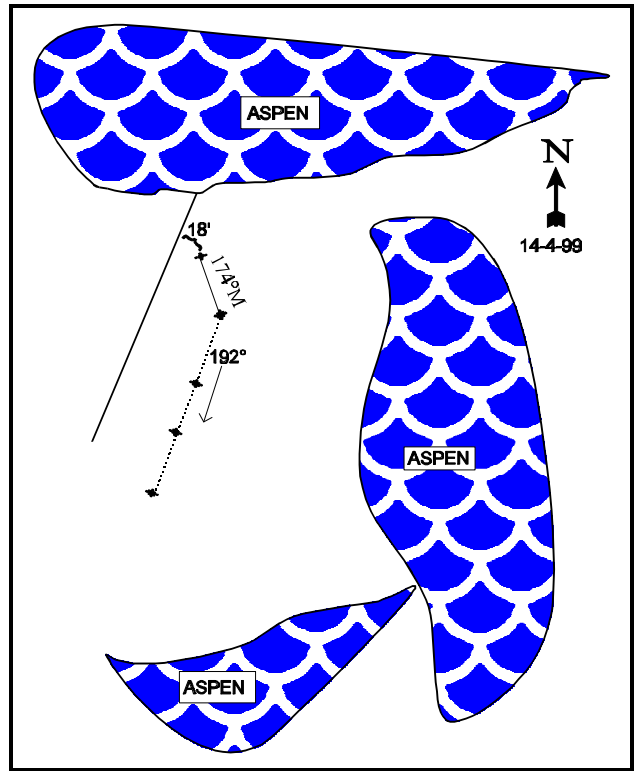
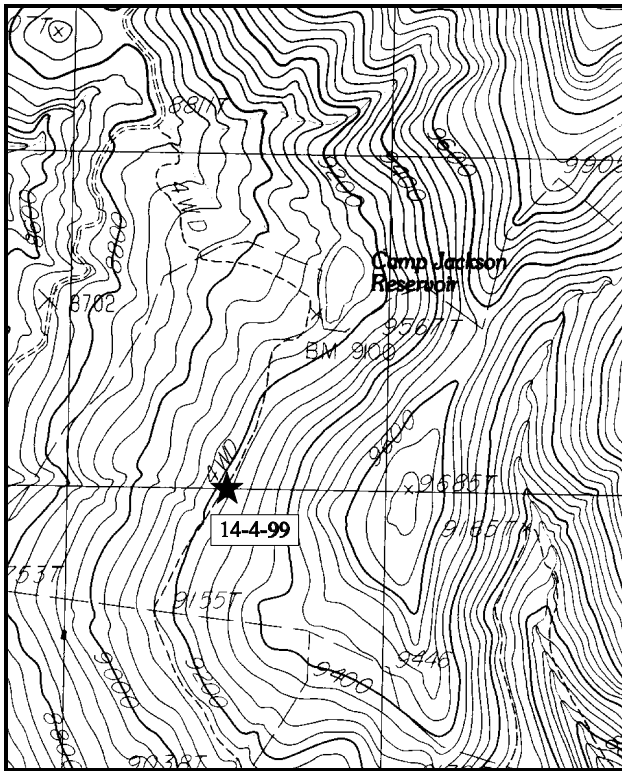
Range type: Gambel Oakbrush .

Compass bearing: frequency baseline 174°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Monticello, go west on the Blue Mountain Road to the North Creek Road just beyond Dalton Springs campground. Travel generally south or southwest on this road for 11.8 miles to the jeep trail leading to Camp Jackson Reservoir. At this point, it is 18 miles to both Monticello and Blanding. Turn east on this rough road, staying right until you come to a locked gate (contact Jerry Holiday in Monticello for combination). Go through the gate to a three-way fork below the south end of the reservoir. Take the right-most fork and go through the aspens for 0.35 miles. Continue out of the aspens into the oakbrush type for approximately 50 yards. The frequency baseline starting point is a red painted fence post (marker for the line intercept study) located 18 feet up on the east side of the road. It has a browse tag #7873 attached.



Map Name: Abajo Peak

Diagrammatic Sketch

Township 34S , Range 22E , Section 23

UTM 4185011.915 N, 633514.446 E

## DISCUSSION

### Trend Study No. 14-4 (35-4)

This trend study is located on the mountain side near Camp Jackson Reservoir which is dominated by open oakbrush and mature aspen stands. The two vegetation types provide a variety and abundance of succulent and browse forage, cover, and fawning areas important to summering deer and elk. The study samples an open hillside with mature aspen stands on three sides. Private land is nearby, but this study is located on Forest Service administered land. The area is managed as part of the Camp Jackson grazing allotment. The Johnson Creek unit is one of three on a rest rotation grazing system for 300 cattle (1,589 AUMs) during summer to early fall. Cattle were being moved through the area to lower grazing lands on the day of study establishment in August of 1986. Pellet group data from 1999 estimated only 1 deer days use/acre (3 deer days use/ha) and 2 elk days use/acre (5 elk days use/ha). Cow days use/acre were estimated at 44 (109 cow days use/ha). All pats appeared to be from last fall. An elk calf was found hiding by the 200 foot stake during the 1999 reading.

This oakbrush-aspen type is found on the west facing slope of the south-eastern most peak of the Abajo Mountains. From the study site, much of the mountain range is visible to the north and west across Johnson Creek. Elk Ridge is a prominent topographical feature to the south. The old original line intercept transect was located very near the new trend transect established in 1986. Elevation on this site is about 9,200 feet. Water is plentiful in the area with nearby perennial streams and Camp Jackson Reservoir. The area is important as a watershed and for recreation and hunting. It is also open to oil and gas mining claims and mineral exploration.

The soil is moderately deep with an estimated effective rooting depth of over 20 inches. Rock appears to be concentrated at about 20 inches in depth. Soil texture is a sandy clay loam with a moderately acid pH (5.7). Phosphorus may be limiting at just 5.7 ppm, when 10 ppm is thought to be minimal for normal plant growth and development. The area receives high precipitation typical of high mountain areas in the region, which can cause severe erosion if protective ground cover is lacking. On trails, bare areas, and road cuts, there are short deep gullies, sheet erosion, and concentrations of rock pavement on the soil surface. Overgrazing by domestic livestock, especially in the early part of this century, has led to severe soil loss and subsequent need for terracing and seeding on some of the higher portions of the Abajo range. Even with the abundance of herbaceous vegetation in addition to the oak clumps, there are still some areas of compacted and eroding exposed soil especially on the various wildlife and livestock trails. However, photo comparisons show the soil has stabilized considerably from the initial line-intercept transects of 1981.

Four to five foot tall oak dominates the area with abundant grasses and bare trails between the oak clumps. The clumps are thick with many young sprouts and stems. Density was estimated at 13,999 stems/acre in 1986. More than half (65%) of the population consisted of young stems. Most of the larger available oak showed moderate hedging, although some on the edges of the clones had been more heavily used because of their accessibility. The plants also suffered grasshopper/insect use resulting in leaf damage and reduction in vigor in 1986. Oak accounted for 60% of the total shrub cover in 1994, but it was mistakenly not counted in the shrub density strips. Density was estimated at 10,780 in 1999. Some of the change in density may be due to the much larger sample used after 1986. Use is currently light, vigor normal, and percent decadence low at 5%. Photo point comparisons and height measurements show that oak is becoming taller. Average cover of oak in 1999 remained similar to 1994 estimates, 20% and 19%. Overhead canopy cover of oak is currently estimated at 9%.

The only other abundant shrubs include Woods rose and snowberry. Snowberry made up 27% of the browse cover in 1994, increasing to 30% by 1999. Seventy percent of them showed moderate to heavy use and many displayed poor vigor for an unknown reason in 1986. Currently the snowberry population does not show these characteristics. The decline in density between 1986 and 1994 is mostly due to the much larger sample used in 1994 and 1999. Currently the population appears stable and only lightly utilized. Other browse

encountered include Woods rose and serviceberry. Both display only light use and good vigor. There are also some small aspens mixed in with the oak.

The herbaceous component is an important forage source on this site. A wide variety of grasses and forbs are present with many being important in soil binding and erosion control. Composition is diverse and different under the oak compared to the open areas. Kentucky bluegrass is the most abundant grass on the site. It dominates the composition under the oak and produced a total of 54% of the grass cover in 1999. Open areas are dominated more by mountain muhly, mutton bluegrass, and sedge. They currently ('99) account for 29% of the grass cover. Forb species encountered are abundant and too numerous to list, but include several desirable species which provide good spring forage. Utilization of forbs is generally light.

#### 1986 TREND ASSESSMENT

Comparison of the old line intercept data of 1981 and the new method of 1986 indicate a stable trend. There are slight differences in species composition and abundance, but overall the site appears to be in similar condition. There may be a trend towards increasing oak cover, but the oak does not appear to get very tall here and forage production remains largely available. Overall, the soil trend is also stable. Specifically referring to the line intercept study and line 1 of the 1986 study, there has been a definite increase in oak density and cover over the last 5 years and this trend should continue. Herbaceous plant cover also appears to be increasing and these indications point to a improving trend. This is especially true in regards to soil trend. Erosion was at one time a serious factor on this site, but increasing vegetative cover has stabilized the soil. The still well-defined erosion channels are showing signs of healing.

#### 1994 TREND ASSESSMENT

The trend for soil on this site should be considered stable with percent bare ground remaining about the same. Nearly half of the total vegetative cover is composed of herbaceous species which can better protect the soils from high intensity summer storms than the aerial cover of browse species. The browse trend is stable to slightly improving. Snowberry, a key browse species, shows signs of improved vigor. The sharp downward change in it's density is more reflective of the much larger sample size taken in 1994 which gives a much better density estimate of this clumped species. The rhizomatous habit of the species can also cause difficulties in estimating it's density. The other key browse species (Gambel oak) was mistakenly not inventoried in the browse strips. Point quarter data taken in 1994 estimates 884 stems/acre. The trend of the herbaceous understory is stable to slightly upward. The nested frequency values for grasses and forbs showed some improvement since 1986. Species diversity is very good with the number of species for the herbaceous understory approaching 50.

#### TREND ASSESSMENT

soil - stable

browse - stable to slightly improving

herbaceous understory - slightly improving

#### 1999 TREND ASSESSMENT

Trend for soil continues to be stable with adequate amounts of protective ground cover to protect the soil. Erosion that is occurring on trails is not excessive. Trend for browse appears stable with oak increasing in height. Most shrubs display light use, normal vigor and low percent decadence. Trend for the herbaceous understory is considered stable with similar sum of nested frequency values compared to 1994 estimates. Nested frequencies of most grasses and forbs did not change significantly but frequency of Kentucky bluegrass did increase significantly. It currently accounts for 54% of the grass cover and 21% of the herbaceous cover. The forb composition consists of several desirable species along with some increasers like,

western yarrow, ballhead sandwort, trailing fleabane, and Rocky Mountain iris. These less desirable species did increase in cover since 1994, but not significantly in nested frequency.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
G	Agropyron trachycaulum	a4	b33	b31	3	16	15	.20	.71
G	Bromus anomalus	b47	ab31	a22	21	13	11	.21	.15
G	Carex spp.	b105	ab95	a62	42	38	23	2.36	1.83
G	Festuca ovina	-	1	-	-	1	-	.00	-
G	Festuca thurberi	22	25	11	9	12	5	.97	.49
G	Koeleria cristata	b20	b43	a6	10	19	2	.39	.03
G	Muhlenbergia montana	47	42	43	19	16	17	2.15	1.01
G	Phleum pratense	1	-	-	1	-	-	-	-
G	Poa arida	-	3	-	-	1	-	.00	-
G	Poa fendleriana	a-	b27	b26	-	9	10	.46	1.20
G	Poa pratensis	a128	a156	b208	43	53	70	2.72	7.58
G	Sitanion hystrix	b28	ab25	a7	20	11	4	.13	.36
G	Stipa columbiana	11	7	8	4	3	4	.06	.31
G	Stipa comata	b49	a4	a11	24	2	5	.19	.10
G	Stipa lettermani	a-	b4	b8	-	3	4	.09	.12
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		462	496	443	196	197	170	9.98	13.92
Total for Grasses		462	496	443	196	197	170	9.98	13.92
F	Achillea millefolium	b163	a130	ab130	61	55	54	1.24	2.38
F	Agoseris glauca	b29	ab18	a9	13	7	3	.06	.04
F	Antennaria parvifolia	-	5	2	-	1	2	.03	.03
F	Arabis spp.	-	4	4	-	2	2	.01	.01
F	Arenaria congesta	60	68	53	26	27	22	.79	.79
F	Aster spp.	c68	a-	b11	25	-	6	-	.19
F	Calochortus gunnisoni	a-	b3	b6	-	3	3	.01	.01
F	Castilleja linariaefolia	32	30	29	15	15	14	.39	.48
F	Chaenactis douglasii	1	-	-	1	-	-	-	-
F	Collomia linearis (a)	-	-	1	-	-	1	-	.03
F	Collinsia parviflora (a)	-	a-	b8	-	-	6	-	.03

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'86	'99
F	<i>Convolvulus sepium</i>	-	3	-	-	1	-	.03	-
F	<i>Crepis acuminata</i>	3	-	-	2	-	-	-	-
F	<i>Delphinium nuttallianum</i>	a-	a-	b12	-	-	6	-	.05
F	<i>Erigeron flagellaris</i>	58	81	78	24	30	28	.46	1.69
F	<i>Eriogonum racemosum</i>	ab4	a-	b10	1	-	4	-	.04
F	<i>Erigeron speciosus</i>	53	71	51	30	28	19	1.17	1.02
F	<i>Fragaria vesca</i>	a-	ab4	b12	-	1	4	.00	.21
F	<i>Geranium caespitosum</i>	b34	ab16	a5	17	8	2	.04	.03
F	<i>Ipomopsis aggregata</i>	b17	b8	a-	7	4	-	.02	-
F	<i>Iris missouriensis</i>	a-	b24	b36	-	11	16	.59	1.07
F	<i>Lathyrus lanszwertii</i>	b156	a90	a62	66	37	20	3.03	2.22
F	<i>Ligusticum porteri</i>	b60	a-	a-	29	-	-	-	-
F	<i>Lomatium dissectum</i>	a22	b54	b46	10	27	22	.54	.54
F	<i>Lychnis drummondii</i>	-	4	-	-	1	-	.63	-
F	<i>Mertensia brevistyla</i>	a-	b6	a-	-	3	-	.01	-
F	<i>Osmorhiza occidentalis</i>	-	4	-	-	1	-	.00	-
F	<i>Penstemon spp.</i>	b34	ab1	a-	17	1	-	.03	-
F	<i>Penstemon strictus</i>	-	3	-	-	2	-	.03	-
F	<i>Phlox longifolia</i>	-	-	1	-	-	1	-	.00
F	<i>Potentilla anersina</i>	b19	a-	a-	7	-	-	-	-
F	<i>Polygonum douglasii (a)</i>	-	5	9	-	2	4	.01	.02
F	<i>Potentilla gracilis</i>	29	34	29	18	17	11	.41	.47
F	<i>Sedum lanceolatum</i>	a7	b48	b28	3	22	10	.13	.10
F	<i>Senecio neomexicanus</i>	b102	a58	a55	43	26	25	.20	.62
F	<i>Stellaria jamesiana</i>	a-	b125	b124	-	48	49	1.05	1.72
F	<i>Swertia radiata</i>	a-	b7	ab5	-	3	2	.09	.44
F	<i>Taraxacum officinale</i>	58	56	42	25	24	19	.30	.52
F	<i>Thalictrum fendleri</i>	34	34	30	14	12	12	.88	1.05
F	<i>Thermopsis montana</i>	a1	b67	c103	1	22	41	5.31	6.81
F	<i>Thlaspi montanum</i>	28	24	10	13	10	7	.05	.06
F	<i>Tragopogon dubius</i>	-	1	-	-	1	-	.00	-
F	Unknown forb-perennial	2	-	-	2	-	-	-	-
F	<i>Veronica biloba (a)</i>	-	-	2	-	-	1	-	.00
F	<i>Viguiera multiflora</i>	-	2	1	-	2	1	.01	.00
Total for Annual Forbs		0	5	20	0	2	12	0.00	0.08
Total for Perennial Forbs		1074	1083	984	470	452	405	17.64	22.68
Total for Forbs		1074	1088	1004	470	454	417	17.65	22.76

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

BROWSE TRENDS --  
Herd unit 14 , Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'04	'99	'94	'99
B	Amelanchier alnifolia	14	4	.65	.06
B	Clematis hirsutissima	0	1	.06	.09
B	Mahonia repens	0	1	-	.03
B	Populus tremuloides	0	5	.15	.33
B	Prunus virginiana	1	0	.03	-
B	Pseudotsuga menziesii	0	1	.38	1.37
B	Quercus gambelii	0	65	20.47	19.30
B	Rosa woodsii	61	41	2.92	2.76
B	Symphoricarpos oreophilus	81	76	9.23	10.48
B	Tetradymia canescens	0	0	-	-
Total for Browse		157	194	33.90	34.45

CANOPY COVER --  
Herd unit 14 , Study no: 4

Species	Percent Cover '09
Populus tremuloides	1
Pseudotsuga menziesii	2
Quercus gambelii	9

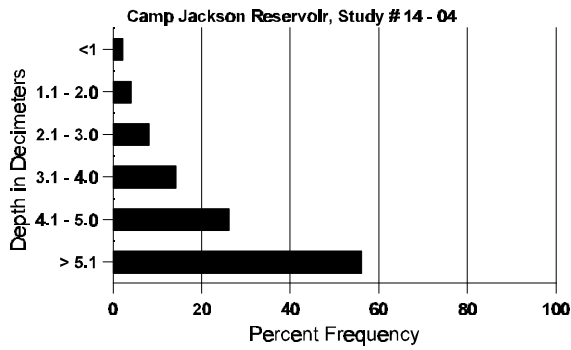
BASIC COVER --  
Herd unit 14 , Study no: 4

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'86	'94	'99
Vegetation	341	355	10.00	49.45	59.33
Rock	134	85	4.25	2.62	4.71
Pavement	129	115	3.50	1.27	2.82
Litter	363	358	64.00	42.77	54.64
Cryptogams	9	14	0	.07	.39
Bare Ground	196	197	18.25	16.64	15.57

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 04, Study Name: Camp Jackson Reservoir

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.9	52.8 (17.2)	5.7	48.9	26.6	24.6	3.0	5.7	124.8	0.4

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 14 , Study no: 4

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Rabbit	-	1	N/A
Elk	-	1	2 (5)
Deer	1	1	1 (2)
Cattle	-	8	44 (109)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 4

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4											
<i>Amelanchier alnifolia</i>																
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	-	-	-	-	-	-	1	-	-	-	-	1	-	-	1
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Y	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	'94	6	-	-	-	-	-	3	-	-	-	-	9	-	-	9
	'99	2	-	-	1	-	-	-	-	-	-	-	3	-	-	3
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	'94	10	-	-	1	-	-	1	-	-	-	-	12	20	14	12
	'99	2	-	-	-	-	-	-	-	-	-	-	2	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>				
'86		00%			00%			00%								
'94		00%			00%			00%				-76%				
'99		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-			
										'94	420		-			
										'99	100		-			



A Y G R E		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Clematis hirsutissima</i>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	20		-			
<i>Mahonia repens</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	-	-	-	2	-	-	-	-	-	2	-	-	-	40	-	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	40		-			
<i>Populus tremuloides</i>																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	-	-	-	-	-	-	3	-	-	3	-	-	-	60	-	3	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	160		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
<i>Prunus virginiana</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	94	1	-	-	-	-	-	-	-	-	-	-	-	20	12	5	1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	20		-			
												'99	0		-			
<i>Pseudotsuga menziesii</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	-	-	-	-	-	-	1	-	-	1	-	-	20	-	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	20		-			
<i>Quercus gambelii</i>																		
S	86	51	19	1	-	-	-	-	-	-	42	3	25	1	4733		71	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	99	26	-	-	17	-	-	-	-	-	43	-	-	-	860		43	
Y	86	42	84	11	-	-	-	-	-	-	94	14	25	4	9133		137	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	99	229	-	-	72	-	-	29	-	-	330	-	-	-	6600		330	
M	86	2	32	7	-	3	-	-	-	-	22	12	10	-	2933	41	26	44
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	146	4	-	6	-	-	-	27	-	183	-	-	-	3660	57	35	183
D	86	2	16	11	-	-	-	-	-	-	18	6	1	4	1933		29	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	99	24	-	2	-	-	-	-	-	-	17	-	-	9	520		26	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	1380			69	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		64%			14%			21%										
'94		00%			00%			00%										
'99		.74%			.37%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	13999	Dec:	14%			
												'94	0		0%			
												'99	10780		5%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total		
	1	2	3	4	5	6	7	8	9	1	2	3	4					
<i>Rosa woodsii</i>																		
S	86	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	55	-	-	4	-	-	2	-	-	58	-	-	-	1220		61	
Y	86	11	5	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	94	27	-	-	2	-	-	3	-	-	32	-	-	-	640		32	
	99	42	-	-	2	-	-	12	-	-	56	-	-	-	1120		56	
M	86	3	16	-	-	1	-	-	-	-	16	-	4	-	1333	22	8	20
	94	68	-	-	22	-	-	7	-	-	97	-	-	-	1940	14	12	97
	99	67	-	-	7	-	-	4	-	-	78	-	-	-	1560	13	9	78
D	86	-	1	8	-	-	-	-	-	-	6	-	2	1	600		9	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		51%			18%			16%			-14%							
'94		00%			00%			00%			+ 4%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	2999	Dec:	20%				
											'94	2580		0%				
											'99	2700		1%				
<i>Symphoricarpos oreophilus</i>																		
S	86	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	26	-	-	1	-	-	1	-	-	28	-	-	-	560		28	
Y	86	34	23	2	-	-	-	-	-	-	44	-	15	-	3933		59	
	94	22	-	-	-	-	-	-	-	-	22	-	-	-	440		22	
	99	45	3	-	2	-	-	14	-	-	64	-	-	-	1280		64	
M	86	20	69	6	-	2	-	-	-	-	57	8	31	1	6466	16	14	97
	94	186	4	-	45	-	-	4	-	-	239	-	-	-	4780	16	25	239
	99	179	9	1	19	-	-	6	-	-	214	-	-	-	4280	18	21	214
D	86	2	13	14	-	-	-	-	-	-	5	2	15	7	1933		29	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	7	-	-	-	-	-	-	-	-	4	-	-	3	140		7	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		58%			12%			37%			-58%							
'94		02%			00%			00%			+ 8%							
'99		04%			.35%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	12332	Dec:	16%				
											'94	5220		0%				
											'99	5700		2%				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Tetradymia canescens																		
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	20	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
	'86	00%			00%			00%										
	'94	00%			00%			00%										
	'99	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	0		-			

Trend Study 14-5-99

Study site name: Jackson Ridge .

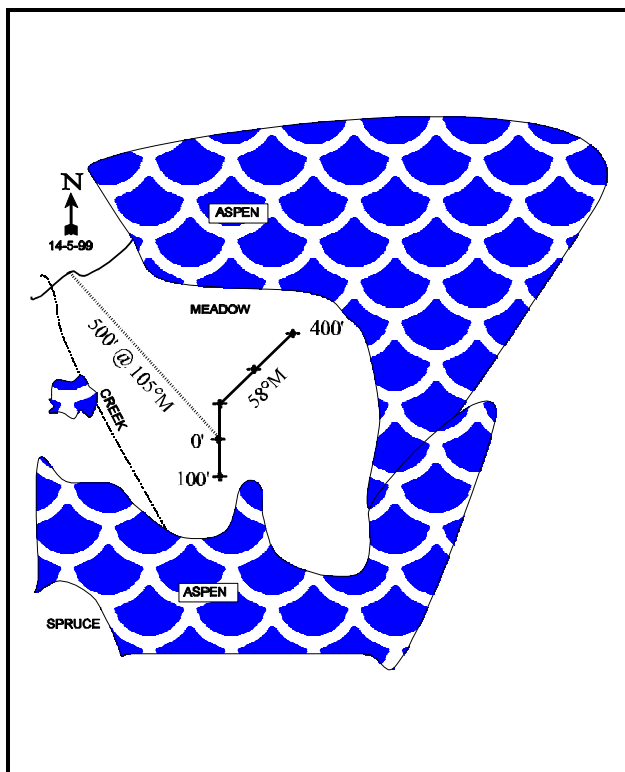
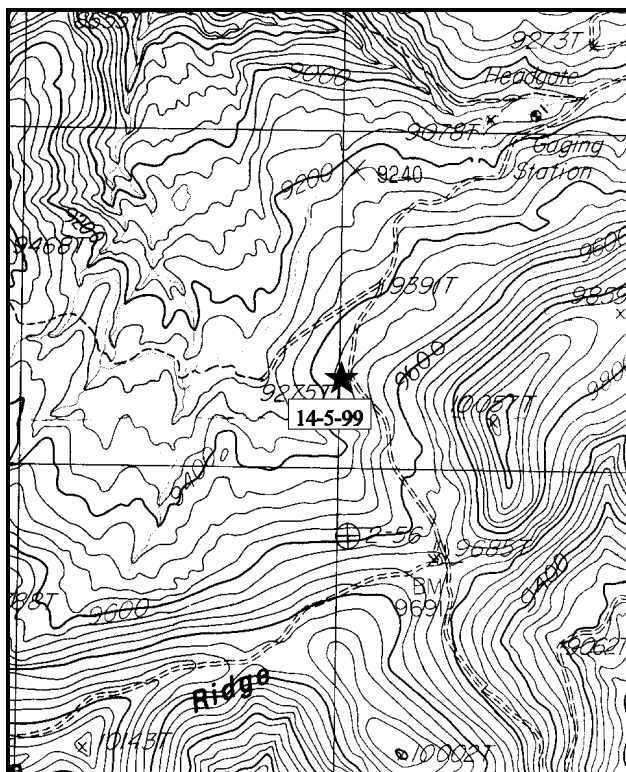
Range type: Dry Meadow .

Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks frequency belts) 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 (120°) 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

UTM 4188194.262 N, 630895.866 E

## DISCUSSION

### Trend Study No. 14-5 (35-5)

The Jackson Ridge Study samples a moderately steep meadow clearing in an aspen- spruce-fir forest on the headwaters of Indian Creek in the southern part of the Abajo Mountains. 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. Deer use the area, but no elk sign was observed in 1986 or 1994. Pellet group data from 1999 estimate 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.

The high elevation (9,400 feet) of the site limits season of use from late spring to late fall. Water is not a limiting factor, even the small stream flowing northwest down the slope towards Indian Creek (perennial) 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.

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 recent rodent activity.

Surrounding the small meadow is a thick forest 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 is currently ('99) slightly higher (620 to 532 trees/acre) than 1986 estimates, but some of the change is due to the lengthening of the baseline in 1994. Overhead canopy cover of aspen was estimated at 21% in 1999. Utilization appeared light. Snowberry occurs infrequently in the meadow with some showing light browsing.

The bulk of available forage production on this study site comes from the herbaceous component which currently ('99) provides 96% of the vegetation cover. 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 and 81% in 1999. Other common grasses include slender wheatgrass, orchard grass, and letterman needlegrass. A large species of *Carex* was found in scattered bunches. 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. To illustrate how dominant the forbs are on the site, they made up 66% of total vegetative cover in 1994 and 60% in 1999.

## 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 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 contribute 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 up.

### TREND ASSESSMENT

soil - improving

browse - improving, but only contributes 1% of total vegetative cover

herbaceous understory - up, with the large increase in forbs

## 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 ½ 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, thistleleaf 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 thistleleaf peavine have increased significantly in nested frequency since 1994.

### TREND ASSESSMENT

soil - stable

browse - stable but unimportant

herbaceous understory - stable

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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
G	Agropyron spicatum	b <sub>22</sub>	a <sup>-</sup>	a <sup>-</sup>	6	-	-	-	-
G	Agropyron trachycaulum	b <sub>104</sub>	a <sub>68</sub>	a <sub>55</sub>	45	30	31	.94	.62
G	Bromus inermis	a <sub>48</sub>	b <sub>19</sub>	b <sub>8</sub>	20	9	3	.27	.21
G	Carex spp.	A <sub>5</sub>	b <sub>21</sub>	ab <sub>7</sub>	2	8	4	.43	.07
G	Dactylis glomerata	a <sub>3</sub>	a <sub>9</sub>	b <sub>28</sub>	1	4	11	.19	1.12
G	Phleum pratense	1	-	4	1	-	1	-	.03
G	Poa pratensis	b <sub>362</sub>	a <sub>341</sub>	ab <sub>357</sub>	95	96	99	8.45	13.86
G	Stipa lettermani	ab <sub>48</sub>	a <sub>45</sub>	b <sub>76</sub>	22	18	32	.24	1.25
G	Trisetum spicatum	b <sub>4</sub>	b <sub>8</sub>	a <sup>-</sup>	3	3	-	.66	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		597	511	535	195	168	181	11.20	17.17
Total for Grasses		597	511	535	195	168	181	11.20	17.17
F	Achillea millefolium	280	291	286	91	91	91	6.55	9.22
F	Agoseris glauca	b <sub>37</sub>	ab <sub>23</sub>	a <sub>13</sub>	20	14	6	.10	.05
F	Androsace septentrionalis (a)	-	a <sub>36</sub>	b <sub>55</sub>	-	16	23	.08	.21
F	Arabis spp.	A <sup>-</sup>	ab <sub>1</sub>	b <sub>10</sub>	-	1	4	.00	.07
F	Cerastium arvense	a <sup>-</sup>	b <sub>10</sub>	a <sup>-</sup>	-	5	-	.02	-
F	Chenopodium album (a)	-	2	-	-	1	-	.00	-
F	Cirsium wheeleri	a <sub>6</sub>	ab <sub>10</sub>	b <sub>24</sub>	2	4	10	.02	.49
F	Conioselinum scopulorum	a <sup>-</sup>	b <sub>11</sub>	a <sup>-</sup>	-	4	-	1.32	-
F	Delphinium nuttallianum	a <sup>-</sup>	b <sub>78</sub>	c <sub>190</sub>	-	38	77	.21	2.13
F	Erigeron engelmannii	b <sub>10</sub>	b <sub>10</sub>	a <sup>-</sup>	3	4	-	.09	-
F	Erigeron flagellaris	102	96	52	35	42	29	.55	.29
F	Erigeron speciosus	ab <sub>10</sub>	b <sub>24</sub>	a <sub>2</sub>	5	11	2	.52	.06
F	Fragaria vesca	39	15	18	13	5	8	.24	.55
F	Galium bifolium (a)	-	9	16	-	3	8	.01	.21
F	Gentiana amarella heterosepala	b <sub>9</sub>	b <sub>8</sub>	a <sup>-</sup>	3	3	-	.01	-
F	Lathyrus lanszwertii	a <sub>16</sub>	a <sub>40</sub>	b <sub>92</sub>	5	16	39	1.56	2.41
F	Lupinus argenteus	a <sub>32</sub>	b <sub>92</sub>	b <sub>122</sub>	17	40	53	1.64	2.38
F	Mertensia brevistyla	-	3	-	-	1	-	.03	-
F	Microsteris gracilis (a)	-	1	-	-	1	-	.00	-
F	Orthocarpus spp. (a)	-	a <sup>-</sup>	b <sub>7</sub>	-	-	3	-	.04
F	Osmorhiza occidentalis	37	25	27	14	10	11	.53	.28
F	Phacelia hastata	b <sub>23</sub>	a <sub>4</sub>	-	10	2	-	.03	-
F	Phlox longifolia	3	-	-	1	-	-	-	-
F	Polygonum douglasii (a)	-	b <sub>49</sub>	a <sub>15</sub>	-	22	6	.11	.13
F	Potentilla gracilis	b <sub>9</sub>	b <sub>10</sub>	a <sup>-</sup>	4	3	-	.18	-
F	Ranunculus spp.	A <sup>-</sup>	b <sub>55</sub>	a <sub>47</sub>	-	28	23	.19	.30



Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
F	Senecio neomexicanus	a <sub>29</sub>	b <sub>73</sub>	b <sub>95</sub>	14	35	43	.64	.57
F	Stellaria jamesiana	a <sub>-</sub>	b <sub>227</sub>	b <sub>204</sub>	-	80	72	2.57	2.82
F	Taraxacum officinale	a <sub>168</sub>	b <sub>215</sub>	b <sub>208</sub>	70	80	80	3.09	5.08
F	Thermopsis montana	a <sub>-</sub>	b <sub>68</sub>	a <sub>-</sub>	-	27	-	.51	-
F	Thlaspi montanum	a <sub>22</sub>	b <sub>62</sub>	b <sub>73</sub>	12	27	35	.18	.35
F	Tragopogon dubius	17	16	7	10	7	4	.66	.02
F	Unknown forb-perennial	b <sub>96</sub>	a <sub>-</sub>	a <sub>-</sub>	43	-	-	-	-
F	Valeriana occidentalis	7	5	-	2	2	-	.30	-
F	Veronica serpyllifolia	1	-	-	1	-	-	-	-
F	Vicia americana	b <sub>145</sub>	b <sub>165</sub>	a <sub>98</sub>	62	62	44	1.82	.64
F	Viola canadensis	a <sub>-</sub>	b <sub>4</sub>	ab <sub>6</sub>	-	3	2	.04	.01
Total for Annual Forbs		0	97	93	0	43	40	0.21	0.59
Total for Perennial Forbs		1098	1641	1574	437	645	633	23.70	27.76
Total for Forbs		1098	1746	1667	437	693	673	24.11	28.36

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

#### BROWSE TRENDS --

Herd unit 14 , Study no: 5

Type	Species	Strip Frequency		Average Cover %	
		'94	'99	'94	'99
B	Picea engelmannii	0	2	.03	.07
B	Populus tremuloides	0	19	.79	1.43
B	Pseudotsuga menziesii	0	0	-	.01
B	Symphoricarpos oreophilus	2	5	.53	.42
Total for Browse		2	26	1.16	1.94

#### CANOPY COVER --

Herd unit 14 , Study no: 5

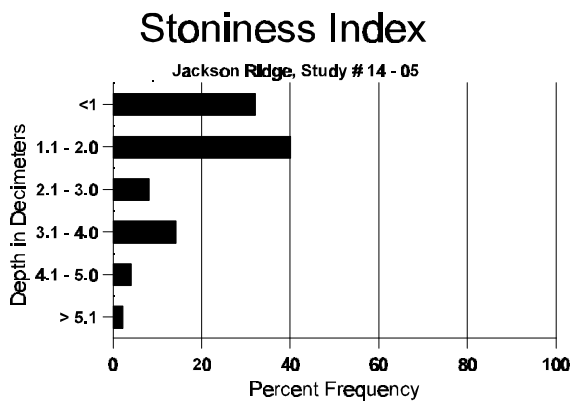
Species	Percent Cover '99
Populus tremuloides	21

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

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'86	'94	'99
Vegetation	383	386	25.50	38.06	49.25
Rock	200	151	6.50	8.04	7.12
Pavement	6	97	1.75	.01	.44
Litter	390	395	55.00	44.68	67.18
Cryptogams	18	47	0	.06	.64
Bare Ground	150	144	11.25	3.96	4.85

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 05, Study Name: Jackson Ridge

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.5	44.8 (15.9)	6.0	36.9	34.6	28.6	5.3	15.6	390.4	0.3



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

Type	Quadrat Frequency	
	'04	'09
Moose	5	-
Elk	-	7
Deer	1	1

Pellet Transect Days Use/Acre (ha)
'09
N/A
11 (27)
1 (2)

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

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Picea engelmannii</i>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
Y	86	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	33	Dec:	-		
												'94	0		-		
												'99	40		-		
<i>Populus tremuloides</i>																	
S	86	1	4	5	-	-	-	-	-	-	6	-	2	2	333		10
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	1	1	-	1	2	4	4	-	-	8	-	2	3	433		13
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7
M	86	-	-	-	-	-	-	-	1	-	1	-	-	-	33	393 300	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	-	-	-	-	-	-	-	24	-	24	-	-	-	480	- -	24
D	86	1	1	-	-	-	-	-	-	-	-	-	2	-	66		2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		25%			25%			44%									
'94		00%			00%			00%									
'99		00%			74%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	532	Dec:	12%		
												'94	0		0%		
												'99	620		0%		

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Pseudotsuga menziesii</i>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	0		-			
<i>Symphoricarpos oreophilus</i>																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	86	-	1	-	-	-	-	-	-	-	1	-	-	-	33	24	2	1
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	23	101	3
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	18	32	6
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	2	-	2	-	-	-	-	-	2	-	2	-	80			4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		100%			00%			00%			+45%							
'94		00%			00%			00%			+75%							
'99		17%			00%			17%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	33	Dec:	0%			
												'94	60		0%			
												'99	240		33%			

Trend Study 14-6-99

Study site name: Harts Draw Reservoir .

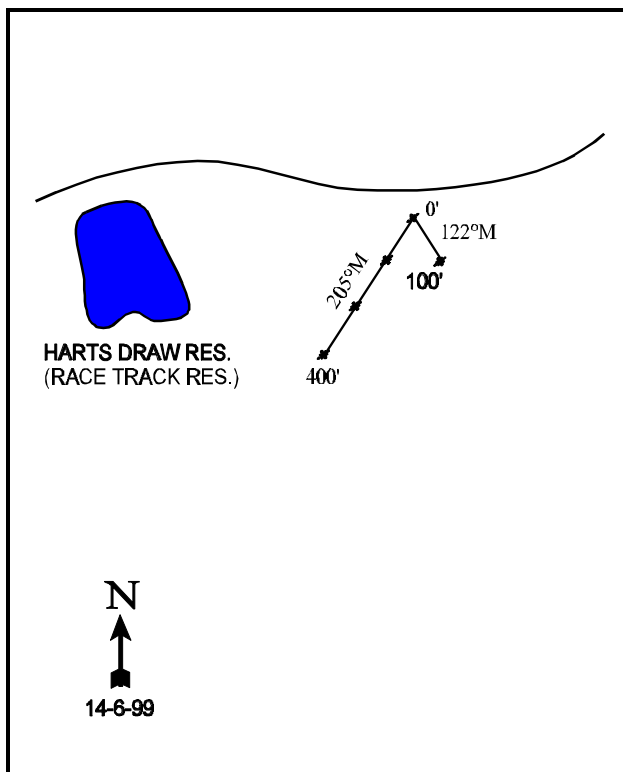
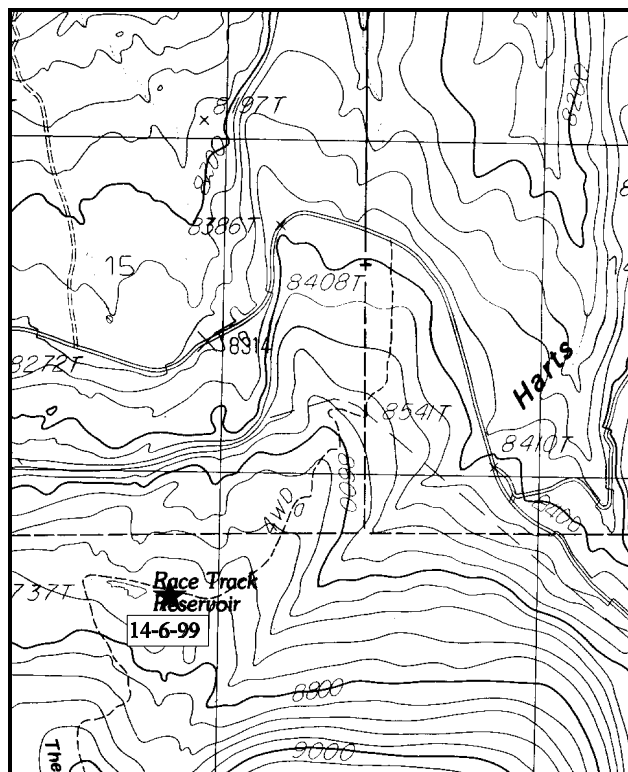
Range type: Mixed Oak-Sagebrush .

Compass bearing: frequency baseline 122°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), 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 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

UTM 4195631.769 N, 632865.459 E

## DISCUSSION

### Trend Study No. 14-6 (35-6)

The Harts Draw Reservoir study is on National Forest land and within summer range for deer and elk. Aspen groves with oakbrush and sagebrush openings are the predominant vegetation types. 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. Warm season escape cover is provided by thick clumps of oak and nearby groves of aspen. Pellet group data from 1999 estimate 18 deer days use/acre (44 deer days use/ha), 1 elk days use/acre (3 elk days use/ha), and 74 cow days use/acre (183 cow days use/ha). Nearly all of the cattle pats appeared to be from last season. About half of the deer pellet groups were recent with the other half from last year.

Soil in the area is moderately deep red-brown loam with an estimated effective rooting depth of nearly 18 inches and a slightly acid pH (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, which is closely intermingled with oakbrush, is a productive and highly utilized summer range. Mountain big sagebrush is the dominant browse species which had an estimated density of 5,399 plants/acre in 1986. This estimate has gone down to 3,100 plants/acre with the much increased sample size used in 1994. With the clumped nature of the population, the larger sample size gives a more realistic population estimate. The mainly mature population averages 1- 1½ feet in height and appeared to be in fairly good health in 1986, even though 28% showed poor vigor. In addition, 47% of the plants were classified as decadent. Plants looked fairly good with abundant seed production in 1986. Hedging on the plants was generally moderate to heavy with 42% showing heavy use. The sagebrush population in 1994 showed an increase in the proportion of plants, exhibiting poor vigor (43%) and decadence (78%). Over half (54%) of the decadent plants were classified as dying. This would equate to 1,300 plants/acre. Recruitment appeared good in 1994 with a biotic potential (proportion of seedlings to the population) of 36% with 7% of the population consisting of young plants. Utilization was mostly light. During the 1999 reading, the population declined slightly to 2,580 plants/acre. Percent decadence has declined to 42%. Utilization continues to be mostly light and vigor has improved. It appears that a large portion of the decadent and dying plants sampled in 1994 died, while some recovered and are now classified as mature plants. Many of the dead plants appear to have died within the past few years due to winter injury or some other sort of natural phenomenon. They did not appear utilized and many had old seed heads and fine stems (not showing clubbed appearance or signs of heavy use) still on the 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. Currently use is mostly light, vigor improved, and percent decadence low at 7%.

Two other shrubs, serviceberry and snowberry, are found in scattered populations. Both shrubs were moderately utilized in 1986. The snowberry had already started to lose its leaves in early September of 1986 when the site was first read. The serviceberry is especially vigorous and nearby six-foot tall shrubs provide abundant forage and seed.

Grasses and forbs are abundant in the understory, however two grasses dominate the herbaceous component. Smooth brome and Kentucky bluegrass each currently ('99) provide 20% cover and account for 100% of the grass cover, 66% of the total herbaceous cover, and 52% of the total vegetation cover. Other grasses are rare. Forbs are diverse but only lupine is common. It produced 60% of the forb cover in 1994 and 85% in 1999. Dusty penstemon was quite common in the past and was heavily hedged, as was redroot eriogonum. Both species have decreased in abundance in 1994 and 1999. 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. Oaks are 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 biotic potential which is 36% (2,160 seedlings/acre). The herbaceous understory trend is stable to slightly up with nested frequency values for both grasses and forbs having increased total values.

### TREND ASSESSMENT

soil - up

browse - slightly down

herbaceous understory - stable to slightly up

## 1999 TREND ASSESSMENT

Trend for soil continues to be 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 stable. Smooth brome and Kentucky bluegrass continue to dominate the herbaceous understory, yet they have remained with similar nested frequency values. The increase in Kentucky bluegrass since 1994 may be due to identification problems with mutton bluegrass. Even though nested frequencies of grasses did not increase, cover of the two dominant grasses doubled since 1994. This would be due to wetter conditions in 1999. Sum of nested frequency of forbs declined slightly, but the dominant forb, lupine, remained stable. Cover of forbs nearly doubled compared to 1994 estimates.

### TREND ASSESSMENT

soil - stable

browse - slightly down

herbaceous understory - stable



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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
G	<i>Agropyron cristatum</i>	12	2	3	5	2	1	.01	.03
G	<i>Bromus inermis</i>	<sub>a</sub> 301	<sub>b</sub> 323	<sub>b</sub> 336	94	95	100	8.02	20.12
G	<i>Carex</i> spp.	<sub>c</sub> 54	<sub>b</sub> 22	<sub>a</sub> -	23	9	-	.43	-
G	<i>Dactylis glomerata</i>	-	-	2	-	-	1	-	.15
G	<i>Poa fendleriana</i>	<sub>c</sub> 130	<sub>b</sub> 68	<sub>a</sub> -	49	25	-	2.01	-
G	<i>Poa pratensis</i>	<sub>a</sub> 143	<sub>b</sub> 270	<sub>c</sub> 326	45	85	93	9.58	20.21
G	<i>Sitanion hystrix</i>	3	3	-	2	1	-	.00	-
G	Unknown grass - perennial	4	-	-	1	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		647	688	667	219	217	195	20.08	40.52
Total for Grasses		647	688	667	219	217	195	20.08	40.52
F	<i>Achillea millefolium</i>	-	-	3	-	-	1	-	.00
F	<i>Androsace septentrionalis</i> (a)	-	7	7	-	2	3	.63	.04
F	<i>Antennaria</i> spp.	<sub>B</sub> 9	<sub>ab</sub> 5	<sub>a</sub> 1	3	2	1	.15	.15
F	<i>Arabis</i> spp.	<sub>A</sub> -	<sub>b</sub> 6	<sub>a</sub> -	-	3	-	.01	-
F	<i>Arenaria</i> spp.	-	-	7	-	-	2	-	.30
F	<i>Aster</i> spp.	-	1	-	-	1	-	.00	-
F	<i>Castilleja linariaefolia</i>	6	8	13	3	6	6	.05	.25
F	<i>Calochortus nuttallii</i>	-	-	2	-	-	1	-	.00
F	<i>Collinsia parviflora</i> (a)	-	<sub>b</sub> 19	<sub>a</sub> 5	-	10	2	.05	.03
F	<i>Crepis</i> spp.	-	3	-	-	1	-	.63	-
F	<i>Erigeron flagellaris</i>	29	25	12	15	10	7	.07	.03
F	<i>Eriogonum racemosum</i>	<sub>b</sub> 76	<sub>ab</sub> 52	<sub>a</sub> 27	30	22	13	.53	.50
F	<i>Gayophytum ramosissimum</i> (a)	-	<sub>b</sub> 25	<sub>a</sub> -	-	8	-	.04	-
F	<i>Ipomopsis aggregata</i>	<sub>b</sub> 17	<sub>ab</sub> 4	<sub>a</sub> -	8	1	-	.63	-
F	<i>Lathyrus pauciflorus</i>	42	42	31	18	16	11	.79	.37
F	<i>Lomatium parryi</i>	<sub>a</sub> -	<sub>b</sub> 26	<sub>a</sub> -	-	10	-	.87	-
F	<i>Lupinus holosericeus</i>	<sub>a</sub> 178	<sub>b</sub> 235	<sub>b</sub> 244	76	86	90	7.76	17.11
F	<i>Microsteris gracilis</i> (a)	-	<sub>a</sub> -	<sub>b</sub> 51	-	-	21	-	.47
F	<i>Penstemon comarrhenus</i>	<sub>c</sub> 138	<sub>b</sub> 64	<sub>a</sub> 7	66	29	5	.29	.07
F	<i>Phlox longifolia</i>	<sub>a</sub> 16	<sub>b</sub> 68	<sub>a</sub> 30	7	26	15	.22	.07
F	<i>Polygonum douglasii</i> (a)	<sub>a</sub> -	<sub>c</sub> 31	<sub>b</sub> 7	-	12	3	.06	.01
F	<i>Senecio neomexicanus</i>	<sub>b</sub> 21	<sub>a</sub> 7	<sub>a</sub> 1	11	4	1	.02	.00
F	<i>Taraxacum officinale</i>	3	7	9	1	3	4	.01	.07
F	<i>Thlaspi</i> spp.	<sub>B</sub> 12	<sub>a</sub> -	<sub>a</sub> -	6	-	-	-	-
F	<i>Vicia americana</i>	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 44	-	-	18	-	.70
Total for Annual Forbs		0	82	70	0	32	29	0.78	0.56

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'04	'09
	Total for Perennial Forbs	547	553	431	244	220	175	12.09	19.67
	Total for Forbs	547	635	501	244	252	204	12.87	20.23

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

#### BROWSE TRENDS --

Herd unit 14 , Study no: 6

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Amelanchier utahensis	15	16	.55	1.37
B	Artemisia tridentata vaseyana	81	60	6.02	8.42
B	Quercus gambelii	1	37	8.86	5.94
B	Symphoricarpos oreophilus	24	13	1.02	.92
	Total for Browse	121	126	16.46	16.66

#### CANOPY COVER --

Herd unit 14 , Study no: 6

Species	Percent Cover
Quercus gambelii	.40

#### BASIC COVER --

Herd unit 14 , Study no: 6

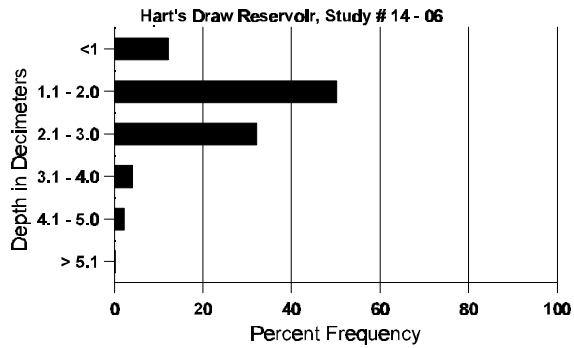
Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'86	'94	'99
Vegetation	385	386	7.50	58.87	64.00
Rock	69	6	0	1.08	.04
Pavement	68	38	.50	.22	.12
Litter	391	387	76.00	57.97	67.18
Cryptogams	13	8	.25	.11	.12
Bare Ground	137	113	15.75	2.75	4.34

#### SOIL ANALYSIS DATA --

Herd Unit 14, Study # 06, Study Name: Harts Draw Reservoir

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.9	47.2 (18.1)	6.4	44.0	35.4	20.6	3.1	23.2	272.0	0.5

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 14 , Study no: 6

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Rabbit	3	12	N/A
Elk	1	-	1 (2)
Deer	8	2	18 (44)
Cattle	2	11	74 (183)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 6

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4											
Amelanchier utahensis																
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	2	-	-	1	-	-	-	-	3	-	-	-	60		3
	'99	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	'86	-	14	1	-	-	-	-	-	13	2	-	-	1000		15
	'94	5	-	-	-	-	-	-	-	5	-	-	-	100		5
	'99	5	1	-	1	-	-	-	-	7	-	-	-	140		7
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	'94	2	2	-	4	-	-	-	-	6	2	-	-	160	39 55	8
	'99	3	8	-	1	-	-	-	-	12	-	-	-	240	31 25	12
D	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	5	-	-	-	-	-	-	-	1	-	-	4	100		5
	'99	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'86		93%		07%		00%		-64%								
'94		11%		00%		22%		+ 5%								
'99		47%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'86	1000	Dec:	0%			
										'94	360		28%			
										'99	380		0%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	104	-	-	-	-	-	4	-	-	-	-	-	2160		108	
	99	6	-	-	1	-	-	-	-	-	-	-	-	140		7	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	11	-	-	-	-	-	-	-	-	-	1	-	220		11	
	99	6	-	-	-	-	-	-	-	-	-	-	-	120		6	
M	86	-	27	16	-	-	-	-	-	-	-	-	-	2866	18 18	43	
	94	19	-	-	3	-	-	1	-	-	-	-	-	460	19 25	23	
	99	48	12	5	4	-	-	-	-	-	-	-	-	1380	20 23	69	
D	86	2	18	18	-	-	-	-	-	-	-	-	-	2533		38	
	94	102	3	2	14	-	-	-	-	-	-	-	-	2420		121	
	99	47	4	-	3	-	-	-	-	-	-	-	-	1080		54	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	800		40	
	99	-	-	-	-	-	-	-	-	-	-	-	-	1480		74	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		56%			42%			28%			-43%						
'94		02%			01%			43%			-17%						
'99		12%			04%			13%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	5399	Dec:	47%		
												'94	3100		78%		
												'99	2580		42%		
<i>Quercus gambelii</i>																	
S	86	6	11	-	-	-	-	-	-	-	9	4	4	-	1133		17
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	8	-	-	-	-	-	-	-	-	-	8	-	-	160		8
Y	86	-	26	10	-	-	-	-	-	-	5	15	14	2	2400		36
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	49	-	-	5	-	-	-	-	-	54	-	-	-	1080		54
M	86	-	9	5	-	-	-	-	-	-	7	3	4	-	933	41 21	14
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	99	87	31	-	2	-	-	-	-	-	120	-	-	-	2400	45 29	120
D	86	-	4	7	-	-	-	-	-	-	4	-	2	5	733		11
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	11	-	-	2	-	-	-	-	-	11	-	-	2	260		13
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	800		40	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		64%			36%			44%			-100%						
'94		100%			00%			00%			+99%						
'99		17%			00%			01%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	4066	Dec:	18%		
												'94	20		100%		
												'99	3740		7%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total										
		1	2	3	4		1	2											
Symphoricarpos oreophilus																			
Y	86	1	2	-	-	-	-	-	-	-	-	3	200		3				
	94	1	-	-	-	-	1	-	-	-	-	2	40		2				
	99	1	-	-	2	-	-	-	-	-	-	3	60		3				
M	86	-	5	-	-	-	-	-	-	-	-	2	-	3	-	333	14	7	5
	94	14	2	-	9	3	-	-	-	-	-	23	2	1	2	560	15	22	28
	99	10	3	-	7	-	-	-	-	-	-	20	-	-	-	400	18	19	20
D	86	-	-	1	-	-	-	-	-	-	-	-	-	-	1	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>								
'86		78%			11%			78%			+ 0%								
'94		17%			00%			10%			-23%								
'99		13%			00%			00%											
Total Plants/Acre (excluding Dead & Seedlings)											'86	599	Dec:	11%					
											'94	600		0%					
											'99	460		0%					

\*\*\*THIS SITE WAS DROPPED\*\*\*

Trend Study 14-7-99

Study site name: Shay Mountain .

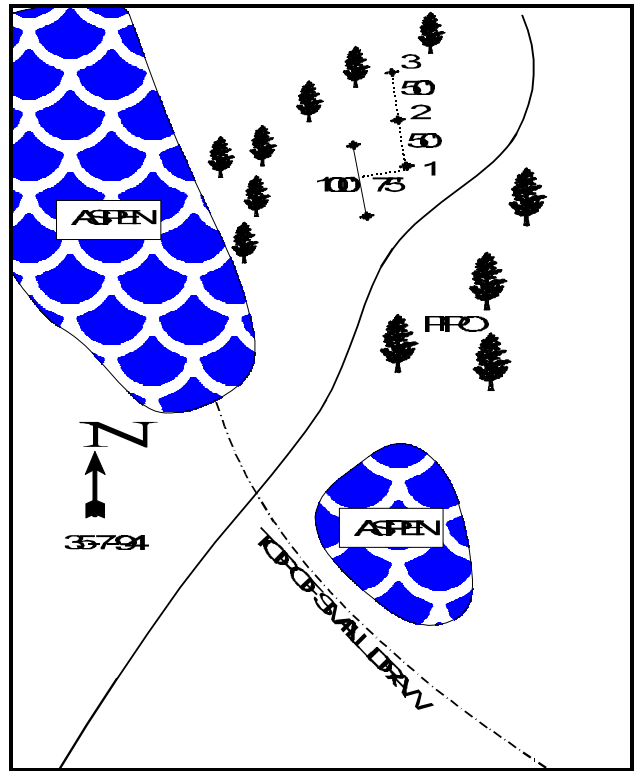
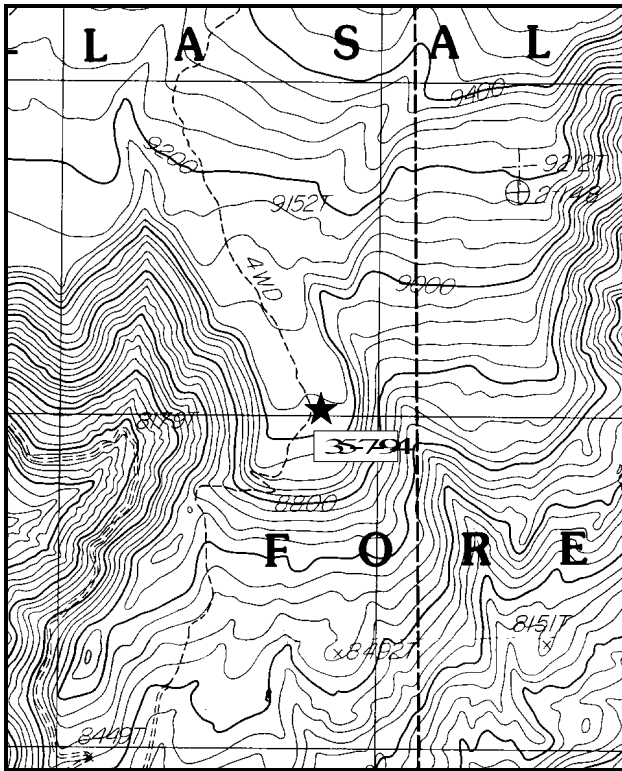
Range type: Mixed Oak-Sagebrush .

Compass bearing: frequency baseline 349 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

On the north side of Foy Lake, turn right Just below the dike. Proceed west on the road towards Shay Mountain for 5.25 miles. At this point, the road forks, with the left fork going toward the "Hop Creek" trail and the right fork towards Shay Mountain. Take the right fork for 0.4 miles to another fork. Turn right and go 1.50 miles (on a rough 4-wheel drive road involving a steep ascent and tight switchbacks) to a faint fork. Turn right and travel on this faint road for 0.25 miles past the edge of a small aspen grove at the head of a drainage to a large ponderosa pine on the right. Stop. The baseline starts 10 feet to the left of the road in the oak-sagebrush. The O-foot end is marked by a short, red painted fence post tagged #7848. Density plot number 1 is located 75 feet east of the 50-foot mark of the baseline. The density plots are set up parallel to the baseline with 50 feet between plots .



Map Name: Shay Mountain

Diagrammatic Sketch

Township 33S , Range 21E , Section 12

## DISCUSSION

### Trend Study No. 14-7 (35-7)

\*\*\*This study was dropped in 1999. Text from the 1994 Utah Big Game Range Trend Studies Report has been retained below. Refer to the above mentioned report for maps and data tables.\*\*\*

Located near the top of Shay Mountain, this study samples deer summer range on the north of the Abajo Mountains. It is good summer habitat, with scattered large Ponderosa pine and a dense shrub understory. Gambel oak, mountain big sagebrush, and snowberry form thick patches of low shrub cover. Nearby areas support large groves of aspen. Besides being deer summer range, this mountain could also receive summer use by elk in the future. Cattle are present in the area in the summer. The Shay Ridge unit of the Harts Draw allotment is managed under a rest rotation grazing system with a season of use from mid-June to mid-October. Cattle were being taken off the mountain on the day the study was established in September 1986.

Shay Mountain itself is a very rugged, rather inaccessible 9,989 foot mountain on the north end of the Abajo mountain range. A very rocky and extremely rough road leads up the south side above Indian Creek, on the north side it drops off to the winter range on lower Shay Mesa. The area is open to oil and gas leasing and there are mineral claims and uranium exploration. However, no current mining activity is going on and human pressure is low. Use is probably confined to cattlemen, agency personnel, and a few hunters. There are several springs and water developments on the mountain. Because of the remoteness of the area, there were sightings of several deer and sign of coyote and bear.

The study samples an area classified as a conifer type (Ponderosa pine with mountain brush understory), oakbrush, and mixed oak-sagebrush. Elevation at the site is 8,800 feet. The slope is approximately 10%, with a southwestern aspect. The area receives an estimated 20 inches of precipitation annually, in the form of snow and summer rain. Snow depth probably precludes use of the study area for 3-4 months each winter.

The soil is a fine dark red-brown loam with 10-20% coarse fragments over lighter sandy clay loam. It is 10-20 inches in depth. The vegetative and litter cover contribute to soil building and protect it from erosion. There is evidence of water erosion on the steeper, exposed slopes.

Gambel oak is the most abundant browse for it makes up 47% of the total browse cover. The sagebrush is comparatively less abundant as it makes up only 22% of the browse cover. Age structure of the oak is dominated by young plants which made up 72% of the population in 1986. Most of the trees, especially on the outer edges, show moderate utilization. Most of the plants in 1986 also showed some insect and hailstorm damage to the leaves, but it is not severe. The oak ranges from two to four feet tall. Oak was mistakenly not sampled in the shrub strips in 1994. Point quarter data taken during that year estimates 25,775 oak stems/acre averaging 2.6" in diameter. Mature mountain big sagebrush plants average 22 inches in height. It is an older population made up of 98% mature and decadent plants. There was good seed production in 1986. In 1994, biotic potential had risen from 0% to 4%. Sagebrush vigor has improved, for only 12% show poor vigor now. Percent decadency has decreased from 75% down to 46%. In 1986, 55% of the plants showed heavy use, now only 1% show this kind of use. In 1986, the heaviest use was on the relatively uncommon bitterbrush, this too has decreased to just 1% of the plants now heavily used. This prostrate growth form numbers 460 plants/acre, with most having a clubbed, but vigorous appearance. Snowberry contributes 22% of the browse cover with only light use.

Grasses are not prominent, but fairly common contributing only 12% of the total vegetative cover. Small and palatable species such as muttongrass, sedge, and Junegrass are most common. Forbs are more common for they make up 22% of the total vegetative cover. The most common forbs are wooly groundsel, yarrow, American vetch, fewflower peavine, balsam root, and dusty penstemon which provides valuable summer forage. More than 30 forb species were encountered on the transects in 1994.

## 1986 APPARENT TREND ASSESSMENT

There are some rather obvious trends apparent on the mixed oakbrush-sagebrush type. The oak appears to be increasing in size and numbers to the detriment of the mountain big sagebrush. Overuse is causing some decadence and poor vigor problems in the sagebrush population. Overall use of the area appears to have increased since 1981. This oak-sagebrush type is relatively uncommon on the mountain and because of its shrub productivity, it may receive proportionally more use. These factors indicate a downward vegetative trend in terms of deer summer range. The various browse plants are all important and utilized, although forbs are certainly an important component of the summer diet and these herbaceous species appear to be doing fine. Management options are limited, but should strive to avoid overgrazing or over browsing. The percent bare ground estimated was 9%. Cover from shrubs is adequate in most places, however more bare ground is associated with the herbaceous plants. There is evidence of erosion and exposure of rocks on areas lacking litter and/or vegetative cover.

## 1994 TREND ASSESSMENT

The trend for soil is stable to slightly improving for there has been only a slight decrease in litter cover, but not more than would be expected with the extended drought since 1985. Percent bare ground has decreased to only 3%. Trend for browse is not as critical as it would be if this were a critical winter range, but trend for this area would be considered stable. Even with the slight decline in sagebrush density (which is more likely due of the larger sample size), vigor has improved, percent decadency has decreased from 75% down to 46%, and biotic potential has increased from 0% to 4%. Most other “key” browse species have shown similar improvement since 1986. Trend for the herbaceous understory is down, for nested frequency values for both grasses and forbs have decreased substantially since 1986. This downward trend is most likely the result of the prolonged drought.

### TREND ASSESSMENT

soil - stable to slightly improving

browse - stable

herbaceous understory - down



Trend Study 14-8-99

Study site name: Peters Point .

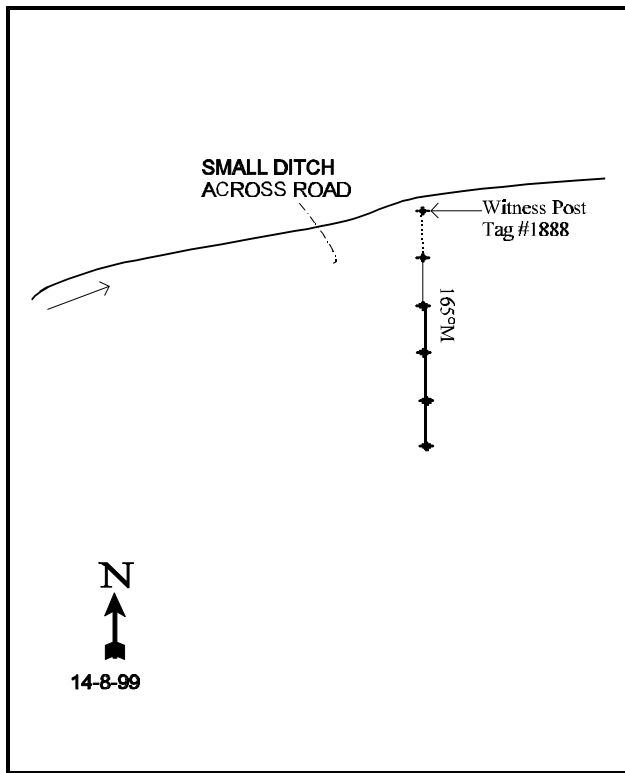
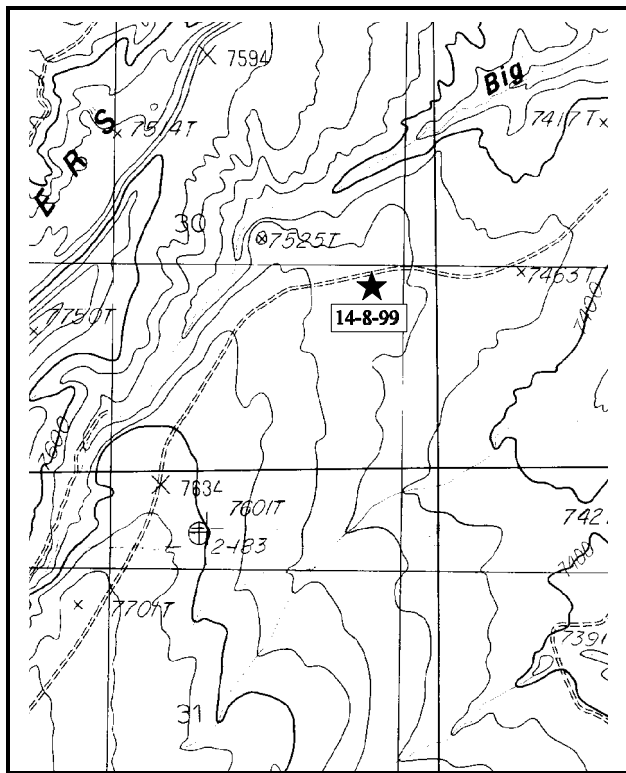
Range type: Chained, Cabled, Seeded P-J.

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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) 1.0 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 enclosure 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

UTM 4202852.821 N , 637552.911 E

## DISCUSSION

### Trend Study No. 14-8 (35-8)

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. 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. A pellet group transect at 7,800 feet (USFS) and 7,300 feet (BLM) both show widely fluctuating use levels varying from 5-43 deer days use/acre (12-106 ddu/ha). Pellet group data from the higher elevation pellet group transects shows a 5-year average (1981-1986) of 21 deer days use/acre (52 ddu/ha), an increase over the previous 5-year average of 9 deer days use/acre (22 ddu/ha). The average deer days use/acre through 1993 continued to increase to 26 (64 ddu/ha), but after the hard winter of 1992-93 it has gone down to 17 deer days use/acre (42 ddu/ha). Pellet group data taken on the site in 1999 estimate 13 deer, 1 elk and 7 cow days use/acre (32 ddu/ha, 3 edu/ha, and 17 cdu/ha). Peters Point is just above the Harts Draw winter concentration area. This plateau has the potential to become an important elk wintering area.

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.

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 is still less than 2% cover. Almost 20% of the area was bare soil in 1986, increasing to 32% in 1994, and 35% in 1999. Much of this increase is from the loss of litter from the extended drought. 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.

Encroachment by the juniper and pinyon into this particular area has been rather slow with an estimated combined density of 200 trees/acre in 1986. Tree density was estimated in 1994 using a point quarter method which is more accurate at estimating density of widely spaced trees. Point quarter data estimated 75 juniper and 19 pinyon trees/acre on the site. Average diameter of the juniper was 4.3 inches while that of pinyon averaged 2.6 inches. Point quarter data from 1999 estimate 68 juniper and 21 pinyon pine trees/acre. Average diameter of juniper is 4.2 inches while that of pinyon is 2.7 inches. Most of the trees are in the 4 to 6 foot high range. Seventeen percent of the juniper sampled were knocked down (tipped over), but still living trees which averaged 3 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. The sagebrush in 1986 appeared to be very vigorous, moderately hedged, and their age class distribution indicated an increasing population. A majority of the plants sampled were mature plants. They had a biotic potential (proportion of seedlings to the population) of 7%, 29% were young, and only 7% were classified as decadent. By 1994 many of these healthy characteristics had declined, with 67% showing poor vigor and 21% of the plants classified as decadent. Utilization was light to moderate. Data from 1999 estimate 2,300 sagebrush plants/acre. Utilization is mostly light, vigor improved with those with poor vigor going from 67% to 6%, and percent decadence has declined from 21% to 8%. Recruitment is not as good as in past years, however there are enough seedlings and young to maintain the population.

Rubber rabbitbrush was the second most abundant browse species in 1986, but it has steadily declined in density from 1,432 plants/acre in 1986 to only 20 in 1999. Broom snakeweed is fairly abundant and has increased substantially since 1994. Individual plants are very small averaging only 4 inches in height. 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 stressed crested wheatgrass and successfully established a dense stand. The wheatgrass occurs in vigorous, large patches that made up 81% of the total grass cover in 1994, increasing to 95% in 1999. This grass, and to a lesser extent the bottlebrush squirreltail, muttongrass, and slender wheatgrass, provides abundant spring and fall forage for deer and cattle and it is also valuable to elk in winter.

Forbs are less common, especially valuable forage species. Total forb cover currently ('99) makes up only 11% of the total vegetative cover. Species diversity is also low. Most numerous is rock goldenrod, an increaser, which has increased significantly in nested frequency since the 1994 reading. It provided 62% of the forb cover in 1994, increasing to 94% in 1999. Dusty penstemon, a valuable forage species, declined significantly in nested frequency since 1994.

#### 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 indicates 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, for 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 its density, but this is primarily because of the much larger sample size. 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%. The increased biotic potential (proportion of seedlings to the population) helps offset this downward tendency, which has increased from 7% up to 14%. The browse trend would still be judged slightly down. The herbaceous understory is rated as down because the nested frequency values for both grasses and forbs have decreased slightly and frequency of the most abundant grass, crested wheatgrass, declined significantly since the last reading. This downward trend is mostly the result of the prolonged drought since 1985.

#### TREND ASSESSMENT

soil - slightly down

browse - slightly down

herbaceous understory - down

## 1999 TREND ASSESSMENT

Trend for soil is stable with similar relative percent cover estimates for litter and bare ground. In addition, nested frequency of crested wheatgrass also increased significantly. 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 significantly, although sum of nested frequency for all herbaceous species remained at similar levels compared to 1994.

### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

### HERBACEOUS TRENDS --

Herd unit 14 , Study no: 8

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
G	Agropyron cristatum	<sub>b</sub> 320	<sub>a</sub> 242	<sub>b</sub> 285	98	79	94	14.34	14.65
G	Agropyron trachycaulum	4	-	-	1	-	-	-	-
G	Bromus tectorum (a)	-	<sub>a</sub> 8	<sub>b</sub> 22	-	2	9	.78	.11
G	Koeleria cristata	<sub>a</sub> -	<sub>b</sub> 14	<sub>ab</sub> 3	-	4	1	1.54	.00
G	Oryzopsis hymenoides	-	4	5	-	2	2	.03	.15
G	Poa fendleriana	<sub>a</sub> 3	<sub>b</sub> 27	<sub>b</sub> 20	2	11	10	.52	.56
G	Poa pratensis	-	7	-	-	2	-	.38	-
G	Sitanion hystrix	<sub>b</sub> 9	<sub>a</sub> -	<sub>ab</sub> 3	3	-	2	.00	.01
Total for Annual Grasses		0	8	22	0	2	9	0.78	0.11
Total for Perennial Grasses		336	294	316	104	98	109	16.82	15.38
Total for Grasses		336	302	338	104	100	118	17.60	15.50
F	Arabis spp.	1	4	1	1	2	1	.01	.00
F	Artemisia ludoviciana	1	-	-	1	-	-	-	-
F	Cryptantha humilis	-	4	-	-	1	-	.63	-
F	Draba spp. (a)	-	-	2	-	-	1	-	.00
F	Eriogonum alatum	1	3	-	1	1	-	.00	-
F	Erigeron pumilus	<sub>ab</sub> 4	<sub>a</sub> -	<sub>b</sub> 12	2	-	7	-	.08
F	Heterotheca villosa	-	-	1	-	-	1	-	.03
F	Lappula occidentalis (a)	-	-	3	-	-	1	-	.00
F	Lesquerella rectipes	<sub>b</sub> 10	<sub>a</sub> -	<sub>a</sub> -	6	-	-	-	-
F	Microsteris gracilis (a)	-	4	3	-	2	1	.01	.00
F	Oenothera spp.	<sub>A</sub> -	<sub>b</sub> 6	<sub>a</sub> -	-	4	-	.02	-
F	Pedicularis centranthera	-	-	4	-	-	2	-	.06

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'04	'09
F	Penstemon pachyphyllus	<sub>a</sub> 9	<sub>b</sub> 20	<sub>a</sub> 7	3	10	3	1.54	.01
F	Petradoria pumila	<sub>b</sub> 118	<sub>ab</sub> 70	<sub>a</sub> 75	44	31	30	3.45	3.50
F	Phlox longifolia	-	-	2	-	-	2	-	.01
F	Sphaeralcea coccinea	-	2	2	-	1	2	.00	.01
Total for Annual Forbs		0	4	8	0	2	3	0.00	0.01
Total for Perennial Forbs		144	109	104	58	50	48	5.67	3.72
Total for Forbs		144	113	112	58	52	51	5.68	3.73

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

#### BROWSE TRENDS --

Herd unit 14 , Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Artemisia frigida	0	0	-	-
B	Artemisia tridentata vaseyana	53	53	7.89	11.36
B	Cercocarpus montanus	0	0	-	-
B	Chrysothamnus nauseosus	3	1	.01	-
B	Chrysothamnus viscidiflorus	0	2	-	-
B	Gutierrezia sarothrae	9	16	.01	.04
B	Juniperus osteosperma	0	6	2.57	4.34
B	Opuntia spp.	4	5	.00	.03
B	Pinus edulis	0	0	-	-
Total for Browse		69	83	10.48	15.78

#### CANOPY COVER --

Herd unit 14 , Study no: 8

Species	Percent Cover '09
Juniperus osteosperma	2

#### BASIC COVER --

Herd unit 14 , Study no: 8

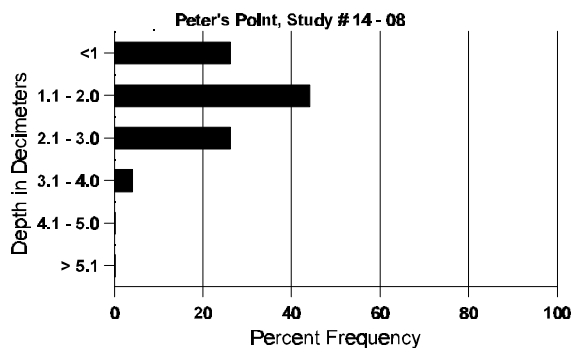
Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'86	'94	'99
Vegetation	302	314	15.25	29.00	35.43
Rock	82	19	1.00	.50	.43
Pavement	165	145	1.25	.96	1.86
Litter	387	385	63.25	35.18	42.61
Cryptogams	41	64	0	.16	2.39
Bare Ground	320	295	19.25	32.11	34.52

SOIL ANALYSIS DATA --

Herd Unit 14, Study # 08, Study Name: Peters Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.8	56.6 (12.6)	7.2	62.9	18.6	18.6	2.3	8.5	86.4	0.6

### Stoniness Index



PELLET GROUP DATA --

Herd unit 14 , Study no: 8

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'94	'99	
Rabbit	23	39	N/A
Deer	6	13	13 (32)
Elk	-	-	1 (2)
Cattle	-	2	7 (17)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 8

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4			
Artemisia frigida								
M	'86	3	-	-	-	-	-	3
	'94	-	-	-	-	-	-	0
	'99	-	-	-	-	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>
		'86		00%		00%		00%
		'94		00%		00%		00%
		'99		00%		00%		00%
Total Plants/Acre (excluding Dead & Seedlings)						'86	100	Dec: -
						'94	0	-
						'99	0	-

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																		
S	86	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	94	23	-	-	-	-	-	-	-	-	23	-	-	-	460		23	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	86	13	2	1	-	-	-	-	-	-	15	1	-	-	533		16	
	94	30	-	-	2	-	-	-	-	-	17	-	15	-	640		32	
	99	14	-	-	1	-	-	-	-	-	15	-	-	-	300		15	
M	86	15	16	4	-	-	-	-	-	-	32	-	3	-	1166	20	20	35
	94	52	19	6	1	-	-	-	-	-	22	1	55	-	1560	19	33	78
	99	81	4	4	1	-	1	-	-	-	91	-	-	-	1820	19	31	91
D	86	1	1	2	-	-	-	-	-	-	3	1	-	-	133		4	
	94	24	4	1	-	-	-	-	-	-	6	-	18	5	580		29	
	99	6	1	2	-	-	-	-	-	-	2	-	1	6	180		9	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		35%			13%			05%			+34%							
'94		17%			05%			67%			-17%							
'99		04%			06%			06%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	1832	Dec:	7%				
											'94	2780		21%				
											'99	2300		8%				
<i>Cercocarpus montanus</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	33	31	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	64	55	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	-				
											'94	0		-				
											'99	0		-				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Chrysothamnus nauseosus</b>																		
S	86	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	86	12	19	1	-	-	-	-	-	-	23	2	7	-	1066		32	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	6	-	-	-	-	-	-	-	-	6	-	-	-	200	43	52	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	14	
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	
D	86	-	4	1	-	-	-	-	-	-	4	-	1	-	166		5	
	94	4	4	-	-	-	-	-	-	-	1	-	-	7	160		8	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		53%			05%			19%			-89%							
'94		50%			00%			88%			-88%							
'99		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	1432	Dec:	12%				
											'94	160		100%				
											'99	20		0%				
<b>Chrysothamnus viscidiflorus</b>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	-	-	1	20		1		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			50%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	0%				
											'94	0		0%				
											'99	40		50%				



A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total				
		1	2	3	4		1	2					
<i>Gutierrezia sarothrae</i>													
S	86	1	-	-	-	-	-	-	1	33		1	
	94	-	-	-	-	-	-	-	-	0		0	
	99	13	-	-	-	-	-	-	13	260		13	
Y	86	4	-	-	-	-	-	-	4	133		4	
	94	-	-	-	-	-	-	-	-	0		0	
	99	26	-	-	-	-	-	-	26	520		26	
M	86	22	-	-	-	-	-	-	22	733	6 6	22	
	94	9	-	-	-	-	-	-	8	180	6 7	9	
	99	53	-	-	-	-	-	-	53	1060	4 4	53	
D	86	1	-	-	-	-	-	-	-	33		1	
	94	1	-	-	-	-	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	0		0	
X	86	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	40		2	
	99	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'86		00%		00%		04%		-78%					
'94		00%		00%		20%		+87%					
'99		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'86	899	Dec:	4%
										'94	200		10%
										'99	1580		0%
<i>Juniperus osteosperma</i>													
Y	86	4	-	-	-	-	-	-	4	133		4	
	94	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	-	2	40		2	
M	86	-	1	-	-	-	-	-	1	33	88 42	1	
	94	-	-	-	-	-	-	-	-	0	- -	0	
	99	5	-	-	-	-	-	-	5	100	- -	5	
X	86	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'86		20%		00%		00%							
'94		00%		00%		00%							
'99		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'86	166	Dec:	-
										'94	0		-
										'99	140		-

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
Y	'86	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'86	7	-	-	-	-	-	-	-	-	7	-	-	-	233	3	8	7
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	15	2
	'99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	3	10	6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			-73%							
'94		00%			00%			00%			+33%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	299	Dec:	-				
											'94	80		-				
											'99	120		-				
Pinus edulis																		
S	'86	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	-				
											'94	0		-				
											'99	0		-				

Trend Study 14-9-99

Study site name: Harts Draw .

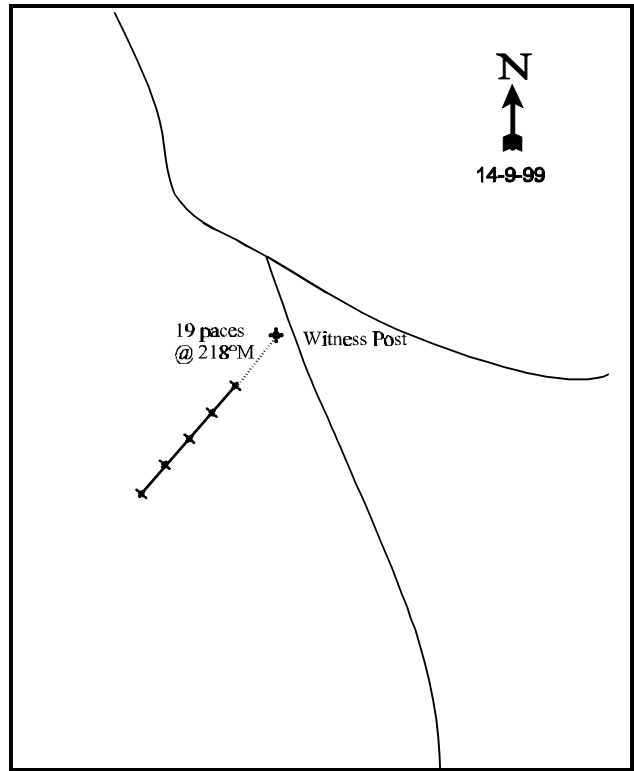
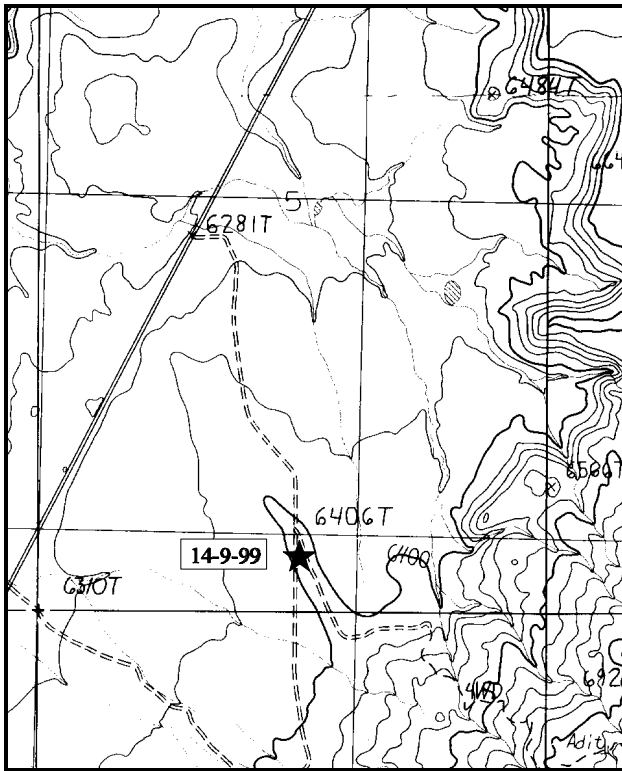
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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 0.15 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. The 0 ft baseline stake is near a small juniper.



Map Name: Photograph Gap

Diagrammatic Sketch

Township 32S , Range 23E , Section 5

UTM 4208972.900 N, 638774.154 E

## DISCUSSION

### Trend Study No. 14-9 (35-9)

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 3% - 7% slope and southwest aspect. In the valley below the ridge, the 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. The BLM currently allows 200-300 cattle in fall and spring. Deer pellet groups indicate moderate 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 91 deer 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).

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. Currently, erosion is not severe due to the gentle terrain.

Browse use in the area is centered on Wyoming big sagebrush, as it is the only palatable species present. It made up 90% of the browse cover in 1994, however declining to 67% by 1999. It appeared to have been used heavily in the past, with use in 1994 appearing severe because of the extremely depressed growth rate in conjunction with the prolonged drought since 1985. New leader growth was very short with virtually no seed production. Almost 50% of the sagebrush surveyed in 1994 were classified as decadent because of a partially dead crown, but this was actually an improvement over 1986 figures. The balance were mature plants under two feet in height. Recruitment was poor with few seedling and young plants. Data from 1999 show a similar population density compared to 1986 and 1994. Utilization is moderate to heavy, but vigor has improved since 1994. Percent decadence has declined from 46% in 1994 to 33% in 1999. Reproduction continues to be poor with no seedlings and few young being sampled.

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. Cover of broom snakeweed has also increased four fold since 1994. It currently accounts for 28% of the total shrub cover. Most of the population (82%) consists of mature plants, although young plants are also abundant. Snakeweed is small in stature, unutilized, and in good vigor.

Grasses are moderately abundant for a Wyoming sagebrush community. They contributed 44% of the total vegetative cover in 1994, increasing to 58% by 1999. Blue grama, an increaser under spring cattle grazing, is fairly abundant on the site and forms thick low mats on the side hill. Other grasses include bottlebrush squirreltail, needle-and-thread, Indian ricegrass, and galleta. Two annual grass, cheatgrass brome and sixweeks fescue, are also present with cheatgrass increasing exponentially in nested frequency value and cover since 1994. Forbs are insignificant with a total cover of only about 1% in 1994 and 1999.

### 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 would have to be slightly downward because of the high percentage of bare ground and very low cover value for litter (<20%). The key browse species is Wyoming big sagebrush, which through the years has been heavily utilized. The slight increase in its density estimate is mostly reflective of the much larger sample size taken in 1994, but there are some important improvements in some other critical population parameters. One of these improvements includes a biotic potential of 1%, for in 1986 there were no seedlings. Another of these improvements is that there is a slight increase in the number of plants that are classified as mature healthy plants. Yet another improvement is that percent decadence has decreased slightly. Any of these changes by themselves would not mean much, but together, the indication is that there is a slight improvement for Wyoming big sagebrush. The one negative characteristic of the community that did not show any improvement was the percent of the population that was classified as showing poor vigor which had increased from 16% to 32%. The increaser broom snakeweed has a population that has decreased by 57% even when it had a biotic potential of 27%. 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.

#### TREND ASSESSMENT

soil - slightly down

browse - slightly down

herbaceous understory - stable

#### 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 down with cheatgrass increasing from a quadrat frequency of only 9% in 1994 to 97% in 1999. Cover of this 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% cover since 1994.

#### TREND ASSESSMENT

soil - up

browse - down slightly

herbaceous understory - down due to a dramatic increase in cheatgrass

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

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'86	'99
G	<i>Agropyron cristatum</i>	-	6	4	-	2	2	.03	.06
G	<i>Bouteloua gracilis</i>	<sub>b</sub> 165	<sub>b</sub> 130	77	62	44	29	5.41	2.97
G	<i>Bromus tectorum</i> (a)	-	<sub>a</sub> 16	<sub>b</sub> 344	-	9	97	.07	12.91
G	<i>Hilaria jamesii</i>	<sub>a</sub> 1	<sub>a</sub> 5	<sub>b</sub> 39	1	4	15	.04	1.52
G	<i>Oryzopsis hymenoides</i>	<sub>a</sub> -	<sub>b</sub> 15	<sub>b</sub> 20	-	10	10	.39	.27
G	<i>Sitanion hystrix</i>	<sub>a</sub> 25	<sub>b</sub> 123	<sub>c</sub> 153	15	49	68	4.70	2.62
G	<i>Stipa comata</i>	<sub>b</sub> 81	<sub>a</sub> -	<sub>ab</sub> 4	39	-	2	-	.04
G	<i>Vulpia octoflora</i> (a)	-	<sub>b</sub> 240	<sub>a</sub> 99	-	81	37	.55	.33
Total for Annual Grasses		0	256	443	0	90	134	0.62	13.24
Total for Perennial Grasses		272	279	297	117	109	126	10.59	7.50
Total for Grasses		272	535	740	117	199	260	11.21	20.75
F	<i>Arnica mollis</i>	<sub>b</sub> 7	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	<i>Astragalus mollissimus</i>	2	-	5	2	-	2	-	.06
F	<i>Chenopodium</i> spp. (a)	-	2	-	-	1	-	.00	-
F	<i>Cryptantha</i> spp.	<sub>A</sub> -	<sub>b</sub> 12	<sub>b</sub> 20	-	6	8	.03	.23
F	<i>Descurainia pinnata</i> (a)	-	<sub>b</sub> 38	<sub>a</sub> 1	-	19	1	.09	.00
F	<i>Eriogonum cernuum</i> (a)	-	1	-	-	1	-	.00	-
F	<i>Erigeron</i> spp.	<sub>B</sub> 9	<sub>a</sub> -	<sub>a</sub> -	6	-	-	-	-
F	<i>Erigeron pumilus</i>	<sub>b</sub> 44	<sub>a</sub> 1	<sub>a</sub> 17	17	1	9	.03	.31
F	<i>Gilia hutchinifolia</i> (a)	-	<sub>b</sub> 20	<sub>a</sub> 8	-	11	4	.05	.02
F	<i>Lappula occidentalis</i> (a)	-	-	1	-	-	1	-	.00
F	<i>Leucelene ericoides</i>	<sub>a</sub> -	<sub>b</sub> 10	<sub>a</sub> -	-	4	-	.33	-
F	<i>Lepidium</i> spp. (a)	-	<sub>b</sub> 20	<sub>a</sub> 7	-	10	4	.42	.23
F	<i>Orobancha fasciculata</i>	-	-	4	-	-	2	-	.01
F	<i>Sphaeralcea coccinea</i>	<sub>b</sub> 52	<sub>a</sub> 14	<sub>a</sub> 13	23	5	5	.03	.05
Total for Annual Forbs		0	81	17	0	42	10	0.58	0.26
Total for Perennial Forbs		116	37	59	52	16	26	0.42	0.67
Total for Forbs		116	118	76	52	58	36	1.00	0.94

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

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

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Artemisia tridentata wyomingensis	77	78	11.80	9.50
B	Chrysothamnus viscidiflorus stenophyllus	10	6	.18	.46
B	Gutierrezia sarothrae	70	94	1.02	3.95
B	Opuntia spp.	11	5	.04	.18
B	Sclerocactus	0	0	.01	-
Total for Browse		168	183	13.07	14.11

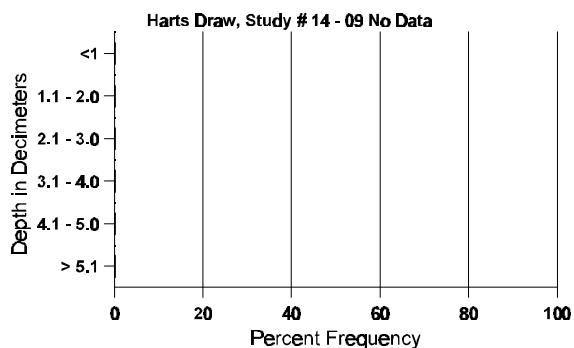
BASIC COVER --  
Herd unit 14 , Study no: 9

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'86	'94	'99
Vegetation	323	359	4.25	21.01	34.93
Rock	139	33	0	.45	.09
Pavement	187	177	8.25	1.01	2.01
Litter	370	366	35.75	18.98	30.61
Cryptogams	89	88	.75	1.52	1.99
Bare Ground	373	317	51.00	51.87	41.37

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 09, Study Name: Harts Draw

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.4	61.8 (14.5)	7.6	72.9	12.6	14.6	1.3	8.8	51.2	0.4

### Stoniness Index



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

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Sheep	-	1	0
Rabbit	14	53	N/A
Elk	8	1	0
Deer	36	40	84 (207)
Cattle	-	1	7 (17)

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

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
Artemisia tridentata wyomingensis																		
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	1	-	-	1	-	-	-	-	-	-	-	-	-	40			2
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	'86	1	-	-	-	-	-	-	-	-	-	-	-	66				1
	'94	1	3	-	-	-	-	-	-	-	-	-	-	80				4
	'99	-	-	-	1	-	-	-	-	-	-	-	-	20				1
M	'86	9	15	-	-	-	-	-	-	-	-	-	-	1600	20	19		24
	'94	23	43	13	-	13	-	-	-	-	-	-	-	1840	20	33		92
	'99	22	62	12	-	5	10	-	-	-	-	-	-	2220	23	31		111
D	'86	10	8	7	-	-	-	-	-	-	-	-	-	1666				25
	'94	28	23	4	3	25	-	-	-	-	-	-	-	1660				83
	'99	15	20	14	-	2	3	1	-	-	-	-	-	1100				55
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	0				0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	780				39
	'99	-	-	-	-	-	-	-	-	-	-	-	-	1560				78
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		46%			14%			16%			+ 7%							
'94		60%			09%			32%			- 7%							
'99		53%			23%			14%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	3332	Dec:	50%			
												'94	3580		46%			
												'99	3340		33%			





A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	99	5	-	-	-	-	-	1	-	-	5	-	1	-	120		6	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	12	-	-	-	-	-	-	-	-	12	-	-	-	240		12	
	99	5	-	-	-	-	-	1	-	-	5	-	1	-	120		6	
M	86	2	-	-	-	-	-	-	-	-	1	-	1	-	133	3	6	2
	94	13	-	-	-	-	-	-	-	-	13	-	-	-	260	2	10	13
	99	5	-	-	-	-	-	1	-	-	5	-	1	-	120	3	7	6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			50%			+73%							
'94		00%			00%			00%			-52%							
'99		00%			00%			17%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	133	Dec:	-			
												'94	500		-			
												'99	240		-			
Sclerocactus																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	9	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	0		-			

Trend Study 14-10-99

Study site name: Harts Point .

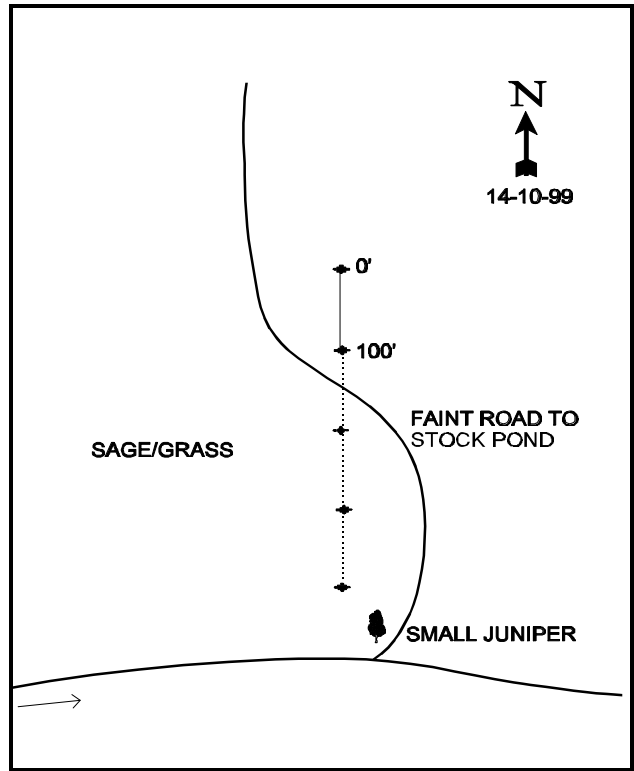
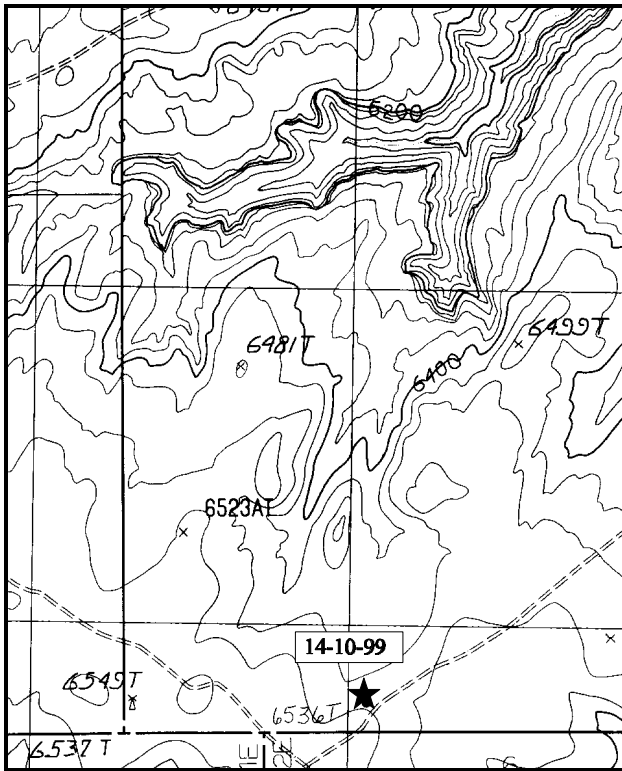
Range type: Big Sagebrush .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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

UTM 4221002.704 N , 627193.856 E

## DISCUSSION

### Trend Study No. 14- 10 (35-10)

This transect is out on Hart's Point, in a sagebrush park surrounded by slickrock domes and Juniper-covered hills. It is an arid site with an elevation of 6,400 feet, a moderate slope (1-4%) and a general western aspect. Drainage off Hart's Point mesa is in a northwesterly direction into Harts Draw. 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. 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). Cattle pats appear to be from last season. Another principal use for this area is oil and gas exploration and extraction. A new pipeline was being 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. These low levels may limit plant growth and development since 10 ppm of phosphorus and 70 ppm of potassium have been determined to be the minimum for normal plant 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 pedestaling around the bunch grasses. Percent bare ground is high at almost 50% in 1994 and 43% in 1999. Cryptogams provided 3% cover in 1994, increasing to 6% by 1999. They generally occur under sagebrush crowns.

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. The population is likely a hybrid between the two subspecies. Use varies greatly between individual plants, indicating some regressive traits with the higher palatability of mountain big sagebrush. The population has remained at a stable density since 1986 at about 3,500 plants/acre, the majority of which are mature. Utilization was heavy in 1986, but more moderate in 1994 and 1999. Percent decadence has remained low, ranging from 23% in 1986 to 11% in 1999. Vigor was normal in 1986, but 57% of the population displayed poor vigor in 1994 (a dry year) and 38% of the decadent plants appeared to be dying. By 1999 vigor of all the mature and most of the decadent plants returned to more normal. Biotic potential (proportion of seedlings to the population) has declined from a high of 21% in 1986, to less than 1% in 1994 and 0% in 1999. Young plants have been sampled with each reading and they are currently appear abundant enough to maintain the population.

Winterfat is scattered throughout the area at relatively low densities (about 200 plants/acre). It appears that these have been heavily hedged in the past which would help explain their low growth form. The few juniper in the area do not appear to show any signs of increasing in the sagebrush flat.

Grasses are diverse and moderately abundant for a Wyoming big sagebrush site. However, only three species are common and two of these are annuals, cheatgrass and sixweeks fescue. These annuals currently provide 55% of the grass cover and cheatgrass has increased significantly in nested frequency since 1994. For the perennial grasses, blue grama is the most abundant, forming a short thick mat over most of the area not occupied by shrubs. It is vigorous, but this warm-season grass does not characteristically provide much spring forage. Blue grama provided 56% of the grass cover in 1994, declining to 34% by 1999. It has declined slightly in nested frequency but not significantly. Occasionally, bunch grasses occur in the protection of the sagebrush crowns.

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. Other perennial

forbs are represented mostly by low and trailing fleabane, and sego lily. 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 lead 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 site #9 at Hart's Draw; 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 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.

##### TREND ASSESSMENT

soil - slightly downward

browse - slightly downward

herbaceous understory - stable

#### 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 declined slightly, 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 herbaceous trend is considered slightly down.

##### TREND ASSESSMENT

soil - stable

browse - up slightly

herbaceous understory - down slightly

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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
G	<i>Bouteloua gracilis</i>	<sub>b</sub> 234	<sub>a</sub> 168	<sub>a</sub> 159	74	51	59	8.36	4.55
G	<i>Bromus tectorum</i> (a)	-	<sub>a</sub> 75	<sub>b</sub> 270	-	27	95	2.93	4.39
G	<i>Hilaria jamesii</i>	31	45	45	16	19	21	.70	.42
G	<i>Oryzopsis hymenoides</i>	<sub>a</sub> 7	<sub>b</sub> 27	<sub>c</sub> 64	3	14	28	.09	.53
G	<i>Poa secunda</i>	-	-	1	-	-	1	-	.00
G	<i>Sitanion hystrix</i>	27	30	19	14	13	8	.16	.11
G	<i>Sporobolus cryptandrus</i>	<sub>a</sub> -	<sub>b</sub> 47	<sub>b</sub> 20	-	19	10	.78	.15
G	<i>Stipa comata</i>	<sub>b</sub> 110	<sub>b</sub> 88	<sub>a</sub> 17	51	38	8	1.00	.23
G	<i>Vulpia octoflora</i> (a)	-	307	299	-	96	91	.88	3.07
Total for Annual Grasses		0	382	569	0	123	186	3.81	7.46
Total for Perennial Grasses		409	405	325	158	154	135	11.12	6.02
Total for Grasses		409	787	894	158	277	321	14.93	13.48
F	<i>Calochortus nuttallii</i>	<sub>b</sub> 6	<sub>a</sub> -	<sub>ab</sub> 3	3	-	1	-	.00
F	<i>Cryptantha</i> spp.	<sub>A</sub> -	<sub>b</sub> 6	<sub>a</sub> -	-	4	-	.02	-
F	<i>Cymopterus</i> spp.	-	3	-	-	1	-	.15	-
F	<i>Delphinium nuttallianum</i>	-	-	1	-	-	1	-	.00
F	<i>Draba reptans</i> (a)	-	7	3	-	4	1	.02	.01
F	<i>Erigeron flagellaris</i>	-	1	3	-	1	1	.00	.00
F	<i>Erigeron pumilus</i>	<sub>b</sub> 77	<sub>a</sub> 1	<sub>a</sub> 3	42	1	2	.01	.18
F	<i>Gilia hutchiniifolia</i> (a)	-	<sub>a</sub> 42	<sub>b</sub> 70	-	19	28	.09	.87
F	<i>Lappula occidentalis</i> (a)	-	1	2	-	1	1	.00	.00
F	<i>Machaeranthera canescens</i>	1	-	-	1	-	-	-	-
F	<i>Plantago patagonica</i> (a)	-	147	160	-	61	69	.30	1.10
F	<i>Ranunculus testiculatus</i> (a)	-	-	3	-	-	1	-	.03
F	<i>Senecio multilobatus</i>	<sub>a</sub> 9	<sub>b</sub> 42	<sub>c</sub> 61	5	19	27	.16	2.25
Total for Annual Forbs		0	197	238	0	85	100	0.42	2.02
Total for Perennial Forbs		93	53	71	51	26	32	0.35	2.45
Total for Forbs		93	250	309	51	111	132	0.77	4.47

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

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

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Artemisia nova	0	1	-	-
B	Artemisia tridentata wyomingensis	79	78	11.46	11.60
B	Ceratoides lanata	9	5	.04	.06
B	Gutierrezia sarothrae	2	1	.00	-
B	Juniperus osteosperma	0	0	-	-
B	Opuntia spp.	3	2	.06	-
Total for Browse		93	87	11.58	11.66

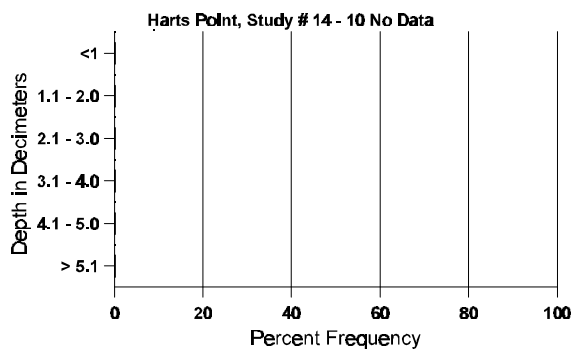
BASIC COVER --  
Herd unit 14 , Study no: 10

Cover Type	Nested Frequency		Average Cover %			
	'04	'09	'86	'94	'99	
Vegetation	35	2	362	10.75	27.60	27.80
Rock	1	-	-	0	.00	0
Pavement	-	1	-	0	0	.00
Litter	374	348	-	45.75	19.87	18.33
Cryptogams	154	163	-	4.50	2.95	6.25
Bare Ground	353	337	-	39.00	49.35	43.04

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 10, Study Name: Harts Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
22.4	64.8 (18.1)	7.5	64.9	18.6	16.6	1.0	4.9	38.4	0.4

### Stoniness Index



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

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Rabbit	36	47	N/A
Deer	30	21	48 (119)
Elk	-	-	1 (2)
Cattle	6	7	22 (54)

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

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
Artemisia nova																		
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	14	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	20		-			
Artemisia tridentata wyomingensis																		
S	'86	15	-	-	-	-	-	-	-	-	15	-	-	-	1000			15
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	'86	10	1	-	-	-	-	-	-	-	10	1	-	-	733			11
	'94	11	-	-	-	-	-	-	-	-	5	1	5	-	220			11
	'99	17	4	-	-	-	-	-	-	-	21	-	-	-	420			21
M	'86	-	9	23	-	-	-	-	-	-	17	14	-	1	2133	17	22	32
	'94	96	116	6	-	-	-	-	-	-	141	1	76	-	4420	37	49	221
	'99	80	41	8	-	3	5	-	-	-	137	-	-	-	2740	25	36	137
D	'86	-	-	13	-	-	-	-	-	-	4	5	-	4	866			13
	'94	30	7	9	-	-	1	-	-	-	21	2	6	18	940			47
	'99	7	4	5	2	1	1	-	-	-	12	-	-	8	400			20
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	400			20
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	660			33
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		18%			64%			09%			+33%							
'94		44%			06%			38%			-36%							
'99		30%			11%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	3732	Dec:	23%			
												'94	5580		17%			
												'99	3560		11%			



A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4		1	2	
<i>Ceratoides lanata</i>									
M	86	-	-	-	-	-	-	-	0
	94	8	-	-	-	-	-	-	160
	99	8	-	1	-	-	-	-	180
D	86	-	-	-	-	-	-	-	0
	94	3	-	-	-	-	-	-	60
	99	-	-	-	-	-	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>	
'86		00%		00%		00%			
'94		00%		00%		09%		-18%	
'99		00%		11%		00%			
Total Plants/Acre (excluding Dead & Seedlings)						'86	0	Dec:	0%
						'94	220		27%
						'99	180		0%
<i>Gutierrezia sarothrae</i>									
M	86	-	-	-	-	-	-	-	0
	94	2	-	-	-	-	-	-	40
	99	1	-	-	-	-	-	-	20
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>	
'86		00%		00%		00%			
'94		00%		00%		00%		-50%	
'99		00%		00%		00%			
Total Plants/Acre (excluding Dead & Seedlings)						'86	0	Dec:	-
						'94	40		-
						'99	20		-
<i>Juniperus osteosperma</i>									
M	86	1	-	-	-	-	-	-	66
	94	-	-	-	-	-	-	-	0
	99	-	-	-	-	-	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>	
'86		00%		00%		00%			
'94		00%		00%		00%			
'99		00%		00%		00%			
Total Plants/Acre (excluding Dead & Seedlings)						'86	66	Dec:	-
						'94	0		-
						'99	0		-

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	8	9	2
	'99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	9	3
D	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'94		00%			00%			33%			+ 0%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'94	60		33%			
												'99	60		0%			

Trend Study 14-11-99

Study site name: Shay Mesa .

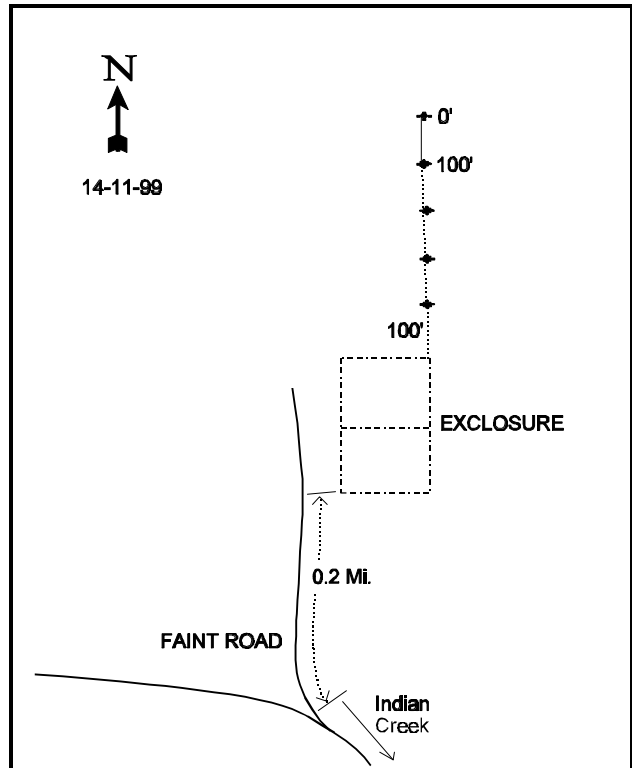
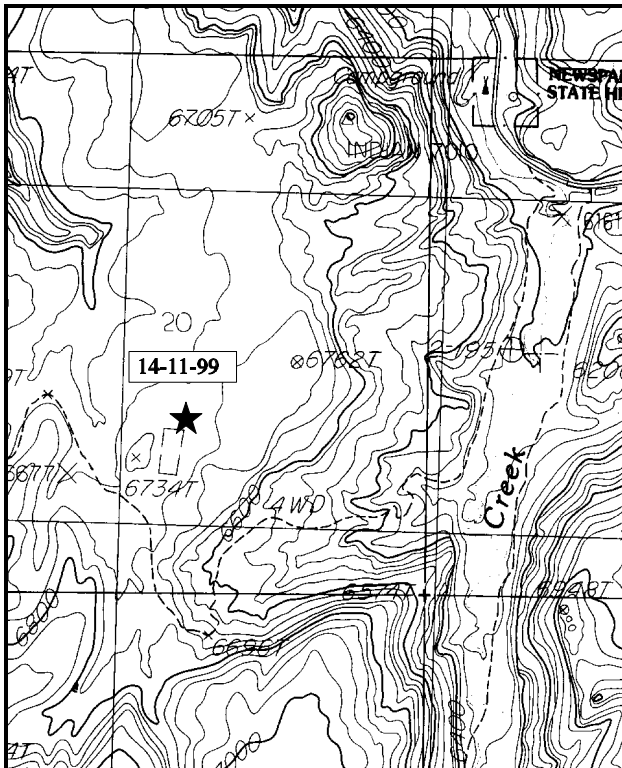
Range type: Chained, Cabled, Seeded P-J .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction of SR-191 and 211 (about 14 miles north of 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 enclosure. Follow this road 0.2 miles to the north end of the enclosure. The end of the baseline is located 100 feet north of the northeast corner of the enclosure. 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

UTM NO GPS

## DISCUSSION

### Trend Study No. 14-11 (35-11)

Located up on Shay Mesa, this study samples a mixed pinyon-juniper woodland with openings of sagebrush-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 transects sample an area near a BLM exclosure. The trend study was placed just outside a 1958 two-way exclosure (cattle and deer) which exhibits dramatic contrasts in plant composition between the total exclosure, livestock exclosure, and the outside. The lack of sagebrush in the grass dominated, livestock exclosure leads to the possible conclusion that cattle grazing could have contributed to keeping shrubs in the understory. The mixed sagebrush-grass outside the exclosure reflects a balance of use by cattle and deer. 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 estimate 26 cow use days/acre (64 cdu/ha). Nearly all of the pats sampled appear to be from last season. Only 1 deer day use/acre (2 ddu/ha) was estimated. Rabbit pellets were very numerous. General browsing use on the sagebrush has been moderate with some classified as heavy, but sagebrush protected in the exclosure show a similar growth and vigor condition. Pinyon and juniper provide good cover for wildlife with estimated densities of 28 juniper and 73 pinyon trees/acre on the site in 1994. Point quarter data from 1999 estimate 12 juniper and 86 pinyon trees/acre. Average diameter of pinyon trees sampled was 4.8 inches, while that of juniper was 5.2 inches. Currently ('99), pinyon provides 50% of the shrub cover and juniper contributes another 10%.

The area sampled shows percent bare ground fairly high at about 40% in 1994. Litter cover has decreased substantially since 1986. 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 and phosphorus. There is one large gully about 20 yards northeast of the baseline which was active in 1986, but appears 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%). Drainage from the area is generally to the north. 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.

The dominant over story is pinyon with a few juniper. The trees appear to be increasing and average between 6-15 feet in height with some of the juniper showing signs of high lining in 1986. The key forage species is mountain big sagebrush which has remained at a stable density since 1986 with an estimated population of about 2,200 plants/acre. The population has become increasingly mature through time. In 1986 only 21% of the population was mature, now in 1999, 85% are classified as mature. Percent decadence currently remains low at only 6%. Utilization was moderate to heavy in 1986, light in 1994, and moderate to heavy again in 1999. Due to the lack of deer pellet groups on the site, this utilization would be from livestock, especially with drought and the fact that most of the grass cover is from blue grama and cheatgrass.

There were some white-stemmed rubber rabbitbrush sampled in 1986, but none were encountered in 1994 or 1999. These rabbitbrush were apparently highly palatable and were heavily hedged during the 1986 reading. Other palatable browse species in the area are four-wing saltbush (warm season species), slender buckwheat, and winterfat (warm season species). These all show heavy use. Broom snakeweed, a small increaser subshrub, is also common.

Grasses are fairly common and although they showed the effects of grazing, especially when compared to the deer only exclosure. Nested frequency for perennial grasses has declined considerable since 1986. The

annual, cheatgrass, has increased significantly in frequency between 1994 and 1999. It currently provides 39% of the grass cover. All this points to the strong influence prolonged drought has on the plant communities.

Several typical pinyon-juniper associated forb species are present, although overall density and usefulness on this winter range is limited. The cover value for all the forbs combined was only a little over 1% in 1994 and 2% in 1999. 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/ 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%. Much of this downward trend can be attributed to the prolonged drought since 1985. 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%. This should turn around with normal precipitation patterns. For the herbaceous understory, the perennial grasses have experienced a sharply significant decrease in their nested frequency values. The perennial forbs are fairly stable, but even when all are combined, they do not contribute much more than 5% of the total vegetative cover. Trend for the herbaceous understory is down.

#### TREND ASSESSMENT

soil - down

browse - stable

herbaceous understory - down

#### 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 for the key species, mountain big sagebrush, is currently low. Utilization is higher than 1994, however vigor has improved and percent decadency is 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 stable for perennial species. However cheatgrass, an annual, has increased significantly in nested frequency since 1994. Cover has also increased 5 fold. Taking this into consideration, overall trend for the herbaceous understory is slightly down.

#### TREND ASSESSMENT

soil - stable

browse - stable for big sagebrush

herbaceous understory - down slightly due to a dramatic increase in cheatgrass

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 11

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'94	'99	'86	'94	'99	'94	'99
G	<i>Agropyron smithii</i>	<sub>b</sub> 204	<sub>a</sub> 69	72	83	30	33	.42	.46
G	<i>Bouteloua gracilis</i>	168	154	163	63	56	57	3.05	5.13
G	<i>Bromus tectorum</i> (a)	-	<sub>a</sub> 49	<sub>b</sub> 222	-	18	71	.18	5.43
G	<i>Oryzopsis hymenoides</i>	<sub>a</sub> -	<sub>ab</sub> 4	<sub>b</sub> 10	-	2	4	.03	.02
G	<i>Poa fendleriana</i>	1	1	-	1	1	-	.00	-
G	<i>Sitanion hystrix</i>	<sub>a</sub> 2	<sub>ab</sub> 12	<sub>b</sub> 19	2	5	9	.03	.09
G	<i>Sporobolus cryptandrus</i>	<sub>b</sub> 53	<sub>a</sub> 3	<sub>a</sub> 7	25	1	3	.00	.01
G	<i>Stipa comata</i>	<sub>c</sub> 280	<sub>b</sub> 178	<sub>a</sub> 117	95	66	44	3.65	2.50
G	<i>Vulpia octoflora</i> (a)	-	<sub>b</sub> 121	<sub>a</sub> 39	-	45	15	.40	.17
Total for Annual Grasses		0	170	261	0	63	86	0.58	5.60
Total for Perennial Grasses		708	421	388	269	161	150	7.20	8.24
Total for Grasses		708	591	649	269	224	236	7.79	13.85
F	<i>Astragalus mollissimus</i>	<sub>ab</sub> 11	<sub>b</sub> 15	<sub>a</sub> 1	4	8	1	.09	.03
F	<i>Calochortus nuttallii</i>	2	-	4	1	-	2	-	.03
F	<i>Chaenactis douglasii</i>	-	3	-	-	2	-	.01	-
F	<i>Descurainia pinnata</i> (a)	-	16	16	-	8	9	.04	.04
F	<i>Draba</i> spp. (a)	-	<sub>b</sub> 65	<sub>a</sub> -	-	28	-	.14	-
F	<i>Eriogonum cernuum</i> (a)	3	5	4	1	3	2	.01	.01
F	<i>Erigeron pumilus</i>	<sub>c</sub> 44	<sub>a</sub> -	<sub>b</sub> 9	24	-	4	-	.02
F	<i>Gilia</i> spp. (a)	-	4	-	-	2	-	.01	-
F	<i>Holosteum umbellatum</i> (a)	-	3	1	-	2	1	.01	.00
F	<i>Lappula occidentalis</i> (a)	-	<sub>b</sub> 18	<sub>a</sub> 4	-	10	2	.05	.01
F	<i>Mammillaria</i> spp.	3	-	-	1	-	-	-	-
F	<i>Penstemon</i> spp.	-	<sub>B</sub> 3	<sub>a</sub> 3	-	1	1	.03	.00
F	<i>Phlox hoodii</i>	<sub>a</sub> -	<sub>b</sub> 19	<sub>b</sub> 22	-	8	9	.26	.27
F	<i>Phlox longifolia</i>	<sub>a</sub> -	<sub>b</sub> 8	<sub>b</sub> 16	-	5	8	.02	.06
F	<i>Plantago patagonica</i> (a)	-	<sub>b</sub> 99	<sub>a</sub> 74	-	41	28	.25	.24
F	<i>Ranunculus testiculatus</i> (a)	-	<sub>a</sub> 16	<sub>b</sub> 36	-	7	14	.03	.14
F	<i>Senecio multilobatus</i>	3	-	1	1	-	1	-	.03
F	<i>Sphaeralcea coccinea</i>	118	126	139	53	55	58	.60	1.16
F	<i>Tragopogon dubius</i>	-	1	-	-	1	-	.00	-
Total for Annual Forbs		3	226	135	1	101	56	0.56	0.45
Total for Perennial Forbs		181	175	195	84	80	84	1.03	1.62
Total for Forbs		184	401	330	85	181	140	1.59	2.07

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

BROWSE TRENDS --  
Herd unit 14 , Study no: 11

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Artemisia tridentata vaseyana	44	40	3.49	5.55
B	Atriplex canescens	3	2	.03	.03
B	Ceratoides lanata	0	1	-	-
B	Chrysothamnus nauseosus	0	0	-	-
B	Echinocereus spp.	0	5	.00	.01
B	Ephedra viridis	0	0	-	-
B	Eriogonum microthecum	14	18	.12	.15
B	Gutierrezia sarothrae	18	62	.11	1.12
B	Juniperus osteosperma	-	-	.76	1.88
B	Leptodactylon pungens	0	1	-	-
B	Opuntia spp.	21	26	.16	.55
B	Pinus edulis	0	8	9.51	9.40
B	Symphoricarpos oreophilus	0	0	-	-
B	Yucca spp.	0	0	-	.03
Total for Browse		100	163	14.20	18.76

CANOPY COVER --  
Herd unit 14 , Study no: 11

Species	Percent Cover '09
Juniperus osteosperma	4
Pinus edulis	13

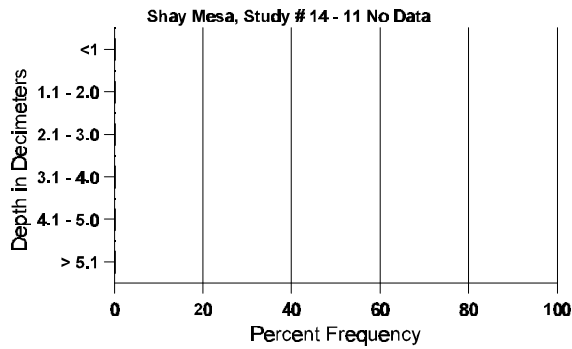
BASIC COVER --  
Herd unit 14 , Study no: 11

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'86	'94	'99
Vegetation	313	329	14.00	23.29	33.92
Rock	3	-	0	.01	0
Pavement	4	1	0	.01	.00
Litter	386	367	61.25	36.06	40.02
Cryptogams	134	146	4.25	1.69	5.40
Bare Ground	323	282	20.50	39.61	41.13

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 11, Study Name: Shay Mesa

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	67.4 (16.6)	7.3	58.9	18.6	22.6	1.5	7.9	83.2	0.6

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 14 , Study no: 11

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Rabbit	62	60	N/A
Deer	9	3	1 (2)
Cattle	3	11	26 (64)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 11

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	'86	5	20	1	-	-	-	-	-	-	21	4	-	1	1733			26
	'94	21	-	-	-	-	-	-	-	-	21	-	-	-	420			21
	'99	3	5	-	-	-	-	-	-	-	8	-	-	-	160			8
M	'86	-	6	1	-	-	-	-	-	-	3	3	1	-	466	23	25	7
	'94	88	-	-	-	-	-	-	-	-	65	4	19	-	1780	18	22	89
	'99	30	44	15	-	-	-	-	-	-	89	-	-	-	1780	22	30	89
D	'86	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	'94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	'99	3	1	2	-	-	-	-	-	-	5	-	1	-	120			6
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	220			11
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		76%			09%			06%			+ 1%							
'94		00%			00%			17%			-10%							
'99		49%			17%			.97%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	2265	Dec:	3%			
												'94	2280		4%			
												'99	2060		6%			



A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4		1	2				
<i>Atriplex canescens</i>												
S	86	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	20		1	
	99	-	-	-	-	-	-	-	0		0	
Y	86	-	-	-	-	-	-	-	0		0	
	94	3	-	-	-	-	-	-	60		3	
	99	-	-	-	-	-	-	-	0		0	
M	86	-	2	1	-	-	-	-	200	5	3	3
	94	1	-	-	-	-	-	-	20	20	30	1
	99	-	-	1	-	-	-	-	20	23	21	1
D	86	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	40		2	
	99	-	-	-	-	-	1	-	20		1	
X	86	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		67%		33%		00%		-40%				
'94		00%		00%		33%		-67%				
'99		00%		50%		50%						
Total Plants/Acre (excluding Dead & Seedlings)						'86	200	Dec:	0%			
						'94	120		33%			
						'99	40		50%			
<i>Ceratoides lanata</i>												
M	86	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	0	11	11	0
	99	-	-	-	-	1	-	-	20	11	12	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'94		00%		00%		00%						
'99		00%		100%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'86	0	Dec:	-			
						'94	0		-			
						'99	20		-			
<i>Chrysothamnus nauseosus</i>												
Y	86	-	1	10	-	-	-	-	733		11	
	94	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	0		0	
M	86	-	1	36	-	-	-	-	2466	15	16	37
	94	-	-	-	-	-	-	-	0	9	39	0
	99	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		04%		96%		00%						
'94		00%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'86	3199	Dec:	-			
						'94	0		-			
						'99	0		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Echinocereus</i> spp.																	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	60			3
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	40	3	6	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'94	0		-		
												'99	100		-		
<i>Ephedra viridis</i>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	26	28	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	20	30	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'94	0		-		
												'99	0		-		
<i>Eriogonum microthecum</i>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	1	-	-	-	-	-	3	-	-	60			3
	99	2	-	-	-	-	-	-	-	-	2	-	-	40			2
Y	86	3	-	-	-	-	-	-	-	-	3	-	-	200			3
	94	13	-	-	-	-	-	-	-	-	13	-	-	260			13
	99	11	-	1	-	-	-	-	-	-	12	-	-	240			12
M	86	5	-	-	-	-	-	-	-	-	5	-	-	333	11	6	5
	94	12	-	-	-	-	-	-	-	-	12	-	-	240	3	4	12
	99	5	9	21	-	-	2	-	-	-	37	-	-	740	6	5	37
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	3	-	-	-	-	-	-	-	-	3	-	-	60			3
	99	-	-	-	-	-	2	-	-	-	2	-	-	40			2
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			+ 5%						
'94		00%			00%			00%			+45%						
'99		18%			51%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	533	Dec:	0%		
												'94	560		11%		
												'99	1020		4%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
<i>Gutierrezia sarothrae</i>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	86	21	-	-	-	-	-	-	-	21	-	-	-	1400		21	
	94	6	-	-	-	-	-	-	-	6	-	-	-	120		6	
	99	30	-	-	-	-	-	-	-	30	-	-	-	600		30	
M	86	99	-	-	-	-	-	-	-	99	-	-	-	6600	7	5	99
	94	23	-	-	-	-	-	-	-	23	-	-	-	460	6	6	23
	99	168	-	-	4	-	-	-	-	172	-	-	-	3440	7	7	172
D	86	4	-	-	-	-	-	-	-	4	-	-	-	266		4	
	94	3	-	-	-	-	-	-	-	3	-	-	-	60		3	
	99	4	-	-	-	-	-	-	-	2	-	-	2	80		4	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'86		00%		00%		00%		-92%									
'94		00%		00%		00%		+84%									
'99		00%		00%		.97%											
Total Plants/Acre (excluding Dead & Seedlings)										'86	8266	Dec:	3%				
										'94	640		9%				
										'99	4120		2%				
<i>Leptodactylon pungens</i>																	
M	86	14	-	-	-	-	-	-	-	14	-	-	-	933	1	3	14
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
D	86	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'86		00%		00%		00%											
'94		00%		00%		00%											
'99		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'86	999	Dec:	7%				
										'94	0		0%				
										'99	20		0%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total										
		1	2	3	4		1	2											
Opuntia spp.																			
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	99	3	-	-	-	-	-	-	-	3	-	-	-	60		3			
Y	86	1	-	-	-	-	-	-	-	1	-	-	-	66		1			
	94	3	-	-	-	-	-	-	-	3	-	-	-	60		3			
	99	7	-	-	-	-	-	-	-	7	-	-	-	140		7			
M	86	3	-	-	-	-	-	-	-	3	-	-	-	200	3	4	3		
	94	19	-	-	-	-	-	-	-	18	-	1	-	380	3	11	19		
	99	30	-	-	-	-	-	-	-	30	-	-	-	600	6	13	30		
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	7	-	-	-	-	-	-	-	7	-	-	-	140		7			
	99	1	-	-	-	-	-	-	-	1	-	-	-	20		1			
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	99	-	-	-	-	-	-	-	-	-	-	-	-	60		3			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'86		00%		00%		00%		+54%											
'94		00%		00%		03%		+24%											
'99		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'86	266	Dec:	0%						
										'94	580		24%						
										'99	760		3%						
Pinus edulis																			
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	99	1	-	-	-	-	-	-	-	1	-	-	-	20		1			
Y	86	1	-	-	-	-	-	-	-	1	-	-	-	66		1			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	99	2	-	-	-	-	-	-	-	2	-	-	-	40		2			
M	86	2	-	-	-	-	-	-	-	2	-	-	-	133	114	45	2		
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
	99	5	-	-	-	-	1	-	-	6	-	-	-	120	-	-	6		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'86		00%		00%		00%													
'94		00%		00%		00%													
'99		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'86	199	Dec:	-						
										'94	0		-						
										'99	160		-						

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Symphoricarpos oreophilus																		
M	86	-	2	1	-	-	-	-	-	-	-	2	-	1	200	15	22	3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'86	67%			33%			33%										
	'94	00%			00%			00%										
	'99	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	200	Dec:	-			
												'94	0		-			
												'99	0		-			
Yucca spp.																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	33	38	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'86	00%			00%			00%										
	'94	00%			00%			00%										
	'99	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'94	0		-			
												'99	0		-			

Trend Study14-12-99

Study site name: Shingle Mill .

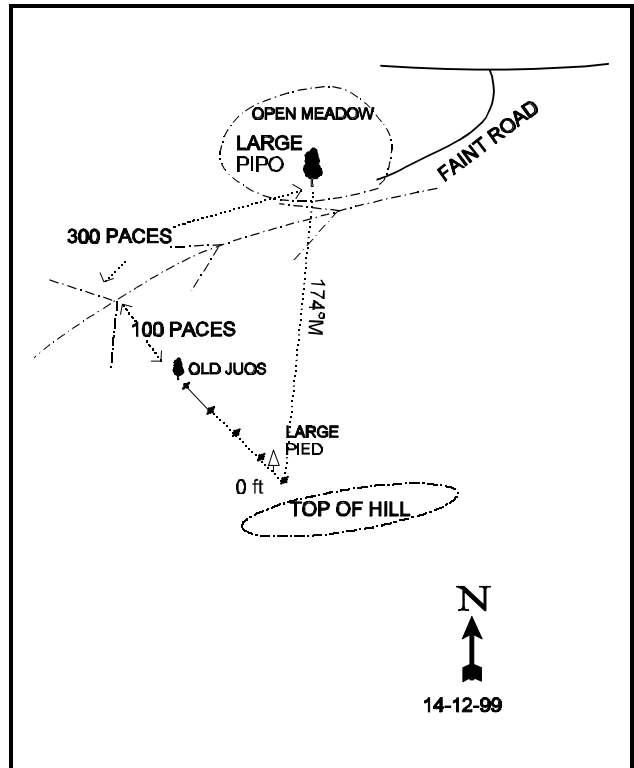
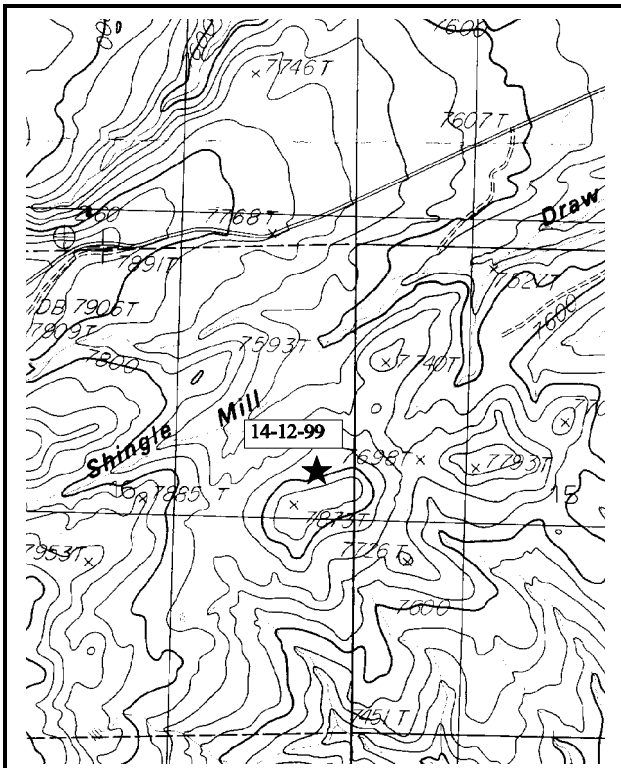
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 278°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1(11 and 95 ft), line 2(34 ft), line 3(59 ft), line 4(71ft).

LOCATION DESCRIPTION

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 .

UTM 4187068.532 N , 641390.437 E

## DISCUSSION

### Trend Study No. 14-12 (35-12)

Shingle Mill is a new trend study site established in 1994. It samples a mixed mountain brush type west of Monticello, considered critical deer winter range by Forest Service personnel. 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 estimate 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 appear to be mostly from last season. This site is similar to site 14-3 (35-3 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 soil on the site is quite variable in depth as illustrated by the presence of both black sagebrush and mountain big sagebrush which characteristically are adapted to different depths of soil. There is also a high amount of large rock on the surface and within the top 4 inches of the soil profile. However, estimated effective rooting depth is moderately deep at nearly 19 inches. 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; 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 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. Black sagebrush occurs on the steeper portions of the slope in isolated patches. It had a density of only 120 plants/acre in 1999. It appears that there was some problems in identification between the two species of sagebrush in 1994. Mountain big sagebrush currently numbers 2,800 plants/acre. Use is mostly moderate, vigor good, and percent decadence low at 12%. True mountain mahogany displayed moderate to heavy use in 1994 and 1999. Density has declined slightly, but vigor is generally good and decadence is low. Squaw-apple has declined in density since 1994. Utilization is moderate to heavy, although vigor is normal and percent decadency low. Reproduction is poor with only a few young plants sampled in 1994 and 1999. Serviceberry also shows some moderate to heavy use, however it only provides 3% of the browse cover with a stable density of about 840 plants/acre in 1999.

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 currently account for 42% of the herbaceous cover. Mutton bluegrass is most abundant followed by prairie junegrass, and subalpine needlegrass. These species provided 57% of the grass cover in 1994 and 80% in 1999. Forbs are also diverse with 20 species encountered in 1999. Most species are uncommon however, with 3 species, weedy milkvetch, silvery lupine, and mat penstemon, providing 91% of the forb cover in 1994 and 93% in 1999. Weedy milkvetch and silvery lupine are poisonous to livestock and considered increasers under grazing pressure.

### 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 in the future.

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 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.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - up, but forbs dominated by poisonous species

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 12

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'94	'99	'94	'99	'94	'99
G	Agropyron smithii	5	20	3	9	.01	.12
G	Agropyron trachycaulum	40	*57	13	23	.82	.75
G	Carex spp.	23	33	10	15	1.23	.93
G	Koeleria cristata	33	*82	14	31	.51	3.25
G	Oryzopsis hymenoides	13	9	8	3	.09	.01
G	Poa fendleriana	241	254	74	84	3.86	6.80
G	Poa pratensis	7	*43	3	18	.16	1.04
G	Sitanion hystrix	91	*29	37	15	.72	.46
G	Stipa columbiana	17	*104	7	32	.52	3.16
G	Stipa comata	-	6	-	2	-	.06
G	Stipa lettermani	35	-	16	-	.66	-
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		505	637	185	232	8.59	16.62
Total for Grasses		505	637	185	232	8.59	16.62
F	Achillea millefolium	24	20	7	7	.22	.57
F	Agoseris glauca	4	-	2	-	.01	-



Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'94	'99	'94	'99	'94	'99
F	Allium spp.	7	*-	4	-	.02	-
F	Arabis spp.	4	-	2	-	.01	-
F	Artemisia ludoviciana	10	3	2	1	.01	.03
F	Astragalus miser	154	207	58	77	5.65	13.08
F	Castilleja linariaefolia	5	4	2	1	.03	.03
F	Calochortus nuttallii	2	*13	1	5	.00	.31
F	Cirsium spp.	4	1	2	1	.01	.00
F	Crepis acuminata	2	13	1	6	.00	.08
F	Cymopterus spp.	1	3	1	1	.00	.00
F	Eriogonum elatum	2	-	1	-	.00	-
F	Erigeron spp.	4	4	3	2	.01	.03
F	Hymenoxys acaulis	9	13	4	5	.09	.05
F	Lathyrus lanszwertii	4	-	1	-	.00	-
F	Lomatium dissectum	14	25	5	13	.17	.21
F	Lupinus argenteus	39	*46	20	20	1.99	3.58
F	Penstemon pachyphyllus	3	-	2	-	.01	-
F	Petradoria pumila	-	*7	-	3	-	.09
F	Penstemon caespitosus	144	165	48	57	2.26	4.53
F	Phlox longifolia	72	*52	29	22	.19	.16
F	Senecio neomexicanus	3	1	1	1	.00	.00
F	Taraxacum officinale	-	28	-	8	-	.14
F	Tragopogon dubius	3	2	1	2	.00	.01
F	Trifolium gymnocarpon	1	3	1	1	.03	.00
F	Zigadenus paniculatus	-	10	-	5	-	.02
Total for Annual Forbs		0	0	0	0	0	0
Total for Perennial Forbs		515	620	198	238	10.78	22.98
Total for Forbs		515	620	198	238	10.79	22.98

\* Indicates significant difference at % = 0.10

BROWSE TRENDS --  
Herd unit 14 , Study no: 12

T y p e	Species	Strip Frequency		Average Cover %	
		'94	'99	'94	'99
B	Amelanchier utahensis	24	17	.72	1.07
B	Artemisia nova	30	5	4.34	.56
B	Artemisia tridentata vaseyana	38	64	5.67	12.10
B	Cercocarpus montanus	27	25	2.77	2.91
B	Chrysothamnus depressus	51	38	1.68	2.32
B	Gutierrezia sarothrae	5	2	.01	.03
B	Juniperus osteosperma	0	1	-	-
B	Opuntia spp.	0	0	-	-
B	Peraphyllum ramosissimum	30	24	3.87	3.62
B	Pinus edulis	0	3	.42	.69
B	Quercus gambelii	0	24	4.10	7.50
B	Symphoricarpos oreophilus	77	71	5.64	9.85
Total for Browse		282	274	29.27	40.67

CANOPY COVER --  
Herd unit 14 , Study no: 12

Species	Percent Cover '99
Pinus edulis	2

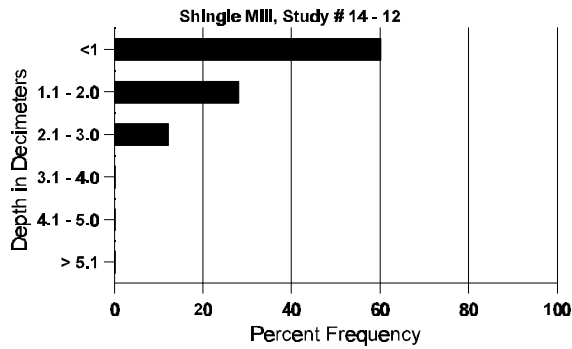
BASIC COVER --  
Herd unit 14 , Study no: 12

Cover Type	Nested Frequency		Average Cover %	
	'94	'99	'94	'99
Vegetation	407	499	47.95	66.71
Rock	307	317	17.14	17.51
Pavement	230	311	2.46	5.48
Litter	462	545	25.22	40.04
Cryptogams	18	55	.28	.95
Bare Ground	351	401	17.34	22.88

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 12, Study Name: Shingle Mill

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.7	51.8 (17.8)	7.3	26.9	20.6	52.6	3.4	5.6	86.4	0.4

# Stoniness Index



## PELLET GROUP FREQUENCY --

Herd unit 14 , Study no: 12

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'94	'99	
Rabbit	-	4	N/A
Elk	5	-	7 (17)
Deer	17	27	39 (96)
Cattle	-	-	9 (22)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 12

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4											
Amelanchier utahensis																
S	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	2	-	-	-	-	-	-	-	2	-	-	-	40		2
Y	94	8	-	-	3	-	1	-	-	12	-	-	-	240		12
	99	11	5	-	3	-	-	-	-	17	-	2	-	380		19
M	94	20	-	-	4	1	1	-	-	26	-	-	-	520	12 15	26
	99	13	-	1	1	1	5	-	-	19	1	1	-	420	17 20	21
D	94	2	-	-	3	-	-	-	-	4	1	-	-	100		5
	99	-	1	-	-	-	1	-	-	-	-	-	2	40		2
X	94	-	-	-	-	-	-	-	-	-	-	-	-	40		2
	99	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'94		02%			05%			00%			- 2%					
'99		17%			17%			12%								
Total Plants/Acre (excluding Dead & Seedlings)										'94	860	Dec:	12%			
										'99	840		5%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia nova</i>																	
S	94	34	-	-	-	-	-	2	-	-	36	-	-	-	720		36
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	94	49	-	-	1	-	-	-	-	-	48	-	2	-	1000	17 27	50
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100	15 23	5
D	94	13	-	-	-	-	-	-	-	-	12	-	-	1	260		13
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			05%			-90%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	1260	Dec:	21%			
											'99	120		17%			
<i>Artemisia tridentata vaseyana</i>																	
S	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6
	99	12	4	-	3	-	-	-	-	-	19	-	-	-	380		19
M	94	30	3	3	-	-	-	-	-	-	36	-	-	-	720	20 27	36
	99	88	16	-	-	-	-	-	-	-	104	-	-	-	2080	19 34	104
D	94	16	-	-	-	-	-	-	-	-	11	-	-	5	320		16
	99	15	2	-	-	-	-	-	-	-	14	-	-	3	340		17
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	380		19
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		05%			05%			09%			+59%						
'99		16%			00%			02%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	1160	Dec:	28%			
											'99	2800		12%			
<i>Cercocarpus montanus</i>																	
S	94	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	94	3	2	-	1	-	-	-	-	-	6	-	-	-	120		6
	99	7	2	-	1	-	-	-	-	-	10	-	-	-	200		10
M	94	17	5	4	1	13	2	-	-	-	42	-	-	-	840	20 22	42
	99	4	4	17	-	1	2	-	-	-	28	-	-	-	560	27 33	28
D	94	-	-	-	-	1	2	-	-	-	3	-	-	-	60		3
	99	1	-	3	-	-	1	-	-	-	1	-	-	4	100		5
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		41%			16%			00%			-16%						
'99		16%			53%			09%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	1020	Dec:	6%			
											'99	860		12%			

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Chrysothamnus depressus</i>																	
S	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	94	159	-	-	14	-	-	7	-	-	180	-	-	-	3600	5 9	180
	99	146	2	-	20	-	-	-	-	-	168	-	-	-	3360	4 8	168
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%			- 7%						
'99		01%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	3600	Dec:	-			
											'99	3360		-			
<i>Gutierrezia sarothrae</i>																	
M	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120	8 8	6
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	6 6	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%			-33%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	120	Dec:	-			
											'99	80		-			
<i>Juniperus osteosperma</i>																	
D	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%									
'99		00%			00%			100%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	0	Dec:	0%			
											'99	20		100%			
<i>Opuntia spp.</i>																	
S	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'94	0	Dec:	-			
											'99	0		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<b>Peraphyllum ramosissimum</b>																	
Y	94	4	2	-	-	-	-	-	-	-	6	-	-	-	120		6
	99	2	1	-	-	-	-	-	-	-	3	-	-	-	60		3
M	94	30	14	2	11	9	-	-	-	-	65	-	1	-	1320	18 27	66
	99	14	17	3	1	-	6	-	-	-	41	-	-	-	820	18 25	41
D	94	-	1	-	2	1	-	-	-	-	3	-	-	1	80		4
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		19%			02%			02%			-65%						
'99		42%			20%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'94	2540	Dec:	3%		
												'99	900		2%		
<b>Pinus edulis</b>																	
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	2	-	-	1	-	-	-	-	-	2	-	1	-	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%									
'99		00%			00%			33%									
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-		
												'99	60		-		
<b>Quercus gambelii</b>																	
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	44	-	-	8	-	-	-	-	-	52	-	-	-	1040		52
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	41	42	6	23	-	8	-	-	-	120	-	-	-	2400	25 21	120
D	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	4	-	-	-	-	-	-	4	80		4
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	360		18
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%									
'99		24%			10%			02%									
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	0%		
												'99	3520		2%		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Symphoricarpos oreophilus																		
S	94	4	-	-	-	-	-	1	-	-	5	-	-	-	100		5	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	94	39	-	-	3	-	-	3	-	-	45	-	-	-	900		45	
	99	16	-	-	1	-	-	-	-	-	17	-	-	-	340		17	
M	94	253	4	-	37	-	-	-	-	-	294	-	-	-	5880	13 21	294	
	99	235	8	-	26	-	-	-	-	-	269	-	-	-	5380	14 23	269	
D	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	2	-	-	-	-	1	-	-	-	2	-	-	1	60		3	
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'94		01%			00%			00%			-15%							
'99		03%			.34%			.34%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	6820	Dec:	1%			
												'99	5780		1%			

Trend Study 14-13-99

Study site name: Black Mesa .

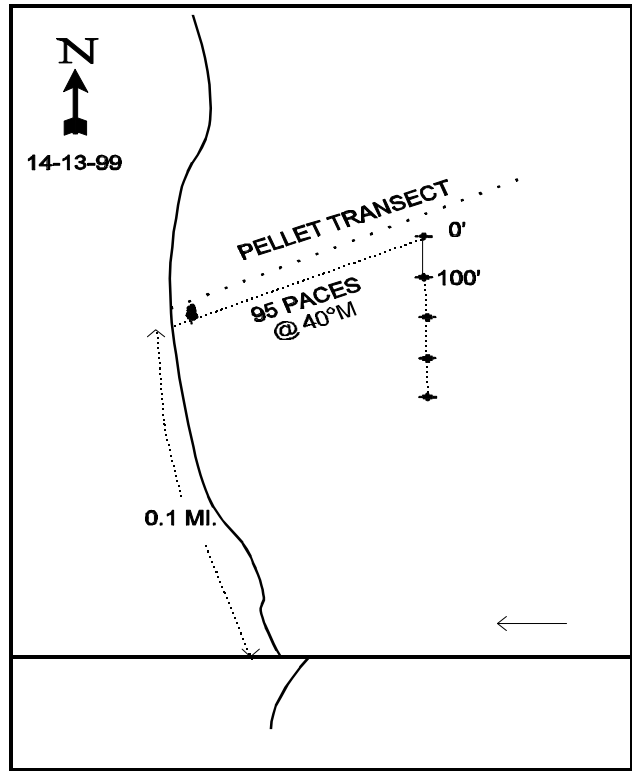
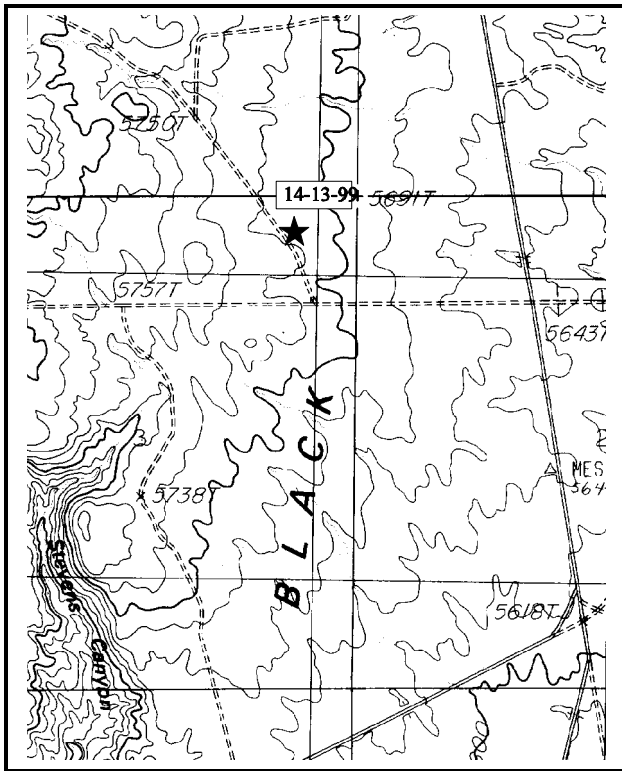
Range type: Big Sagebrush .

Compass bearing: frequency baseline 163°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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 #283). 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 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

UTM 4153113.532 N , 624401.546 E



## DISCUSSION

### Trend Study No. 14-13 (36-1)

This transect is on top of Black Mesa, considered an important deer wintering area southeast of Elk Ridge and one of the lowest sites elevationally on the unit. It is 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 with an elevation of 5,700 feet. Free water is limited in the area, but some must be available when cattle are grazing. 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 was infrequent and not concentrated on the site during past readings, but pellet group data from the site in 1999 estimated 44 cow use days/acre (109 cdu/ha). 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 use day/acre (2 edu/ha). Human pressure in the area is generally low, however there are several mining claims staked out near the study.

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 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. Values less than 10 ppm for phosphorus and 70 ppm for potassium are minimal for normal 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.

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. The biotic potential (proportion of seedlings to the population) was also good at 12%. Utilization was moderate to heavy with 37% of the plants sampled displaying heavy use. Vigor was considered poor on 20% of the sagebrush sampled. 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. However, these improvements were short lived. By 1999, use has returned to moderate to heavy and vigor is reduced on about 20% of the population. Percent decadence has increased from 37% in 1986 to 57% by 1992 and 60% in 1999. Of those decadent plants sampled in 1999, 34% appear to be dying. The proportion of mature plants in the stand has declined from 47% in 1986 to 31% in 1999. Reproduction is currently poor and dead plants are nearly as numerous as live ones. Many of these problems are the result of the extended drought the area has experienced, combined with excessively high soil temperatures and continued heavy use.

The scattered juniper in the flat are generally vigorous and could probably be slowly increasing. Point quarter data from 1999 estimate only 10 juniper trees/acre with an average diameter of 6.3 inches. There is a patch of dead trees and stumps along the baseline. The site also contains a dense population of broom snakeweed which had an estimated population of 10,132 plants/acre in 1986. Density declined to only 2,940 plants/acre by 1994, but rebounded in 1999 to 8,900 plants/acre. Only a few seedlings were encountered, yet young plants are numerous and account for 18% of the population.

The herbaceous understory contains a number of perennial grasses, however cheatgrass dominates the understory. It has increased significantly in nested frequency since 1992 when annuals were first included in the sampling design. Cheatgrass currently provides 75% of the grass cover. The occurrence of perennial

grasses is erratic and limited to small patches of galleta, some bottlebrush squirreltail, and a few needle-and-thread. These grasses showed signs of moderate utilization in 1986. Forbs are very scarce and currently ('99) provide less than 1/2 of 1% cover.

#### 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 aggressive 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. Rather than continue the point method (4 points on each quadrat) which estimated basal cover and did not estimate foliar cover, a slightly modified version of the Daubenmire (1959) (see methods) method was used. All measurements except for vegetation will be relatively similar. Now, cover values for vegetation will usually be much larger because they are projected over rock, pavement, litter, etc.. Total cover now can add up to over 100 percent because it is multistoried and projected over the top of rock, litter, pavement, etc. 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 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 an upward trend for the herbaceous understory.

##### TREND ASSESSMENT

soil - stable to slightly improving

browse - down with losses in population and increases in percent decadency

herbaceous understory - up

#### 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 poor on 21% of the plants sampled, and half of the 1,420 decadent plants sampled appear 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 of perennial grasses. Frequency of perennial forbs declined slightly.

##### TREND ASSESSMENT

soil - stable

browse - up slightly

herbaceous understory - up slightly

#### 1999 TREND ASSESSMENT

Tend for soil is up due to a decline in percent bare ground from 46% in 1994 to 38% in 1999. Litter cover also increased substantially. Unfortunately, much of the improvements are due to the dramatic increase in

cheatgrass. Trend for browse is down once again after an 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 4 fold and cover rose from ½ of 1% 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.

TREND ASSESSMENT

soil - up

browse - down

herbaceous understory - down and dominated by cheatgrass

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 13

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %		
		'86	'92	'94	'99	'86	'92	'94	'99	'92	'94	'99
G	Bromus tectorum (a)	-	a26	b95	c358	-	12	40	96	.14	.49	12.17
G	Hilaria jamesii	a40	b66	b75	72	15	21	25	27	4.26	4.42	3.22
G	Oryzopsis hymenoides	a-	b13	b12	ab2	-	5	6	1	.05	.08	.03
G	Sitanion hystrix	c142	b55	c131	a15	64	23	55	7	1.33	2.24	.21
G	Sporobolus cryptandrus	a-	b27	a11	a5	-	14	5	2	1.74	.39	.01
G	Stipa comata	a2	b53	c93	b43	2	26	35	25	2.02	1.75	.33
G	Vulpia octoflora (a)	-	a17	b50	b59	-	8	24	22	.04	.12	.19
Total for Annual Grasses		0	43	145	417	0	20	64	118	0.18	0.61	12.36
Total for Perennial Grasses		184	214	322	137	81	89	126	62	9.42	8.89	3.81
Total for Grasses		184	257	467	554	81	109	190	180	9.60	9.51	16.18
F	Astragalus convallarius	a-	b7	b5	ab3	-	4	3	1	.09	.04	.03
F	Chenopodium album (a)	-	b26	a-	a-	-	10	-	-	.39	-	-
F	Chaenactis stevioides	a-	b5	a-	a-	-	3	-	-	.01	-	-
F	Comandra pallida	a-	b13	b9	b11	-	5	4	4	.25	.04	.09
F	Cordylanthus wrightii (a)	-	b58	a-	a-	-	33	-	-	2.34	-	-
F	Cryptantha spp.	a-	a-	b8	a-	-	-	4	-	-	.07	-
F	Descurainia pinnata. (a)	-	b18	ab13	a3	-	7	6	1	.06	.05	.00
F	Draba rectifruca (a)	-	a-	b9	a-	-	-	5	-	-	.05	-
F	Eriogonum cernuum (a)	-	b22	ab2	a-	-	11	2	-	.13	.01	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %		
		'86	'92	'94	'99	'86	'92	'94	'99	'92	'94	'99
F	<i>Erodium cicutarium</i> (a)	-	-	-	2	-	-	-	1	-	-	.00
F	<i>Erigeron</i> spp.	2	-	-	-	1	-	-	-	-	-	-
F	<i>Euphorbia fendleri</i>	3	-	1	-	1	-	1	-	-	.00	-
F	<i>Gilia hutchinifolia</i> (a)	-	<sub>b</sub> 109	<sub>a</sub> 5	<sub>a</sub> 14	-	47	4	5	.38	.02	.22
F	<i>Lappula occidentalis</i> (a)	-	<sub>c</sub> 28	<sub>b</sub> 11	<sub>a</sub> -	-	11	5	-	.30	.02	-
F	<i>Lactuca serriola</i>	-	-	6	-	-	-	2	-	-	.03	-
F	<i>Lupinus</i> spp.	<sub>a</sub> -	<sub>b</sub> 92	<sub>a</sub> -	<sub>a</sub> -	-	47	-	-	.68	-	-
F	<i>Lygodesmia</i> spp.	-	-	1	-	-	-	1	-	-	.00	-
F	<i>Mentzelia albicaulis</i> (a)	-	<sub>b</sub> 39	<sub>a</sub> -	<sub>a</sub> -	-	18	-	-	.47	-	-
F	<i>Medicago sativa</i>	2	-	-	-	1	-	-	-	-	-	-
F	<i>Navarretia intertexta</i> (a)	-	-	3	1	-	-	1	1	-	.00	.00
F	<i>Phlox longifolia</i>	<sub>ab</sub> 26	<sub>bc</sub> 41	<sub>c</sub> 52	<sub>a</sub> 7	12	18	21	4	.11	.10	.02
F	<i>Sphaeralcea coccinea</i>	1	-	1	3	1	-	1	1	.00	.00	.00
F	Unknown forb-annual (a)	-	<sub>b</sub> 34	<sub>a</sub> -	<sub>a</sub> -	-	18	-	-	.33	-	-
F	Unknown forb-perennial	-	-	2	-	-	-	1	-	-	.00	-
Total for Annual Forbs		0	334	43	20	0	155	23	8	4.42	0.16	0.23
Total for Perennial Forbs		34	158	85	24	16	77	38	10	1.16	0.31	0.14
Total for Forbs		34	492	128	44	16	232	61	18	5.59	0.48	0.38

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

BROWSE TRENDS --  
Herd unit 14 , Study no: 13

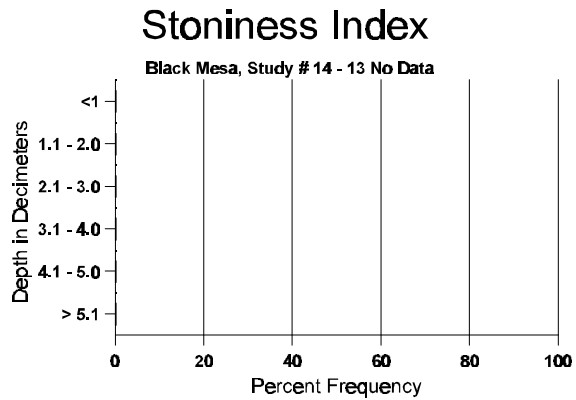
Type	Species	Strip Frequency			Average Cover %		
		'92	'94	'99	'92	'94	'99
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	57	67	63	7.89	12.23	4.72
B	<i>Ephedra viridis</i>	1	1	1	-	-	-
B	<i>Gutierrezia sarothrae</i>	51	42	70	6.96	.57	2.88
B	<i>Juniperus osteosperma</i>	-	-	-	-	.85	-
B	<i>Opuntia</i> spp.	0	1	0	-	-	-
B	<i>Yucca</i> spp.	1	0	2	.63	-	-
Total for Browse		110	111	136	15.48	13.66	7.60

BASIC COVER --  
Herd unit 14 , Study no: 13

Cover Type	Nested Frequency			Average Cover %			
	'92	'94	'99	'86	'92	'94	'99
Vegetation	224	301	374	3.25	23.40	23.32	25.59
Rock	8	36	2	0	.45	.10	.06
Pavement	4	42	33	.50	0	.09	.06
Litter	190	376	371	38.50	27.37	29.72	38.25
Cryptogams	23	31	13	5.75	.91	.31	.08
Bare Ground	228	361	305	52.00	39.81	46.33	38.41

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 13, Study Name: Black Mesa

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.7	76.0 (12.3)	7.3	60.9	16.6	22.6	1.3	7.5	70.4	0.5



PELLET GROUP FREQUENCY --  
Herd unit 14 , Study no: 13

Type	Quadrat Frequency		
	'92	'94	'99
Rabbit	52	39	75
Elk	-	1	1
Deer	22	17	34
Cattle	-	4	10

Pellet Transect Days Use/Acre (ha) '99
N/A
1 (2)
58 (143)
44 (109)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 13

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																		
S	'86	7	-	-	-	-	-	-	-	-	6	-	-	1	466			7
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	57	-	-	-	-	-	-	-	-	57	-	-	-	1140			57
	'99	4	2	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	'86	3	3	2	-	-	-	-	-	-	5	-	-	3	533			8
	'92	7	10	-	8	2	-	1	-	-	28	-	-	-	560			28
	'94	47	-	-	-	-	-	1	-	-	47	-	-	1	960			48
	'99	2	3	3	2	-	-	-	-	-	10	-	-	-	200			10
M	'86	9	7	7	-	-	-	-	-	-	18	3	-	2	1533	19	15	23
	'92	10	16	8	-	-	-	-	-	-	34	-	-	-	680	-	-	34
	'94	64	-	-	-	-	-	-	-	-	61	3	-	-	1280	25	36	64
	'99	-	13	14	-	-	6	-	-	-	33	-	-	-	660	23	33	33
D	'86	5	4	9	-	-	-	-	-	-	11	2	-	5	1200			18
	'92	8	44	30	-	-	-	-	-	-	72	-	-	10	1640			82
	'94	71	-	-	-	-	-	-	-	-	30	1	4	36	1420			71
	'99	1	10	5	2	13	29	4	-	-	40	-	2	22	1280			64
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	1200			60
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	1460			73
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		29%			37%			20%			-12%							
'92		50%			26%			07%			+25%							
'94		00%			00%			21%			-45%							
'99		36%			53%			22%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	3266	Dec:	37%				
											'92	2880		57%				
											'94	3660		39%				
											'99	2140		60%				
<i>Ephedra viridis</i>																		
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	17	19	1
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	15	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%			+ 0%							
'94		00%			00%			00%			+ 0%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	-				
											'92	20		-				
											'94	20		-				
											'99	20		-				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4		1	2		
<i>Gutierrezia sarothrae</i>										
S	86	1	-	-	-	-	-	-	1	1
	92	4	-	-	-	-	-	-	4	4
	94	196	-	-	-	-	-	-	196	196
	99	2	-	-	-	-	-	-	2	2
Y	86	19	-	-	-	-	-	-	19	19
	92	7	-	-	-	-	-	-	7	7
	94	40	-	-	-	-	-	-	40	40
	99	79	-	-	-	-	-	75 4	1580	79
M	86	111	-	-	-	-	-	-	111	111
	92	364	-	-	-	-	3	-	7340	367
	94	86	-	-	-	-	-	17	1720	86
	99	356	-	-	-	-	-	-	7120	356
D	86	22	-	-	-	-	-	-	1466	22
	92	42	-	-	-	-	-	-	840	42
	94	21	-	-	-	-	-	5 14	420	21
	99	10	-	-	-	-	-	1 4	200	10
X	86	-	-	-	-	-	-	-	0	0
	92	-	-	-	-	-	-	-	0	0
	94	-	-	-	-	-	-	-	420	21
	99	5	-	-	-	-	-	-	200	10
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>					
'86		00%	00%	00%	-18%					
'92		00%	00%	00%	-65%					
'94		00%	00%	24%	+67%					
'99		00%	00%	01%						
Total Plants/Acre (excluding Dead & Seedlings)						'86	10132	Dec:	14%	
						'92	8320		10%	
						'94	2940		14%	
						'99	8900		2%	
<i>Opuntia spp.</i>										
Y	86	-	-	-	-	-	-	-	0	0
	92	-	-	-	-	-	-	-	0	0
	94	1	-	-	-	-	-	-	20	1
	99	-	-	-	-	-	-	-	0	0
M	86	-	-	-	-	-	-	-	0	0
	92	-	-	-	-	-	-	-	0	0
	94	-	-	-	-	-	-	-	0	4 3
	99	-	-	-	-	-	-	-	0	-
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>					
'86		00%	00%	00%						
'92		00%	00%	00%						
'94		00%	00%	00%						
'99		00%	00%	00%						
Total Plants/Acre (excluding Dead & Seedlings)						'86	0	Dec:	-	
						'92	0		-	
						'94	20		-	
						'99	0		-	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Yucca spp.																		
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'92	-	1	-	-	-	-	-	-	-	-	-	-	20	-	-	1	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'99	1	-	-	1	-	-	-	-	-	-	-	-	40	14	19	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'86	00%			00%			00%										
	'92	100%			00%			00%										
	'94	00%			00%			00%										
	'99	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'92	20		-			
												'94	0		-			
												'99	40		-			



Trend Study 14-14-99

Study site name: Texas Flat .

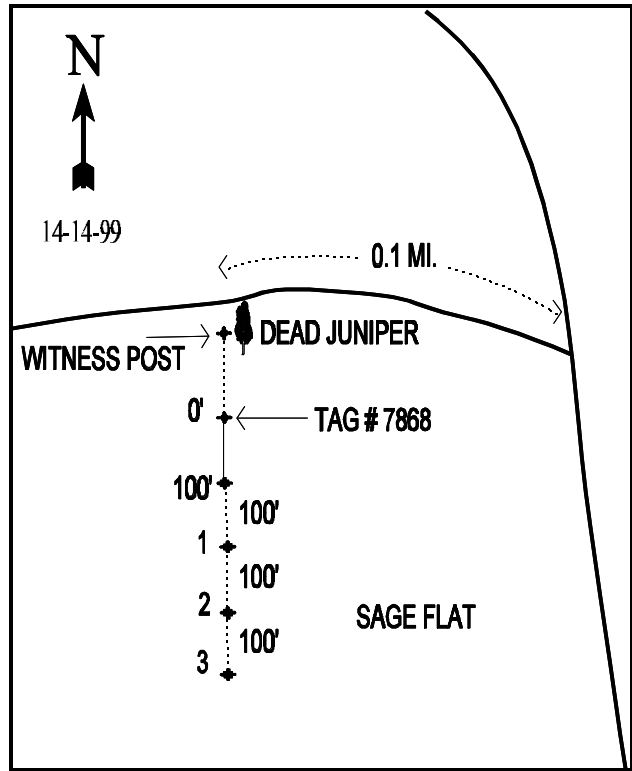
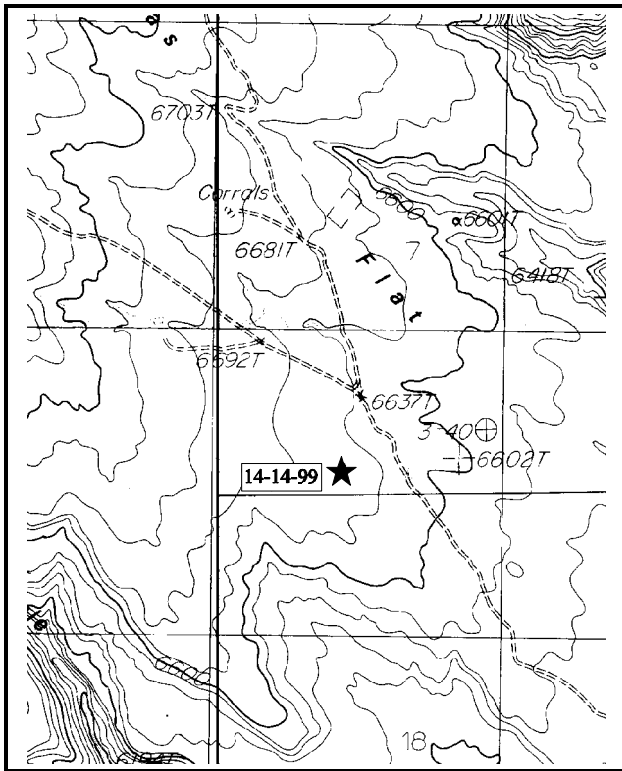
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 164°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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

UTM 4159914.905 N, 609095.293 E

## DISCUSSION

### Trend Study No. 14-14 (36-2)

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. They had heavily utilized the available crested wheatgrass in 1986. Deer use is light on the site judging by pellet groups and sagebrush utilization. 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 (1998 DWR). Pellet group data from the site in 1999 estimate 19 deer days use/acre (47 ddu/ha) and 46 cow days use/acre (114 cdu/ha). All of the cattle pats appeared to be from last season.

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 penetrometer measurements difficult. Effective rooting depth was estimated at only about 8 inches. This is obviously an underestimation considering that basin big sagebrush, a species which only occurs on deep soils, is present on the site. Parent material is sandstone. There is no rock on the surface or within the profile. Due to the sandy nature of the soil, average soil temperature is high at about 71°F at a depth of 12 inches. Erosion is not a problem due to the high infiltration capacity of the soil and the lack of significant slope.

The herbicide treatment was planned to leave edges and drainages for wildlife. The study site is close to the pinyon-Juniper border, so it is unknown at this point how much herbicide was actually applied. Since the Basin big sagebrush present is not a preferred variety 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 also kills forbs, so the few forbs in the community will be temporarily eliminated.

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. Seedlings were also abundant with a biotic potential of 36%. 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, 78% of which were classified as mature. Density rose in 1994 to 500 plants/acre and remained at that level in 1999. The surviving mature plants are large and vigorous with excellent leader growth and seed production. Most of the decadent sagebrush appear to have partial crown death due to the treatment. Use is light, vigor generally good, and percent decadence is low at 12%. Recruitment has been poor since 1986 with few seedlings and young sampled since then.

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. Broom snakeweed, an increaser subshrub, is common with a stable density of around 2,500 plants/acre.

Grass species present in 1986, prior to the treatment, were mainly crested wheatgrass, some 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 remained similar in 1992, then increased in 1994 and 1999. Nested frequency of sand dropseed increased significantly in 1992, but declined significantly in 1999. Currently ('99) crested wheatgrass accounts for 89% of the grass cover with sand dropseed contributing 10%.

Forbs were scarce before the treatment, however they increased dramatically by 1992. Common species included, low fleabane, thistle leaf peavine, prickly lettuce, and scarlet globemallow. Sum of nested frequency of perennial forbs declined dramatically by 1994 and have remained at a low level since. The only common perennial forb encountered in 1999 include, timber poison vetch, thistle leaf peavine heath aster, and scarlet globemallow. The annual forb, woolly plantain is also very abundant, especially in the interspaces between grass plants. It currently ('99) accounts for 55% of the forb cover. Other annual and perennial forbs are uncommon.

#### 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.

##### TREND ASSESSMENT

soil - stable

browse - down for sagebrush

herbaceous understory - up

#### 1994 TREND ASSESSMENT

Trend for soil is up slightly. Total vegetative cover declined from 53% to 34%, but litter cover increased and percent cover of bare ground declined from 30% to 22%. Trend for browse is also up slightly. Density has increased from 180 to 500 plants/acre. Use is light and percent decadence low at 8%. Recruitment is 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.

##### TREND ASSESSMENT

soil - up slightly

browse - up slightly

herbaceous understory - down due to a major decline in frequency of forbs

#### 1999 TEND 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.

TREND ASSESSMENT

soil - stable

browse - stable but still at low densities after treatment

herbaceous understory - stable

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 14

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %		
		'86	'92	'94	'99	'86	'92	'94	'99	'92	'94	'99
G	Agropyron cristatum	ab252	a235	bc280	c306	92	81	95	97	15.33	17.76	15.43
G	Bromus tectorum (a)	-	-	-	2	-	-	-	1	-	-	.00
G	Sporobolus cryptandrus	a30	c241	c206	b124	15	86	73	47	17.44	4.88	1.80
G	Stipa comata	b29	a2	a4	ab11	12	2	3	5	.03	.06	.08
G	Vulpia octoflora (a)	-	-	4	3	-	-	2	1	-	.01	.00
Total for Annual Grasses		0	0	4	5	0	0	2	2	0	0.00	0.00
Total for Perennial Grasses		311	478	490	441	119	169	171	149	32.81	22.71	17.31
Total for Grasses		311	478	494	446	119	169	173	151	32.81	22.72	17.32
F	Artemisia dracunculus	-	-	-	6	-	-	-	2	-	-	.30
F	Astragalus convallarius	9	20	14	31	6	12	9	14	.46	.07	.83
F	Astragalus spp.	b13	a-	a-	b6	7	-	-	3	-	-	.06
F	Calochortus nuttallii	-	1	-	-	-	1	-	-	.00	-	-
F	Castilleja spp.	a-	a-	b24	a-	-	-	12	-	-	.06	-
F	Chenopodium spp. (a)	-	b17	a-	a-	-	10	-	-	.65	-	-
F	Conyza canadensis (a)	-	b10	a-	a-	-	4	-	-	.02	-	-
F	Cordylanthus wrightii (a)	-	b10	a-	a-	-	4	-	-	.52	-	-
F	Descurainia pinnata (a)	-	-	-	4	-	-	-	2	-	-	.01
F	Epilobium spp.	a-	b13	a-	a-	-	5	-	-	.15	-	-
F	Eriogonum cernuum (a)	-	3	-	-	-	1	-	-	.03	-	-
F	Erigeron pumilus	ab18	b25	b27	a3	8	10	13	2	1.72	.52	.01
F	Euphorbia glyptosperma (a)	-	b19	a-	a-	-	8	-	-	.04	-	-
F	Gayophytum ramosissimum (a)	-	-	3	-	-	-	1	-	-	.03	-
F	Lathyrus lanszwertii	a2	b38	bc45	c70	2	20	21	29	1.43	.77	1.85
F	Lappula occidentalis (a)	-	-	-	3	-	-	-	1	-	-	.00
F	Lactuca serriola	a-	c164	b8	ab3	-	69	4	1	5.43	.02	.00
F	Leucelene ericoides	a-	a2	a-	b20	-	1	-	8	.00	-	1.35
F	Machaeranthera canescens	a-	b262	a-	a3	-	88	-	2	15.27	-	.01
F	Penstemon comarrhenus	5	12	8	6	2	5	6	4	.12	.03	.07

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %		
		'86	'92	'94	'99	'86	'92	'94	'99	'92	'94	'99
F	Phlox longifolia	6	4	4	4	2	3	2	1	.01	.01	.15
F	Plantago patagonica (a)	-	<sub>a</sub> 92	<sub>a</sub> 112	<sub>b</sub> 209	-	37	38	65	2.24	.64	6.81
F	Polygonum spp.	-	<sub>B</sub> 19	<sub>a</sub> -	<sub>a</sub> -	-	9	-	-	.69	-	-
F	Portulaca oleracea	<sub>a</sub> -	<sub>b</sub> 99	<sub>a</sub> -	<sub>a</sub> -	-	43	-	-	1.46	-	-
F	Salsola pestifer (a)	-	<sub>b</sub> 45	<sub>a</sub> -	<sub>a</sub> -	-	18	-	-	.87	-	-
F	Senecio multilobatus	1	-	-	-	1	-	-	-	-	-	-
F	Sphaeralcea coccinea	55	40	38	54	26	17	20	24	1.36	.27	.88
F	Streptanthus cordatus	-	-	1	-	-	-	1	-	-	.03	-
F	Tragopogon dubius	<sub>a</sub> -	<sub>b</sub> 17	<sub>b</sub> 6	<sub>ab</sub> 4	-	7	5	2	.25	.02	.01
F	Unknown forb-annual (a)	-	8	-	-	-	3	-	-	.18	-	-
F	Zigadenus paniculatus	-	-	-	3	-	-	-	1	-	-	.00
Total for Annual Forbs		0	204	115	216	0	85	39	68	4.56	0.66	6.82
Total for Perennial Forbs		109	716	175	213	54	290	93	93	28.40	1.83	5.55
Total for Forbs		109	920	290	429	54	375	132	161	32.97	2.50	12.38

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

#### BROWSE TRENDS --

Herd unit 14 , Study no: 14

Type	Species	Strip Frequency			Average Cover %		
		'92	'94	'99	'92	'94	'99
B	Amelanchier utahensis	0	0	1	-	-	.53
B	Artemisia tridentata tridentata	7	15	17	.22	2.38	.48
B	Chrysothamnus nauseosus albicaulis	0	0	0	-	.00	-
B	Chrysothamnus viscidiflorus viscidiflorus	6	0	6	.15	-	.38
B	Eriogonum microthecum	6	0	5	.18	-	.03
B	Gutierrezia sarothrae	51	42	28	2.94	1.25	.46
B	Juniperus osteosperma	1	0	1	2.83	-	2.20
B	Opuntia fragilis	8	9	25	.42	.05	.46
B	Pinus edulis	-	-	-	-	.00	-
B	Sclerocactus	16	3	0	-	.03	-
B	Yucca spp.	0	0	0	-	-	-
Total for Browse		95	69	83	6.76	3.73	4.55

#### CANOPY COVER --

Herd unit 14 , Study no: 14

Species	Percent Cover '99
Juniperus osteosperma	4

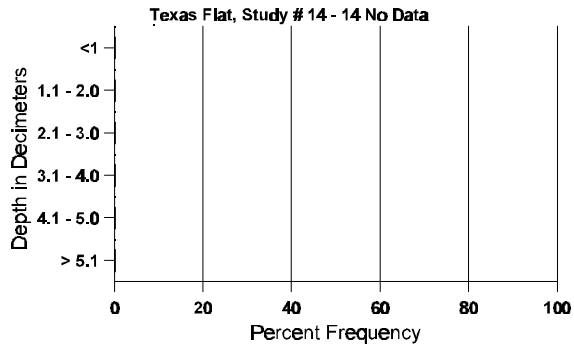
BASIC COVER --  
Herd unit 14 , Study no: 14

Cover Type	Nested Frequency			Average Cover %			
	'92	'94	'99	'86	'92	'94	'99
Vegetation	361	351	352	1.25	52.89	33.92	37.51
Rock	-	4	-	0	0	.03	0
Pavement	-	7	-	0	0	.39	0
Litter	289	400	371	58.75	29.62	51.50	44.35
Cryptogams	19	9	39	0	1.19	.12	.68
Bare Ground	251	313	273	40.00	29.62	22.07	24.50

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 14, Study Name: Texas Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
7.9	70.6 (5.5)	6.9	76.9	8.6	14.6	1.6	12.7	89.6	0.4

### Stoniness Index



PELLET GROUP FREQUENCY --  
Herd unit 14 , Study no: 14

Type	Quadrat Frequency		
	'92	'94	'99
Rabbit	11	34	48
Deer	7	14	8
Cattle	6	1	19

Pellet Transect Days Use/Acre (ha)
09
N/A
19 (47)
46 (114)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 14

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Amelanchier utahensis</i>																		
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	123	102	0
	'99	-	-	-	-	-	-	-	1	-	1	-	-	-	20	129	150	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	-				
											'92	0		-				
											'94	0		-				
											'99	20		-				
<i>Artemisia tridentata tridentata</i>																		
S	'86	47	-	-	-	-	-	-	-	-	41	6	-	-	3133			47
	'92	19	-	-	-	-	-	-	-	-	19	-	-	-	380			19
	'94	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	'99	2	-	-	2	-	-	-	-	-	4	-	-	-	80			4
Y	'86	68	-	-	-	-	-	-	-	-	67	1	-	-	4533			68
	'92	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	'86	10	1	-	-	-	-	-	-	-	10	1	-	-	733	25	24	11
	'92	4	2	-	1	-	-	-	-	-	7	-	-	-	140	-	-	7
	'94	22	-	-	-	-	-	-	-	-	18	-	4	-	440	24	23	22
	'99	21	-	-	-	-	-	-	-	-	21	-	-	-	420	30	31	21
D	'86	2	1	-	-	-	-	-	-	-	3	-	-	-	200			3
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	'99	1	2	-	-	-	-	-	-	-	2	-	-	1	60			3
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	1260			63
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	1160			58
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		02%			00%			00%			-97%							
'92		22%			00%			00%			+64%							
'94		00%			00%			16%			+ 0%							
'99		08%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	5466	Dec:	4%				
											'92	180		0%				
											'94	500		8%				
											'99	500		12%				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus nauseosus albicaulis																		
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	21	0
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	44	32	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'92	0		-			
												'94	0		-			
												'99	0		-			
Chrysothamnus viscidiflorus viscidiflorus																		
Y	'86	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	'92	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	1	4	1	-	-	-	-	-	-	6	-	-	-	120	-	-	6
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	19	27	6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			-20%							
'92		50%			13%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	200	Dec:	-			
												'92	160		-			
												'94	0		-			
												'99	140		-			



A Y G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Eriogonum microthecum																	
S	86	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	12	-	-	-	-	-	-	-	-	12	-	-	-	800		12
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	22	1	-	-	-	-	-	-	-	23	-	-	-	460	-	23
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	-	6	1	-	-	-	-	-	-	7	-	-	-	140	12 13	7
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			-40%						
'92		08%			00%			00%									
'94		00%			00%			00%									
'99		75%			13%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	800	Dec:	0%		
												'92	480		4%		
												'94	0		0%		
												'99	160		0%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4				
<b>Gutierrezia sarothrae</b>									
S	86	1	-	-	-	-	-	1	1
	92	1	-	-	-	-	-	1	1
	94	1	-	-	-	-	-	1	1
	99	4	-	-	-	-	-	4	4
Y	86	7	-	-	-	-	-	7	7
	92	17	-	-	-	-	-	17	17
	94	8	-	-	-	-	-	8	8
	99	36	-	-	-	-	-	36	36
M	86	25	-	-	-	-	-	25	25
	92	137	-	-	-	-	-	137	137
	94	93	-	-	-	-	-	93	93
	99	65	-	-	-	-	-	65	65
D	86	5	-	-	-	-	-	5	5
	92	-	-	-	-	-	-	0	0
	94	16	-	-	-	-	-	13	16
	99	-	-	-	-	-	-	0	0
X	86	-	-	-	-	-	-	0	0
	92	-	-	-	-	-	-	0	0
	94	-	-	-	-	-	-	20	1
	99	-	-	-	-	-	-	20	1
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>				<u>%Change</u>	
'86		00%	00%	00%				+20%	
'92		00%	00%	00%				+81%	
'94		13%	13%	.37%				-87%	
'99		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)						'86	2465	Dec:	14%
						'92	3080		0%
						'94	2340		2%
						'99	2020		0%
<b>Juniperus osteosperma</b>									
S	86	-	-	-	-	-	-	0	0
	92	-	-	-	-	-	1	1	1
	94	-	-	-	-	-	-	0	0
	99	-	-	-	-	-	-	0	0
M	86	-	-	-	-	-	-	0	0
	92	-	-	-	-	-	1	1	1
	94	-	-	-	-	-	-	0	0
	99	-	-	-	-	-	1	1	1
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>				<u>%Change</u>	
'86		00%	00%	00%					
'92		00%	100%	00%					
'94		00%	00%	00%					
'99		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)						'86	0	Dec:	-
						'92	20		-
						'94	0		-
						'99	20		-

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<b>Opuntia fragilis</b>																	
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	3	-	-	-	-	-	-	-	-	-	-	-	60		3	
Y	'86	23	-	-	-	-	-	-	-	-	-	-	-	1533		23	
	'92	3	-	-	2	-	-	-	-	-	-	-	-	100		5	
	'94	4	-	-	-	-	-	-	-	-	-	-	-	80		4	
	'99	13	-	-	-	-	-	-	-	-	-	-	-	260		13	
M	'86	4	-	-	-	-	-	-	-	-	-	-	-	266	4 8	4	
	'92	3	-	-	2	-	-	-	-	-	-	-	-	100	- -	5	
	'94	9	-	-	3	-	-	-	-	-	-	-	-	240	6 13	12	
	'99	16	-	-	-	-	-	-	-	-	-	-	-	320	5 18	16	
D	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'92	-	-	-	-	1	-	-	-	-	-	-	-	20		1	
	'94	-	-	-	1	-	-	-	-	-	-	-	-	20		1	
	'99	5	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			-88%						
'92		09%			00%			09%			+35%						
'94		00%			00%			12%			+50%						
'99		00%			00%			26%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	1799	Dec:	0%		
												'92	220		9%		
												'94	340		6%		
												'99	680		15%		
<b>Sclerocactus</b>																	
Y	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'92	23	-	-	-	-	-	-	-	-	-	-	-	460		23	
	'94	2	-	-	-	-	-	-	-	-	-	-	-	40		2	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	'92	12	1	-	-	-	-	-	-	-	-	-	-	260	- -	13	
	'94	1	-	-	-	-	-	-	-	-	-	-	-	20	- -	1	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		03%			00%			00%			-92%						
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	720		-		
												'94	60		-		
												'99	0		-		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total				
		1	2	3	4		1	2					
Yucca spp.													
M	'86	-	-	-	-	-	-	-	0	-	-	0	
	'92	-	-	-	-	-	-	-	0	-	-	0	
	'94	-	-	-	-	-	-	-	0	16	39	0	
	'99	-	-	-	-	-	-	-	0	-	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>		<u>%Change</u>			
	'86	00%			00%			00%					
	'92	00%			00%			00%					
	'94	00%			00%			00%					
	'99	00%			00%			00%					
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-
										'92	0		-
										'94	0		-
										'99	0		-

Trend Study 14-15-99

Study site name: Harmony Flat .

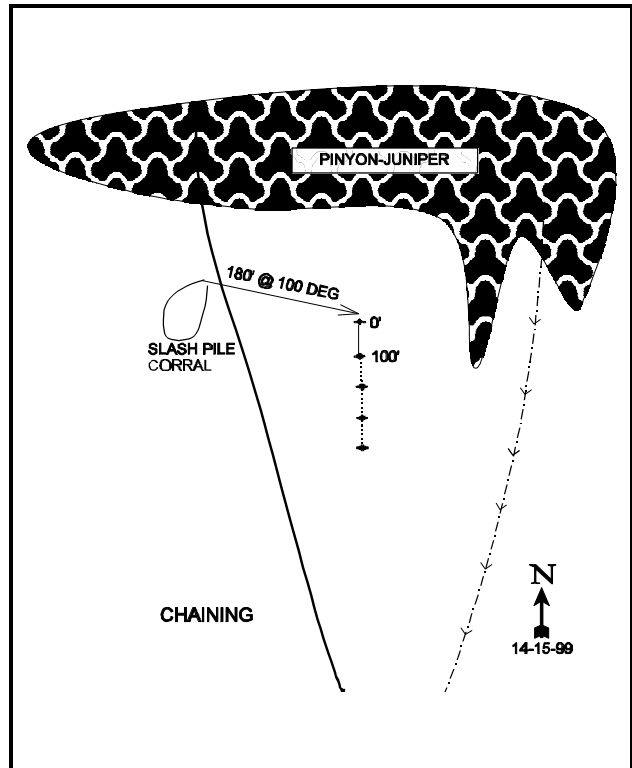
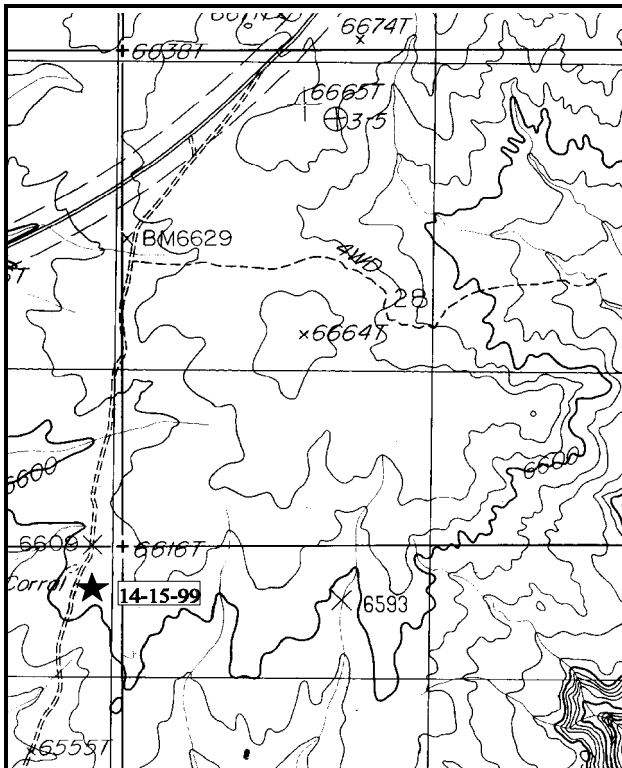
Range type: Chained, Cabled, Seeded P-J

Compass bearing: frequency baseline 165°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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

Diagrammatic Sketch

Township 37S , Range 18E , Section 32

UTM 4154275.191 N , 592911.595 E

## DISCUSSION

### Trend Study No. 14-15 (36-3)

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 of intermixed pinyon-Juniper woodlands and 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%. The area 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). The pellet group transect, like the Interagency range trend study, is at an elevation of 6,600 feet. Pellet group data taken along the study site baseline in 1999 estimate 21 deer days use/acre (52 ddu/ha) and 19 cow days use/acre (47 cdu/ha). Some of the cattle pats were fresh, while the majority were from last season. All of the deer pellet groups appear to be from the previous winter. Rabbit sign is very common.

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, so no rock index data is available. 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 thoroughly consistent root barrier. The soil temperature is relatively high at almost 72°F at an average depth of about 15 inches. Soil erosion is a bit of a problem on this site. In 1986, heavy rains for two days previous to data collection caused fresh rill and gully erosion. Sheet erosion was also evident and many grasses were pedestalled by loss of the surrounding soil. The fine, sandy loam bare soil occupied 47% of the ground surface in 1986, and remained at that high level in 1999. 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, chaining litter cover is slowly declining with time, from a cover value of 50% in 1986 to 35% by 1999.

Young juniper and pinyon continue to occupy the site which was treated more than twenty years ago. They currently average 6-8 feet in height and probably represent mostly the small trees that survived the chaining. Pinyon and juniper are common, but none were encountered on the density plots in 1986, so plants/acre were not estimated. 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. Forty percent of the juniper trees sampled were previously knocked down (tipped over) but still living from the chaining treatment. They have an average diameter of nearly 6 inches. Since 1992, juniper cover has declined slightly while pinyon cover has increased from less than 1/4 of 1% to just over 1%. Both tree species currently provide 19% of the browse cover.

The most abundant browse and also key species for the site is Wyoming big sagebrush. It provided 83% of the browse cover in 1992, and 81% in 1999. Seed production was low in 1986, with a moderately dense population of 5,198 plants/acre which contained 44% mature plants. The young age class made up 28% of the population. Biotic potential (proportion of seedlings to the population) was fairly low at only 2%. Utilization was mostly light, vigor normal, and percent decadence was 28%. Density remained similar in 1992, but utilization was heavier with 56% of the population moderately browsed and 25% heavily utilized. Vigor was good however, with percent decadence declining to only 2%. Data from 1999 shows similar use, moderate to heavy use. Density has declined primarily due to a reduction in young plants. Vigor is considered poor on 11% of the plants sampled and percent decadence has increased to 30%. Other palatable browse species, ephedra and four-wing saltbush, are uncommon and are understandably browsed heavily.

Another plant that has been heavily utilized is crested wheatgrass. Except for scattered protected plants, most had been grazed down to a height of 2-4 inches in 1986. No regrowth had yet occurred by July of 1986 when the transects were set up. Density for crested wheatgrass appeared to be low for a seeded area. Other grasses were much less common and provide little forage, but included western wheatgrass, smooth brome, and bottlebrush squirreltail. Data from 1999 show that crested wheatgrass has remained at a stable nested frequency value, but the only other perennial grass found on the site is a few bottlebrush squirreltail. Utilization was evident in 1999, at a level of 30% to 40% on individual plants. Use was inconsistent however. Forbs are uncommon. A few palatable species, dusty penstemon and seeded alfalfa, were severely hedged in 1986. Alfalfa was not found in 1992 or 1999.

#### 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 will maintain itself in 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 its population, a decline in percent decadence from 28% to only 2%, and no plants were classified as having poor vigor. The herbaceous understory would be judged 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.

##### TREND ASSESSMENT

soil - stable, but poor condition

browse - stable

herbaceous understory - stable but poor

#### 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 of perennial forbs has declined slightly, but forbs are so rare that they account for very little cover.

##### TREND ASSESSMENT

soil - stable but in poor condition

browse - down slightly

herbaceous understory - stable but poor

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 15

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	<i>Agropyron cristatum</i>	235	227	228	84	78	78	10.14	8.51
G	<i>Agropyron smithii</i>	<sub>b</sub> 3	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
G	<i>Bromus inermis</i>	4	1	-	2	1	-	.00	-
G	<i>Sitanion hystrix</i>	3	-	2	2	-	1	-	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		245	228	230	91	79	79	10.14	8.51
Total for Grasses		245	228	230	91	79	79	10.14	8.51
F	<i>Astragalus convallarius</i>	<sub>a</sub> -	<sub>b</sub> 5	<sub>ab</sub> 1	-	4	1	.09	.00
F	<i>Chenopodium album</i> (a)	-	2	-	-	1	-	.00	-
F	<i>Collinsia parviflora</i> (a)	-	-	1	-	-	1	-	.00
F	<i>Cordylanthus wrightii</i> (a)	-	<sub>b</sub> 134	<sub>a</sub> -	-	57	-	5.47	-
F	<i>Gilia</i> spp. (a)	-	4	-	-	2	-	.01	-
F	<i>Lomatium</i> spp.	-	<sub>B</sub> 3	<sub>a</sub> -	-	3	-	.01	-
F	<i>Medicago sativa</i>	<sub>b</sub> 14	<sub>a</sub> -	<sub>a</sub> -	6	-	-	-	-
F	<i>Phlox longifolia</i>	<sub>a</sub> -	<sub>b</sub> 11	<sub>b</sub> 8	-	5	4	.02	.02
F	<i>Streptanthus cordatus</i>	-	2	-	-	1	-	.00	-
Total for Annual Forbs		0	140	1	0	60	1	5.48	0.00
Total for Perennial Forbs		14	21	9	6	13	5	0.13	0.02
Total for Forbs		14	161	10	6	73	6	5.62	0.02

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

BROWSE TRENDS --  
Herd unit 14 , Study no: 15

T y p e	Species	Strip Frequency		Average Cover %	
		'92	'99	'92	'99
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	71	69	11.02	11.82
B	<i>Atriplex canescens</i>	0	0	-	-
B	<i>Gutierrezia sarothrae</i>	0	2	.03	.00
B	<i>Juniperus osteosperma</i>	6	6	2.03	1.43
B	<i>Opuntia</i> spp.	1	0	-	-
B	<i>Pinus edulis</i>	2	2	.18	1.31
Total for Browse		80	79	13.27	14.57



CANOPY COVER --  
Herd unit 14 , Study no: 15

Species	Percent Cover 09
Juniperus osteosperma	2

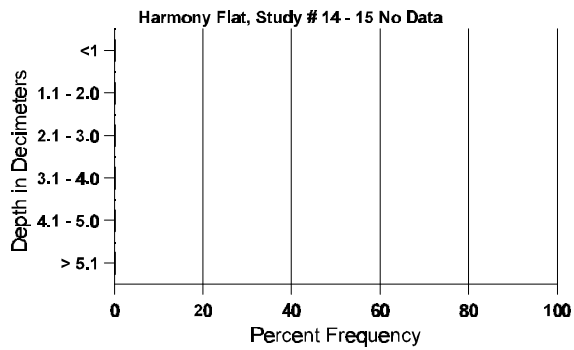
BASIC COVER --  
Herd unit 14 , Study no: 15

Cover Type	Nested Frequency 02 09		Average Cover %		
	'86	'92	'99		
Vegetation	279	252	3.00	20.40	21.62
Rock	-	-	0	.38	0
Pavement	-	5	0	0	.01
Litter	263	361	50.00	37.43	34.76
Cryptogams	15	45	0	1.05	1.44
Bare Ground	237	337	47.00	44.36	47.77

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 15, Study Name: Harmony Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.9	71.6 (14.5)	7.4	60.9	16.6	22.6	1.5	70.4	35.2	0.4

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 14 , Study no: 15

Type	Quadrat Frequency 02 09	
	Rabbit	61
Deer	23	15
Cattle	3	8

Pellet Transect Days Use/Acre (ha) 09
N/A
21 (52)
19 (47)

BROWSE CHARACTERISTICS --  
Herd unit 14 , Study no: 15

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Artemisia tridentata wyomingensis																	
S	86	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	92	-	-	-	-	-	-	5	-	-	5	-	-	-	100		5
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	86	22	-	-	-	-	-	-	-	-	22	-	-	-	1466		22
	92	15	54	13	5	1	-	1	4	-	93	-	-	-	1860		93
	99	1	9	7	-	-	-	-	-	-	17	-	-	-	340		17
M	86	31	3	-	-	-	-	-	-	-	34	-	-	-	2266	18 17	34
	92	21	85	47	-	1	-	-	-	-	154	-	-	-	3080	- -	154
	99	9	64	24	-	4	8	-	-	-	102	-	7	-	2180	24 31	109
D	86	15	7	-	-	-	-	-	-	-	19	-	-	3	1466		22
	92	1	1	2	-	-	2	-	-	-	6	-	-	-	120		6
	99	2	22	26	-	3	1	-	-	-	42	-	6	6	1080		54
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		13%			00%			04%			- 3%						
'92		56%			25%			00%			-29%						
'99		57%			37%			11%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	5198	Dec:	28%			
											'92	5060		2%			
											'99	3600		30%			
Atriplex canescens																	
D	86	-	-	-	-	-	-	-	-	1	1	-	-	-	66		1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			100%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	66	Dec:	100%			
											'92	0		0%			
											'99	0		0%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		5	6		7	8	9					
<i>Gutierrezia sarothrae</i>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	2	-	-	-	40	5	6	2
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-				
										'92	0		-				
										'99	40		-				
<i>Juniperus osteosperma</i>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	1	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	1	-	-	-	20			1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	4	-	-	-	-	-	-	-	4	-	-	-	80	-	-	4
	99	6	-	-	-	-	-	-	-	6	-	-	-	120	-	-	6
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%			+14%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	0%				
										'92	120		17%				
										'99	140		0%				
<i>Opuntia spp.</i>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	9	21	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-				
										'92	20		-				
										'99	0		-				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus edulis																	
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'92	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%			+ 0%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	40		-		
												'99	40		-		

Trend Study 14-16-99

Study site name: Lower Lost Park .

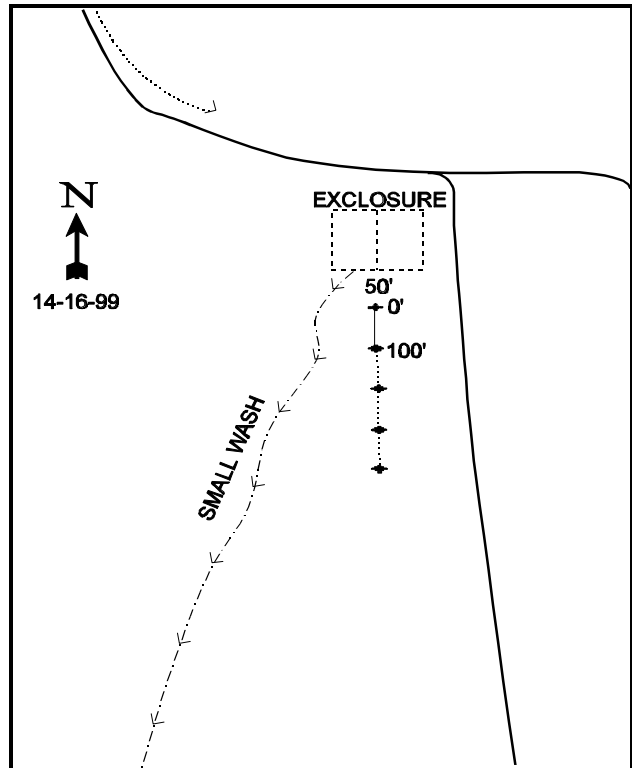
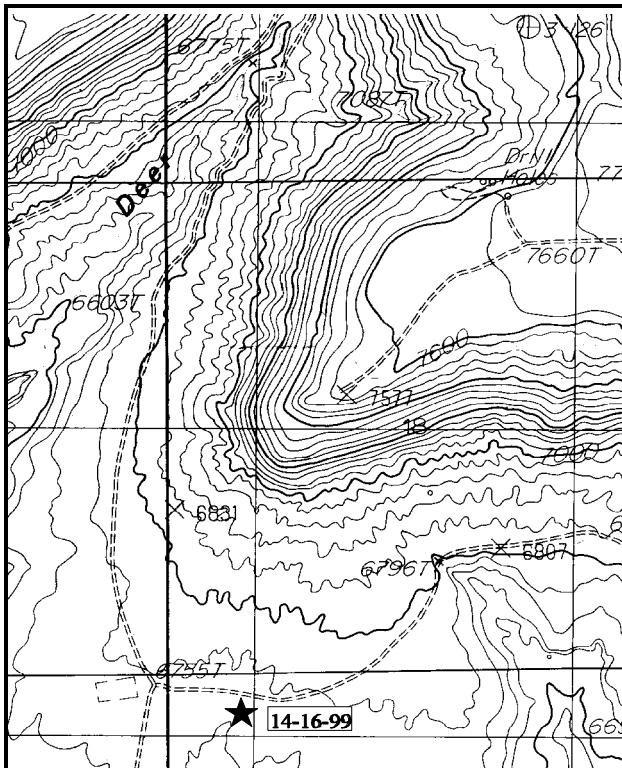
Range type: Big Sagebrush .

Compass bearing: frequency baseline 165°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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 enclosure (Deer Flat enclosure and transect). Stay left at the fork by the enclosure 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 enclosure. Turn right on the road just east of the enclosure and stop after 100 feet. The transect begins 50 feet south of the center of the enclosure. All transect stakes are green fence posts. The 0-foot baseline post is tagged #7884.



Map Name: Woodshoe Butte

Diagrammatic Sketch

Township 36S , Range 18E , Section 19

UTM 4167112.344 N, 589573.463 E

## DISCUSSION

### Trend Study No. 14- 16 (36-4)

The BLM administered study site in Lower Lost Park samples deer winter range in a sagebrush-pinyon-juniper flat below and south of the mouth of Deer Canyon. This area is on the west side of Elk Ridge. Topography at the study area is basically level at an elevation of 6,700 feet. The area drains west and south into the deep slickrock of White Canyon. It was originally treated (chaining) in 1969. Crested wheatgrass and some four-wing saltbush were seeded. A livestock permittee 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 initiated, for 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 trend transect on the study site shows from 0 to 22 deer days use/acre (0-55 ddu/ha), but averaged only 11 ddu/acre (29 ddu/ha) over the 5-year period from 1981-86 (Jense et al. 1986). In the 5-year period between 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 deer days use/acre (138 ddu/ha), 1 elk days use/acre (2 edu/ha), and 7 cow days use/acre (17 cdu/ha).

The study is set up just outside an old (1958) cattle and deer enclosure. Animals have apparently been inside the enclosure and except for greater cryptogam development in the enclosure, there is little 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 penetrometer depth readings difficult. Phosphorus and potassium are low at just 3.3 ppm and 44.8 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium have been determined limiting to normal plant growth and development. 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.

At the time of study establishment, August 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 is still moderate to heavy and vigor poor on a third of the plants sampled. Percent decadence has declined but it is still high at 47%. Leader growth and seed production are currently poor. Recruitment in the form of seedlings and young is nearly non existent.

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. By 1999, conditions are similar with perennial grasses providing only 2% cover. Forbs are also lacking and few species are common. The planned treatment obviously did not take place.

### 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 at this time is best described as stable, with an increase in density (14%) offset somewhat by an increase in percent decadence, now up to 69%. But, biotic potential (<1%) is almost nonexistent and there are very few plants in the young age class (1%). These sagebrush population parameters should be closely monitored, especially if the prolonged drought continues. The herbaceous understory trend can be best described as down, with a large decrease in nested grass frequencies and a slight decline in nested perennial forb frequencies. Grasses are the most important component of the herbaceous understory and are weighted more heavily in determining trend for this site.

##### TREND ASSESSMENT

soil - stable, but still very poor condition

browse - stable, but population parameters should be watch closely

herbaceous understory - down, still poor for grasses with crested wheatgrass almost non-existent

#### 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 become decadent and die out. 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.

##### TREND ASSESSMENT

soil - stable but in poor condition

browse - down

herbaceous understory - down slightly

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 16

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	Agropyron cristatum	11	2	10	4	2	6	.01	.10
G	Bouteloua gracilis	a-	b16	18	-	6	9	.22	.12
G	Bromus tectorum (a)	-	a-	b116	-	-	45	-	.86
G	Oryzopsis hymenoides	ab26	b41	a14	12	21	6	.35	.09
G	Poa fendleriana	b47	a-	a-	20	-	-	-	-
G	Sitanion hystrix	b157	a72	a89	67	34	39	.78	1.28
G	Stipa comata	18	20	34	8	8	14	.26	.22
G	Vulpia octoflora (a)	-	a70	b135	-	32	50	.21	1.26
Total for Annual Grasses		0	70	251	0	32	95	0.20	2.13
Total for Perennial Grasses		259	151	165	111	71	74	1.64	1.82
Total for Grasses		259	221	416	111	103	169	1.85	3.96
F	Arabis spp.	-	-	4	-	-	2	-	.01
F	Astragalus convallarius	95	87	75	47	48	42	.96	.79
F	Calochortus nuttallii	a-	b11	a-	-	4	-	.02	-
F	Cordylanthus wrightii (a)	a13	b157	a1	6	72	1	6.91	.00
F	Descurainia pinnata (a)	-	-	2	-	-	1	-	.00
F	Erigeron pumilus	a25	a19	b52	14	12	25	.16	.77
F	Eriogonum racemosum	-	-	2	-	-	1	-	.00
F	Lesquerella spp.	-	2	-	-	1	-	.00	-
F	Madia glomerata (a)	-	-	1	-	-	1	-	.00
F	Machaeranthera grindelioides	b36	a6	a3	17	4	1	.02	.00
F	Penstemon comarrhenus	b53	ab36	a19	23	14	9	1.29	.12
F	Phlox longifolia	a207	b259	253	80	90	89	2.03	1.49
F	Sphaeralcea coccinea	b33	a12	ab19	17	7	10	.11	.08
F	Townsendia spp.	-	4	2	-	2	1	.01	.00
F	Unknown forb-annual (a)	-	2	-	-	1	-	.00	-
F	Unknown forb-perennial	2	-	-	1	-	-	-	-
Total for Annual Forbs		13	159	4	6	73	3	6.92	0.01
Total for Perennial Forbs		451	436	429	199	182	180	4.62	3.28
Total for Forbs		464	595	433	205	255	183	11.54	3.30

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



BROWSE TRENDS --  
Herd unit 14 , Study no: 16

Type	Species	Strip Frequency		Average Cover %	
		'02	'09	'02	'09
B	Artemisia tridentata wyomingensis	95	93	17.77	14.76
B	Chrysothamnus depressus	11	3	.04	.30
B	Chrysothamnus viscidiflorus	0	3	-	-
B	Eriogonum microthecum	4	4	.18	.03
B	Gutierrezia sarothrae	0	0	-	.00
B	Juniperus osteosperma	4	5	.56	.33
B	Opuntia spp.	1	3	-	-
B	Pinus edulis	10	6	6.81	7.19
Total for Browse		125	117	25.37	22.63

CANOPY COVER --  
Herd unit 14 , Study no: 16

Species	Percent Cover '09
Pinus edulis	6

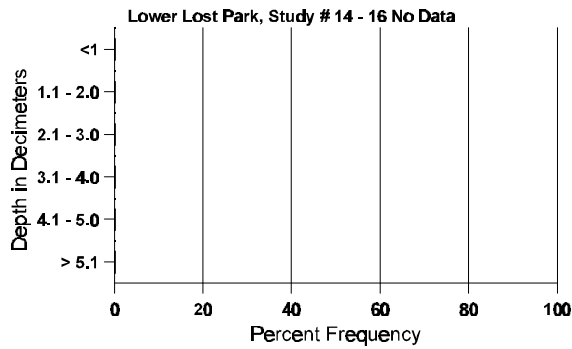
BASIC COVER --  
Herd unit 14 , Study no: 16

Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	317	313	3.25	32.20	27.01
Rock	-	3	0	.01	.00
Pavement	-	-	0	0	0
Litter	259	375	28.25	29.35	31.84
Cryptogams	71	132	2.00	2.19	3.28
Bare Ground	266	340	66.50	46.18	48.67

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 16, Study Name: Lower Lost Park

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.5	73.5 (11.8)	6.9	44.0	32.2	23.8	1.0	3.3	44.8	0.5

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 14 , Study no: 16

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'82	'89	
Rabbit	44	60	N/A
Elk	-	1	1 (2)
Deer	49	39	56 (138)
Cattle	3	-	7 (17)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 16

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total											
		1	2	3	4														
<i>Artemisia tridentata wyomingensis</i>																			
S	'86	-	-	-	-	-	-	-	-	-	-	-	0		0				
	'92	-	-	-	-	-	-	1	-	-	-	-	1	-	1				
	'99	-	-	-	-	-	-	-	-	-	-	-	-	0	0				
Y	'86	-	-	-	-	-	-	-	-	-	-	-	0		0				
	'92	1	1	-	1	-	-	-	-	-	-	-	3	-	3				
	'99	1	-	-	-	-	-	-	-	-	-	-	1	-	1				
M	'86	10	19	11	1	-	-	-	-	-	-	35	3	-	3	2733	20	19	41
	'92	42	52	22	6	3	1	-	-	5	104	14	13	-	2620	-	-	131	
	'99	38	39	35	1	11	1	-	-	-	92	9	24	-	2500	19	29	125	
D	'86	6	20	43	1	-	-	-	-	-	43	3	-	24	4666			70	
	'92	75	83	58	13	41	14	3	-	9	201	6	35	54	5920			296	
	'99	15	29	53	1	11	-	2	-	-	53	4	17	37	2220			111	
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	880			44	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'86		35%		49%		24%		+14%											
'92		42%		25%		24%		-45%											
'99		38%		38%		33%													
Total Plants/Acre (excluding Dead & Seedlings)										'86		7399		Dec:		63%			
										'92		8600				69%			
										'99		4740				47%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
<b>Chrysothamnus depressus</b>																		
Y	86	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	1	3	-	-	-	-	-	-	-	4	-	-	-	80		4	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	3	-	-	-	-	-	-	-	-	3	-	-	-	200	6	6	3
	92	2	4	1	-	1	-	1	-	-	9	-	-	-	180	-	-	9
	99	2	-	2	-	-	-	-	-	-	4	-	-	-	80	8	11	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			- 2%							
'92		62%			08%			00%			-69%							
'99		00%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	266	Dec:	-			
												'92	260		-			
												'99	80		-			
<b>Chrysothamnus viscidiflorus</b>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	13	15	2
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	1	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%										
'99		00%			00%			33%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'92	0		0%			
												'99	60		33%			
<b>Eriogonum microthecum</b>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	3	-	-	4	-	-	-	80			4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	99	3	1	-	-	-	-	-	-	-	4	-	-	-	80	3	7	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%			-33%							
'99		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'92	120		-			
												'99	80		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4			
<i>Gutierrezia sarothrae</i>								
S	86	-	-	-	-	-	-	0
	92	-	-	-	-	-	-	0
	99	2	-	-	-	-	-	40
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>
	'86	00%		00%		00%		
	'92	00%		00%		00%		
	'99	00%		00%		00%		
Total Plants/Acre (excluding Dead & Seedlings)						'86	0	Dec: -
						'92	0	-
						'99	0	-
<i>Juniperus osteosperma</i>								
Y	86	-	-	-	-	-	-	0
	92	2	-	-	-	-	-	40
	99	4	-	-	-	-	-	80
M	86	-	-	-	-	-	-	0
	92	2	-	-	-	-	-	40
	99	1	-	-	-	-	-	20
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>
	'86	00%		00%		00%		
	'92	00%		00%		00%		+20%
	'99	00%		00%		00%		
Total Plants/Acre (excluding Dead & Seedlings)						'86	0	Dec: -
						'92	80	-
						'99	100	-
<i>Opuntia spp.</i>								
Y	86	-	-	-	-	-	-	0
	92	-	-	-	-	-	-	0
	99	1	-	-	-	-	-	20
M	86	1	-	-	-	-	-	66
	92	-	-	-	1	-	-	20
	99	3	-	-	-	-	-	60
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>
	'86	00%		00%		00%		-70%
	'92	00%		00%		00%		+75%
	'99	00%		00%		00%		
Total Plants/Acre (excluding Dead & Seedlings)						'86	66	Dec: -
						'92	20	-
						'99	80	-

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus edulis																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	-
	99	2	-	-	-	-	-	1	1	-	4	-	-	-	80	-	-
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%			-40%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	0%			
											'92	200		10%			
											'99	120		0%			

Trend Study 14-17-99

Study site name: Deer Flat .

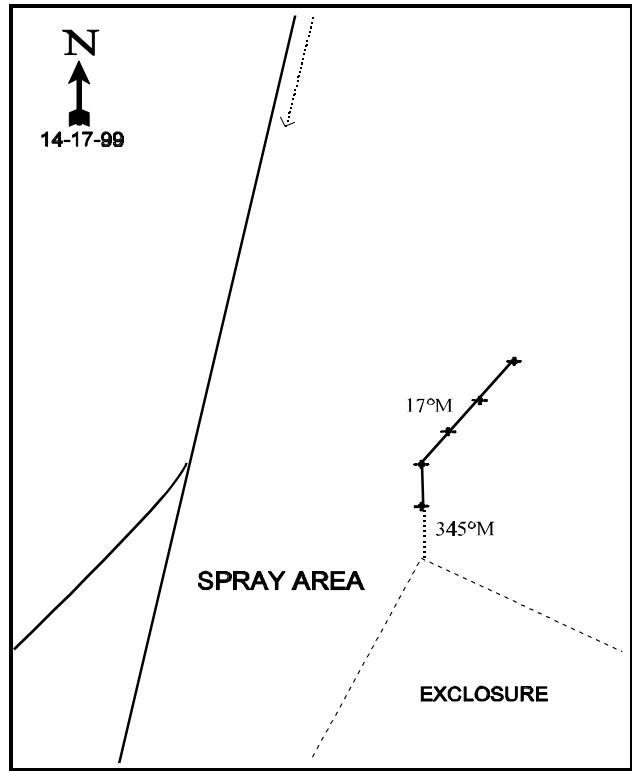
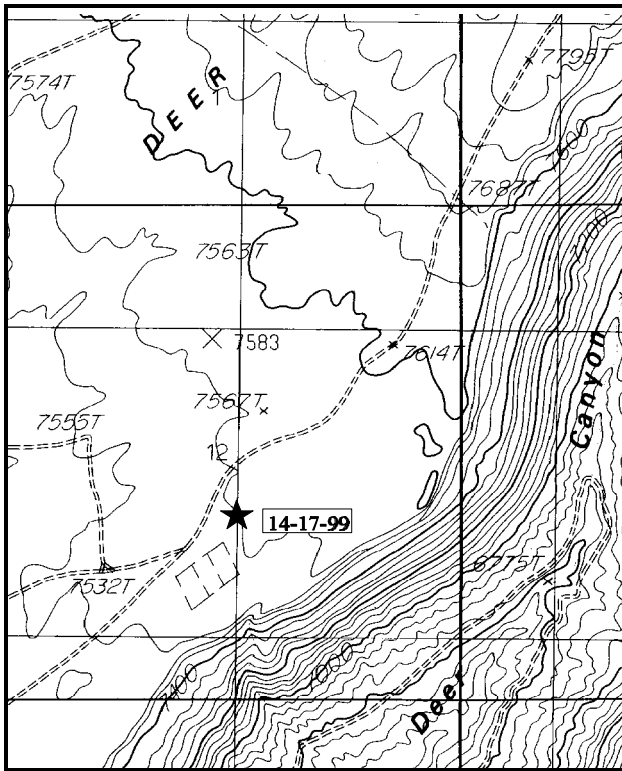
Range type: Sprayed Shrubland .

Compass bearing: frequency baseline 345°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11& 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

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 enclosure on the east side of the road. The 0-foot end of the baseline is 150 feet north of the north corner of the enclosure.



Map Name: Woodenshoe Butte

Diagrammatic Sketch

Township 36S , Range 17E , Section 12

UTM 4169361.081 N, 588951.386 E

## DISCUSSION

### Trend Study No. 14-17 (36-5)

\*\*\*This study will be discontinued and replaced by 14-32, located on Lower Deer Flat.\*\*\*

The portion of Deer Flat sampled by this Interagency trend study is an open high elevation flat (7,660 ft) on BLM administered land which is the result of several different treatments. It is basically level, with a gentle 2%-4% slope and a south western aspect and above the Lower Lost Park area. The area had been railed, chained, and seeded in the past and in September of 1984, the herbicide tebuthiuron was applied which resulted in a nearly complete kill of mountain big sagebrush and reinvasion of pinyon. The transect is 200 yards east of and runs parallel to the edge of a pinyon-juniper woodland. It is also near the edge of the herbicide treatment area with mountain big sagebrush still persisting there. Deer tracks and pellet groups were common in 1986, and can also be found in the treated area. A nearby pellet group transect indicates a high level of deer use in the area with an average of 78 deer days use/acre (192 ddu/ha) between 1991 and 1997 (DWR 1998). Because of the high elevation, the flat would be utilized mainly during light to moderate winters and as transitional range. During hard winters, use shifts to the lower elevations, like Beef Basin and Lower Lost Park. Pellet group data taken along the trend study site baseline in 1999 estimated only 7 deer days use/acre (17 ddu/ha) indicating a low level of use on the site itself. For this reason, a new site was established in 1994, about 3 miles to the south where winter deer use is more concentrated. This trend study, Deer Flat, will be discontinued.

Cattle also use the area and were on the flat just across the dirt road at the time of study establishment in August of 1986. The grazing program is a two pasture rotation system involving 400 cattle. One pasture is used from June 1 to August 15 one year and then the other pasture is used from August 16 to October 31 the next year. There is a thick, vigorous stand of grasses and abundant forage available as a result of the treatment. Cattle were in the vicinity during the 1999 reading. Pellet group data from the site estimate 67 cow days use/acre (165 cdu/ha), nearly all of which appeared to be from last fall. Cattle are abundant in the area but concentrated on treated areas where more grasses and less sagebrush are found.

The soil is a light orange color and has a loam texture. It appears to be moderately deep and contains few rocks. Effective rooting depth is estimated at just over 12 inches, but soil penetrometer depth measurements were limited by the compact nature of the soil. Because of the vigorous bunch grasses, vegetative cover is good and there was 55% litter cover from grasses and dead sagebrush in 1986. Erosion appears to be minimal, although there appears to be some soil loss due to wind.

The purpose of the herbicide treatment was to eliminate woody vegetation on the range. There were some young sagebrush present, at the time of study establishment in 1986. They appeared vigorous, yet it was unknown if they could survive since the chemical can linger in the soil for several years in arid climates. During the 1992 reading, density of sagebrush was estimated at 1,740 plants/acre. Mature plants accounted for 70% of the population. Use was light to moderate, vigor normal, and percent decadence low at only 3%. Seedlings and young plants were common. By 1999, density of sagebrush has increased nearly 4 fold to 6,600 plants/acre. Most (86%) consist of young plants which would indicate an expanding population. Use is mostly light and vigor normal.

Although dwarfed by the tall and vigorous perennial grasses that have been released by the treatment, there were an estimated 2,166 stickleaf low rabbitbrush plants/acre in 1986. This shrub species was apparently resistant to tebuthiuron for the population has increased in 1992 to 8,060 plants/acre. Seedlings and young were also very abundant. Density of low rabbitbrush increased slightly by 1999 to 8,800 plants/acre. Young plants are still numerous and comprise 52% of the population. Seedlings are also common, although continued increases in density will likely not occur due to competition with sagebrush and perennial grasses.

Perennial grasses dominate the site. The most abundant grasses include, crested wheatgrass, western wheatgrass, blue grama, bottlebrush squirreltail, and needle-and-thread grass. Annual cheatgrass can also be found in very low frequencies. None of the grasses showed much evidence of recent utilization in 1999, although cattle currently have access to the area. Two years after the herbicide treatment in 1986, forbs did not show many effects. Composition and abundance is what one would expect on this type of range site. The herbicide however, appears to have killed the arrowleaf balsamroot. There are several forbs found on the site but, only redroot eriogonum, longleaf phlox, and scarlet globemallow are common. All forbs combined produced only about 6% cover in 1992 and 3% in 1999.

#### 1986 APPARENT TREND ASSESSMENT

The treatment created a dynamic grassland that for the next few years will result in increased forage production of herbaceous species, as long as it is not selectively over grazed by cattle. Token strips of sagebrush were left along the edge of the pinyon-juniper and provide some browse forage for deer. On transitional higher altitude range such as this site, herbaceous plants can make up a significant part of the mule deer diet. The area also may have the potential to be an elk wintering area if they continue to increase. Therefore, the treatment has resulted in an improved condition for big game and livestock, and an upward vegetative trend. A larger buffer strip might have been desirable. With little erosion and increasing vegetative cover, the soil trend is also up.

#### 1992 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground declined from 40% to 34% and there was a substantial increase in nested frequency for perennial grasses. Litter cover has declined from 55% in 1986 to 26% currently. Over 75% of the vegetative cover is composed of herbaceous species, which are much better at protecting the soil resource from the erosive forces of high intensity summer storms. The density for the key browse species, mountain big sagebrush, is still low, but it has increased by 41% since 1986 (now 1,740 plants/acre). Low rabbitbrush has also increased by 73%, which appears to not have been effected by the herbicide treatment, other than allowing for more opportunistic openings in the community to increase it's density. Trend for key browse is up, but still in low densities. The herbaceous understory trend is also up with a large increase in nested frequency for grasses with a slight decrease in the forbs.

#### TREND ASSESSMENT

soil - stable

browse - up, but still low density for mountain big sagebrush

herbaceous understory - up

#### 1999 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent cover of bare ground, an increase in litter cover, and an increase in the sum of nested frequency of perennial grasses. Trend for browse is up. Density of the key species, mountain big sagebrush, has increased nearly 4 fold. The majority of the population are young plants which would indicate an expanding population. Density of low rabbitbrush has remained stable since 1992. Trend for the herbaceous understory is up slightly. Sum of nested frequency of perennial grasses has increased slightly, while frequency of perennial forbs has increased as well. Nested frequency of the dominant grass, crested wheatgrass, has increased significantly with each reading. Since 1992, bottlebrush squirreltail and needle-and-thread grass have declined significantly in frequency.

#### TREND ASSESSMENT

soil - up slightly

browse - up

herbaceous understory - up slightly



HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 17

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	<i>Agropyron cristatum</i>	a106	b238	c276	47	85	92	14.90	17.39
G	<i>Agropyron smithii</i>	b63	a34	c132	27	14	52	1.16	2.04
G	<i>Bouteloua gracilis</i>	a25	b75	b68	11	31	26	6.90	2.49
G	<i>Bromus tectorum</i> (a)	-	4	-	-	2	-	.01	-
G	<i>Oryzopsis hymenoides</i>	-	3	-	-	1	-	.00	-
G	<i>Poa fendleriana</i>	-	3	2	-	2	1	.16	.00
G	<i>Sitanion hystrix</i>	b90	b74	a27	45	31	14	.51	.24
G	<i>Stipa comata</i>	b107	b109	a73	48	49	34	3.09	.54
Total for Annual Grasses		0	4	0	0	2	0	0.00	0
Total for Perennial Grasses		391	536	578	178	213	219	26.73	22.73
Total for Grasses		391	540	578	178	215	219	26.74	22.73
F	<i>Agoseris glauca</i>	a-	ab4	b5	-	2	3	.01	.01
F	<i>Arabis</i> spp.	-	-	1	-	-	1	-	.00
F	<i>Astragalus convallarius</i>	b28	a11	a3	15	7	1	.37	.00
F	<i>Balsamorhiza sagittata</i>	-	-	1	-	-	1	-	.00
F	<i>Calochortus nuttallii</i>	1	-	3	1	-	2	-	.01
F	<i>Cordylanthus kingii</i> (a)	4	-	-	2	-	-	-	-
F	<i>Comandra pallida</i>	-	-	6	-	-	2	-	.03
F	<i>Epilobium brachycarpum</i> (a)	-	1	-	-	1	-	.00	-
F	<i>Eriogonum leptophyllum</i>	b8	a-	a-	4	-	-	-	-
F	<i>Erigeron pumilus</i>	-	-	1	-	-	1	-	.03
F	<i>Eriogonum racemosum</i>	ab53	a47	b91	28	25	44	.52	1.36
F	<i>Erigeron utahensis</i>	b36	a-	b23	17	-	11	-	.16
F	<i>Lupinus</i> spp.	a-	b6	b8	-	4	3	.02	.09
F	<i>Machaeranthera canescens</i>	-	4	-	-	2	-	.01	-
F	<i>Oenothera pallida</i>	a-	a-	b16	-	-	8	-	.16
F	<i>Penstemon comarrhenus</i>	10	10	2	4	4	2	.04	.01
F	<i>Phlox longifolia</i>	ab123	a99	b155	51	43	64	.96	.87
F	<i>Polygonum douglasii</i> (a)	-	b79	a1	-	31	1	3.45	.00
F	<i>Sphaeralcea coccinea</i>	ab36	a23	b47	17	12	24	.16	.37
F	<i>Tragopogon dubius</i>	1	2	-	1	2	-	.06	-
Total for Annual Forbs		4	80	1	2	32	1	3.46	0.00
Total for Perennial Forbs		296	206	362	138	101	167	2.18	3.13
Total for Forbs		300	286	363	140	133	168	5.64	3.14

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

BROWSE TRENDS --  
Herd unit 14 , Study no: 17

Type	Species	Strip Frequency		Average Cover %	
		'02	'09	'02	'09
B	Amelanchier utahensis	2	0	.15	-
B	Artemisia tridentata vaseyana	41	60	1.30	3.31
B	Chrysothamnus viscidiflorus viscidiflorus	82	92	5.73	4.93
B	Eriogonum microthecum	2	3	-	-
B	Opuntia spp.	1	0	-	-
B	Pediocactus simpsonii	0	4	.03	.15
B	Pinus edulis	3	1	1.96	-
B	Unknown browse	4	3	-	-
Total for Browse		135	163	9.15	8.40

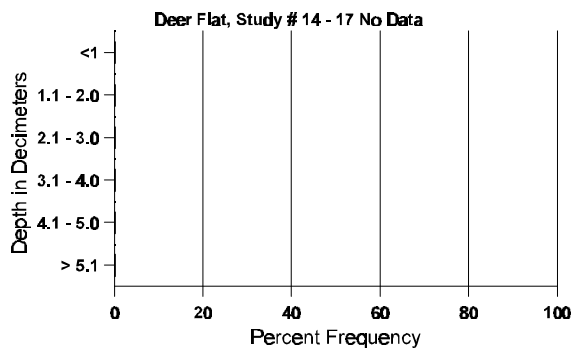
BASIC COVER --  
Herd unit 14 , Study no: 17

Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	338	342	4.75	37.11	36.50
Rock	-	-	0	.02	0
Pavement	-	3	0	0	.00
Litter	285	380	55.00	26.13	41.03
Cryptogams	-	25	0	0	.21
Bare Ground	281	317	40.25	33.64	32.72

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 17, Study Name: Deer Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.4	65.6 (13.1)	6.7	48.0	31.4	20.6	1.4	9.3	121.6	0.5

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 14 , Study no: 17

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'82	'89	
Rabbit	29	7	N/A
Deer	16	9	7 (17)
Cattle	17	17	67 (165)

BROWSE CHARACTERISTICS --  
Herd unit 14 , Study no: 17

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Amelanchier utahensis</i>																		
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	1	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	66	56	0
D	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			100%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'92	40		50%			
												'99	0		0%			
<i>Artemisia tridentata vaseyana</i>																		
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	8	-	-	2	-	-	2	-	-	12	-	-	-	240			12
	'99	33	1	-	-	-	-	3	-	-	37	-	-	-	740			37
Y	'86	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	'92	13	8	-	2	-	-	-	-	-	23	-	-	-	460			23
	'99	277	6	-	2	-	-	-	-	-	285	-	-	-	5700			285
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	36	24	-	1	-	-	-	-	-	61	-	-	-	1220	-	-	61
	'99	21	20	3	-	-	-	-	-	-	44	-	-	-	880	20	29	44
D	'86	23	-	-	-	-	-	-	-	-	21	-	1	1	766			23
	'92	2	1	-	-	-	-	-	-	-	3	-	-	-	60			3
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	1540			77
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			06%			+41%							
'92		38%			00%			00%			+74%							
'99		08%			.90%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	1032	Dec:	74%			
												'92	1740		3%			
												'99	6600		0%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	899	22	-	137	-	-	-	-	-	-	-	-	986	-	72	1058
	99	56	-	-	-	-	-	-	-	-	-	-	-	56	-	-	56
Y	86	16	-	-	-	-	-	-	-	-	-	-	-	533			16
	92	121	49	12	26	4	-	-	-	-	-	-	-	205	-	7	212
	99	223	-	-	6	-	-	-	-	-	-	-	-	229	-	-	229
M	86	30	-	-	-	-	-	-	-	-	-	-	-	1000	7	11	30
	92	124	53	-	8	-	-	-	-	-	-	-	-	3700	-	-	185
	99	164	41	-	3	-	-	-	-	-	-	-	-	4160	9	17	208
D	86	18	1	-	-	-	-	-	-	-	-	-	-	633			19
	92	1	5	-	-	-	-	-	-	-	-	-	-	120			6
	99	1	-	1	1	-	-	-	-	-	-	-	-	60			3
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		02%			00%			09%			+73%						
'92		28%			03%			03%			+ 8%						
'99		09%			.22%			.22%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	2166	Dec:	29%		
												'92	8060		1%		
												'99	8800		1%		
<i>Eriogonum microthecum</i>																	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	-	-	-	40			2
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	1	-	-	-	-	-	-	-	-	40	-	-	2
	99	2	-	-	-	-	-	-	-	-	-	-	-	40	7	8	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%			+50%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	40		-		
												'99	80		-		
<i>Opuntia spp.</i>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	20		-		
												'99	0		-		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4							
<b>Pediocactus simpsonii</b>												
M	86	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	0	-	-	0
	99	4	-	-	-	-	-	-	4	-	-	4
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'92		00%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'86	0	Dec:	-
									'92	0		-
									'99	80		-
<b>Pinus edulis</b>												
Y	86	-	-	-	-	-	-	-	0			0
	92	1	1	-	-	-	-	-	40			2
	99	1	-	-	-	-	-	-	20			1
M	86	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	20	-	-	1
	99	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'92		33%		00%		33%		-67%				
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'86	0	Dec:	-
									'92	60		-
									'99	20		-
<b>Unknown browse</b>												
Y	86	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	5	-	-	120			6
	99	1	-	-	-	-	-	-	20			1
M	86	-	-	-	-	-	-	-	0	-	-	0
	92	-	2	-	-	-	-	-	40	-	-	2
	99	1	-	1	-	-	-	-	40	3	7	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'92		88%		00%		00%		-63%				
'99		00%		33%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'86	0	Dec:	-
									'92	160		-
									'99	60		-

Trend Study 14-18-99

Study site name: Kigalia Point.

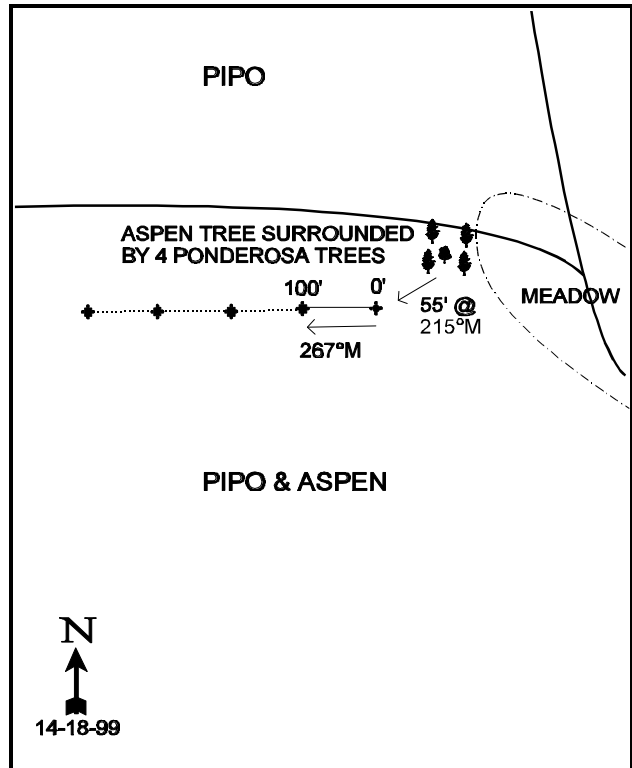
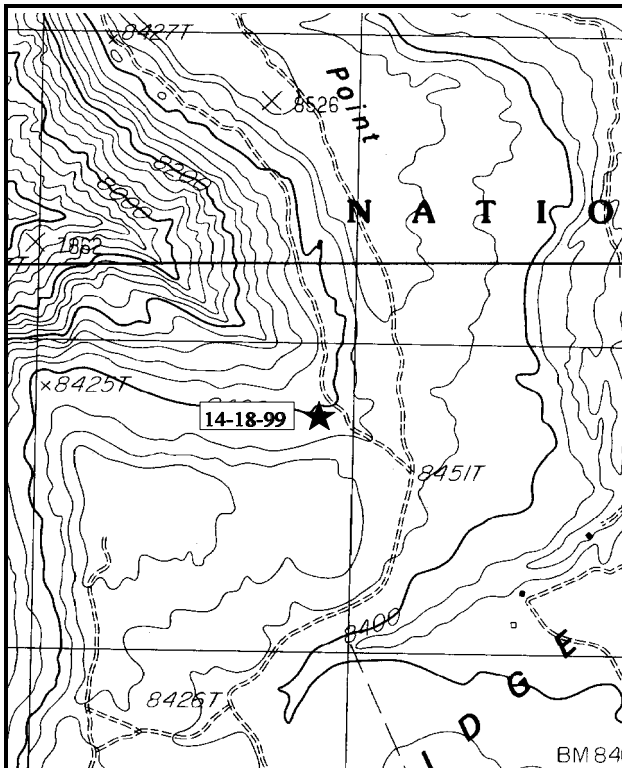
Range type: Selective Logged-Ponderosa Pine.

Compass bearing: frequency baseline 252°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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. Turn left onto this road and travel 0.05 miles (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. Stop here and walk 55 feet southwest 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.



Map Name: Kigalia Point

Diagrammatic Sketch

Township 36S , Range 19E , Section 4

UTM 4170639.834 N, 603105.120 E

## DISCUSSION

### Trend Study No. 14-18 (36-6)

Kigalia Point is a narrow, two mile long ridge on the north side of south Elk Ridge. The point drops sharply on all sides to the east, west and north. Elevation is consistently around 8,400 feet on top. The level terrain on top of this extension of the plateau is dominated by Ponderosa pine and quaking aspen with a dense understory. 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.

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) with no planned increase. 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 old 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. 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 acid pH (6.0). Phosphorus is low at 5.1ppm. Levels less than 10 ppm are limiting to normal plant growth and development. 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 site is basically level, with a slight northern aspect. Evidence of logging activity is indicated by numerous stumps and downed trees and limbs.

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. 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.

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 ½ 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 a controlled ground fire which occurred sometime during the fall of 1998. The surviving plants are lightly browsed and in good vigor.

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 was Kentucky bluegrass, which is considered an increaser with heavy grazing. Other prevalent species were smooth brome, timothy, and intermediate wheatgrass. No utilization of the grasses was apparent. Some of the forbs show signs of use. The more common and preferred species were Kings clover, dandelion, trailing fleabane, and fewflower peavine. Use is light and all species appear vigorous.

#### 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

browse - stable, but not critical for this summer range

herbaceous understory - stable to slightly up

#### 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 - down slightly, due to fire

browse - down due to the effect of fire

herbaceous understory - down slightly

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 18

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	Agropyron intermedium	a14	b77	51	5	29	18	1.82	1.68
G	Agropyron trachycaulum	a20	b32	a11	7	12	5	1.02	.05
G	Bromus anomalus	a-	b21	b18	-	10	7	.77	.28
G	Bromus inermis	a85	b179	b187	34	60	59	11.11	7.80
G	Carex spp.	b13	b5	a-	5	3	-	.04	-
G	Dactylis glomerata	a16	b39	ab19	6	16	8	1.67	.75
G	Festuca thurberi	-	6	-	-	2	-	.53	-
G	Juncus spp.	a-	b7	a-	-	4	-	.04	-
G	Oryzopsis hymenoides	3	-	-	1	-	-	-	-
G	Phleum alpinum	-	-	3	-	-	1	-	.03
G	Phleum pratense	40	36	23	21	14	10	1.06	.34
G	Poa pratensis	b294	a216	a203	87	67	62	16.39	7.03
G	Sitanion hystrix	b30	ab24	a3	17	9	2	1.31	.06
G	Stipa columbiana	a-	b29	a-	-	11	-	.35	-
G	Stipa comata	a-	b5	a-	-	3	-	.41	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		515	676	518	183	240	172	36.56	18.05
Total for Grasses		515	676	518	183	240	172	36.56	18.05
F	Achillea millefolium	c164	b94	a59	68	35	24	3.83	1.34
F	Agoseris glauca	-	-	1	-	-	1	-	.03
F	Antennaria spp.	-	2	-	-	1	-	.00	-
F	Arenaria congesta	-	3	-	-	1	-	.03	-
F	Collomia linearis (a)	-	3	13	-	1	5	.03	.05
F	Comandra pallida	-	-	6	-	-	2	-	.01
F	Erigeron flagellaris	19	40	19	8	16	9	2.42	.11
F	Erigeron speciosus	1	4	-	1	2	-	.06	-
F	Geranium spp.	-	1	4	-	1	2	.03	.06
F	Lathyrus lanszwertii	a8	b65	b78	3	30	27	1.16	4.01
F	Lomatium spp.	-	8	6	-	4	2	.04	.15
F	Polygonum douglasii (a)	-	b21	a2	-	10	1	.07	.00
F	Senecio canus	ab2	b7	a-	1	3	-	.01	-

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'02	'09
F	<i>Stellaria jamesiana</i>	a-	b <sub>24</sub>	b <sub>38</sub>	-	10	15	.17	.61
F	<i>Taraxacum officinale</i>	b <sub>126</sub>	ab <sub>113</sub>	a <sub>86</sub>	50	50	37	.89	1.66
F	<i>Thlaspi fendleri</i>	-	1	-	-	1	-	.03	-
F	<i>Thermopsis montana</i>	ab <sub>43</sub>	a <sub>17</sub>	b <sub>50</sub>	16	7	17	.26	2.84
F	<i>Trifolium kingii</i>	b <sub>183</sub>	a <sub>74</sub>	a <sub>104</sub>	77	29	39	.44	3.07
F	Unknown forb-perennial	b <sub>9</sub>	ab <sub>1</sub>	a-	5	1	-	.00	-
F	<i>Vicia exigua</i>	b <sub>16</sub>	a-	a-	8	-	-	-	-
F	<i>Viola</i> spp.	-	2	-	-	1	-	.00	-
Total for Annual Forbs		0	24	15	0	11	6	0.10	0.05
Total for Perennial Forbs		571	456	451	237	192	175	9.41	13.93
Total for Forbs		571	480	466	237	203	181	9.51	13.98

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

#### BROWSE TRENDS --

Herd unit 14 , Study no: 18

Type	Species	Strip Frequency		Average Cover %	
		'02	'09	'02	'09
B	<i>Amelanchier alnifolia</i>	1	0	-	-
B	<i>Pinus ponderosa</i>	8	6	17.36	.38
B	<i>Populus tremuloides</i>	5	7	7.45	.48
B	<i>Quercus gambelii</i>	19	6	5.21	.36
B	<i>Rosa woodsii</i>	22	12	.36	.10
B	<i>Symphoricarpos oreophilus</i>	91	76	22.51	6.27
Total for Browse		146	107	52.91	7.59

#### CANOPY COVER --

Herd unit 14 , Study no: 18

Species	Percent Cover '09
<i>Pinus ponderosa</i>	22
<i>Populus tremuloides</i>	9

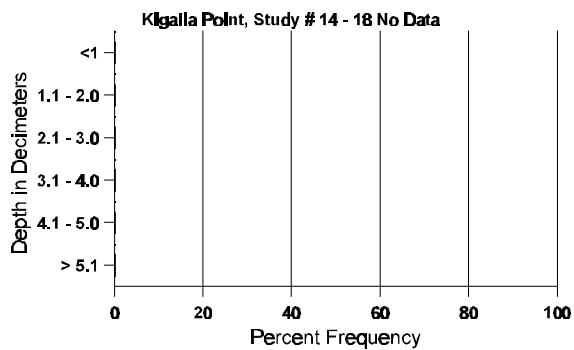
BASIC COVER --  
Herd unit 14 , Study no: 18

Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	345	336	13.25	74.02	44.20
Rock	-	2	0	.01	.38
Pavement	-	-	0	0	0
Litter	230	394	83.00	83.83	69.15
Cryptogams	4	-	0	.00	0
Bare Ground	51	175	3.75	3.93	12.71

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 18, Study Name: Kigalia Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.8	54.5 (17.9)	6.0	46.0	36.2	17.8	3.6	5.1	99.2	0.4

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 14 , Study no: 18

Type	Quadrat Frequency	
	'02	'09
Rabbit	3	-
Elk	5	5
Deer	16	-
Cattle	9	-

Pellet Transect Days Use/Acre (ha)
'09
N/A
13 (32)
5 (12)
5 (12)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 18

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<b>Amelanchier alnifolia</b>																	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	1	-	-	-	-	-	-	-	-	-	-	1	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		50%			00%			50%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%		
												'92	40		50%		
												'99	0		0%		
<b>Pinus ponderosa</b>																	
Y	86	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	3	-	-	-	-	-	-	6	-	9	-	-	-	180	-	9
	99	3	-	-	-	-	-	-	6	-	9	-	-	-	180	-	9
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	1	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			+70%						
'92		00%			00%			00%			-18%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	66	Dec:	0%		
												'92	220		9%		
												'99	180		0%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
Populus tremuloides																	
S	86	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	1	1	-	2	-	-	-	-	3	1	-	-	80		4	
	99	9	-	-	-	-	-	-	-	9	-	-	-	180		9	
Y	86	-	-	-	-	-	-	2	-	2	-	-	-	133		2	
	92	-	-	-	-	-	-	1	-	1	-	-	-	20		1	
	99	10	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	86	-	-	-	-	-	-	5	-	5	-	-	-	333	303	61	5
	92	-	-	-	-	-	-	4	-	4	-	-	-	80	-	-	4
	99	-	-	-	-	-	-	3	-	3	-	-	-	60	-	-	3
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	1	-	2	-	-	-	40		2	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			-79%						
'92		00%			00%			00%			+67%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'86	466	Dec:	0%				
										'92	100		0%				
										'99	300		13%				
Quercus gambelii																	
S	86	20	2	3	-	-	-	-	-	20	4	1	-	1666		25	
	92	28	1	-	1	-	-	3	-	33	-	-	-	660		33	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	86	26	10	7	-	-	-	-	-	36	6	1	-	2866		43	
	92	27	67	2	4	1	-	-	-	80	21	-	-	2020		101	
	99	17	-	-	-	-	-	-	-	17	-	-	-	340		17	
M	86	1	-	-	-	-	-	2	-	3	-	-	-	200	143	39	3
	92	-	2	4	-	-	-	6	-	12	-	-	-	240	-	-	12
	99	-	-	-	-	1	-	1	-	2	-	-	-	40	171	59	2
D	86	1	1	9	-	-	1	1	-	5	1	6	1	866		13	
	92	-	2	1	-	-	-	-	-	2	-	-	1	60		3	
	99	-	-	-	-	-	-	2	1	1	-	-	2	60		3	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	200		10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		19%			29%			14%			-41%						
'92		62%			06%			.86%			-81%						
'99		05%			00%			09%									
Total Plants/Acre (excluding Dead & Seedlings)										'86	3932	Dec:	22%				
										'92	2320		3%				
										'99	440		14%				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Rosa woodsii																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	11	-	-	8	-	-	-	-	-	19	-	-	-	380		19
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	34	4	-	26	-	-	-	-	-	64	-	-	-	1280		64
	99	23	-	-	-	-	-	-	-	-	23	-	-	-	460		23
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	2	-	-	-	-	-	-	-	2	-	-	-	40	-	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	3	-	-	-	-	-	-	3	-	-	1	80		4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		09%			04%			01%			-67%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%		
												'92	1400		6%		
												'99	460		0%		
Symphoricarpos oreophilus																	
S	86	125	1	-	-	-	-	-	-	-	126	-	-	-	8400		126
	92	74	1	-	63	-	-	52	-	-	190	-	-	-	3800		190
	99	32	-	-	-	-	-	-	-	-	32	-	-	-	640		32
Y	86	103	53	9	-	-	-	-	-	-	164	-	-	1	11000		165
	92	456	218	42	32	-	-	-	-	-	635	-	-	113	14960		748
	99	207	22	-	-	-	-	-	-	-	229	-	-	-	4580		229
M	86	33	71	10	-	-	-	-	-	-	114	-	-	-	7600	28	20
	92	77	280	77	11	-	-	-	-	-	445	-	-	-	8900	-	-
	99	44	9	-	-	-	-	-	-	-	53	-	-	-	1060	18	24
D	86	2	5	2	-	-	-	-	-	-	8	-	1	-	600		9
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	37	4	-	-	-	-	-	-	-	39	-	-	2	820		41
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	920		46
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		45%			07%			.69%			+20%						
'92		42%			10%			09%			-73%						
'99		11%			00%			.61%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	19200	Dec:	3%		
												'92	23880		0%		
												'99	6460		13%		

Trend Study 14-19-99

Study site name: Woodenshoe .

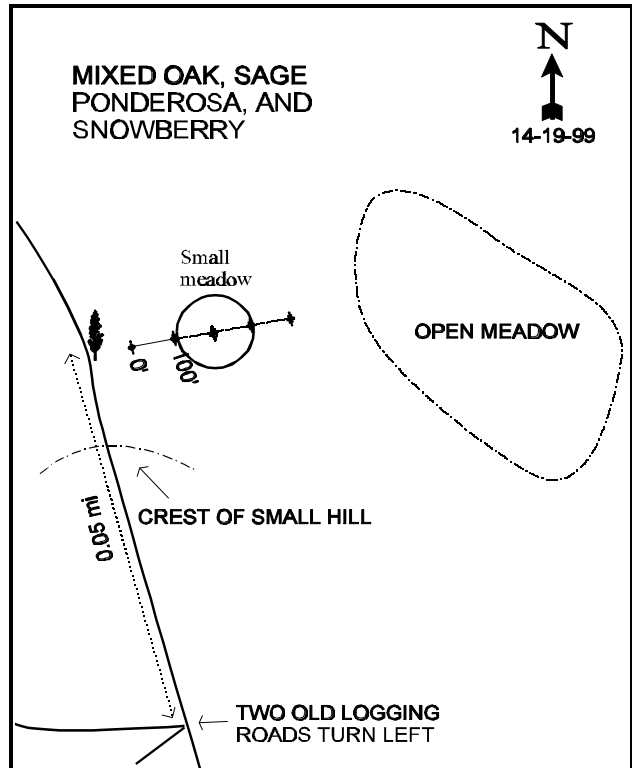
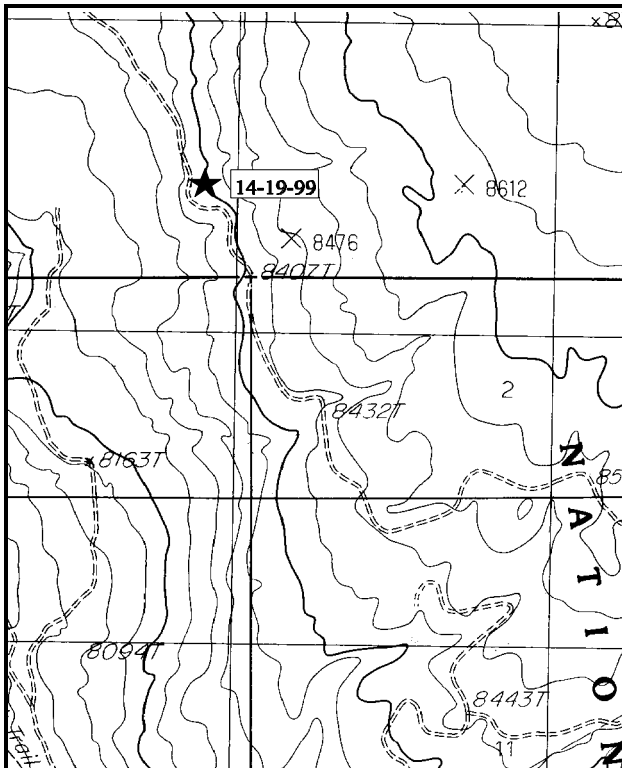
Range type: Selective Logged-Ponderosa Pine.

Compass bearing: frequency baseline 64°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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 ponderosa on the right and a small clump of tall oak on the left. The transect starting point is about 10 feet east side 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 or 35

UTM 4171983.232 N, 595608.453 E

## DISCUSSION

### Trend Study No. 14-19 (36-7)

The Wooden Shoe 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 Wooden Shoe Canyon. Although the vegetation is relatively dense, the area appears to be drier than the other summer range studies, which helps explain the lack of aspen. The area is dominated mainly by Ponderosa pine, Gambel oak, snowberry, sagebrush, and various perennial grasses. 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. The forest Service indicates that no future land treatments are planned. 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 estimate 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). About 30% of the cow pats are recent. The rest appear to be from last season. Cows and deer were observed near the site in 1999.

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 less than 10 ppm can limit normal plant growth and development. Parent material of the soil is granite, and bedrock is 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.

Although the uneven aged stand of Ponderosa pine is not the most numerous woody vegetative component, many trees are large and tall (75-100 ft.). They visually dominate much of the area and provide a protective canopy cover. Overhead ponderosa cover was estimated at 21% in 1999. Oak appears to dominate the shrubby understory, although snowberry is also quite prevalent. Oak has a vigorous population with high percentages of young plants and light use. Snowberry has declined in density since 1986, but some of the change is due to the much larger sample taken in 1992. Twenty-nine percent of the snowberry was classified in poor vigor in 1986, but only 3% in 1992. Insect damage was noted on some oak, snowberry, and forbs in 1986. Mountain big sagebrush displays light to moderate use, but only makes up a small portion of the browse cover (11% in '99). There was an estimated 63% of the population consisting of decadent plants in 1986. Percent decadence has declined to only 30% in 1992 and 8% in 1999. Other palatable shrubs are less common, which includes chokecherry, bitterbrush, and ceanothus. Observed use is generally light except for bitterbrush which has displayed moderate to heavy use since 1986.

Although overall density is rather low and restricted by the tree and shrub over story, there is a diverse and healthy herbaceous understory. The small openings in the over story support a good, dry meadow-like stand of grasses. Common species are mutton bluegrass, Kentucky bluegrass, bottlebrush squirreltail, needle-and-thread, and sedge. Kentucky bluegrass is more common in the openings, not as shade tolerant. Several species of productive, palatable forbs are also found. Utilization of forbs is light. More notable species include thickleaf peavine, Rocky Mountain penstemon, redroot eriogonum, and silky lupine.



## 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 extended 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 the 7 years of drought which have 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 its 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 respectively for grasses and forbs from 5 to 12 and 14 to 26. 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

browse - stable

herbaceous understory - up

## 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

browse - stable

herbaceous understory - down for grasses, stable for forbs, slightly down overall

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 19

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	Agropyron trachycaulum	a-	b29	43	-	13	21	.41	.55
G	Bouteloua gracilis	-	7	-	-	2	-	.06	-
G	Bromus anomalus	5	12	16	3	6	6	.29	.13
G	Carex spp.	44	32	23	19	17	13	2.24	.93
G	Koeleria cristata	-	2	-	-	1	-	.03	-
G	Muhlenbergia montana	-	8	7	-	4	2	.45	.06
G	Poa fendleriana	ab54	b99	a36	23	34	15	1.75	.70
G	Poa pratensis	a-	b82	c126	-	27	40	3.87	7.08
G	Sitanion hystrix	b63	b92	a10	29	32	3	3.43	.18
G	Stipa columbiana	a-	c22	b9	-	11	4	.73	.12
G	Stipa comata	b30	ab12	a8	11	6	4	.39	.07
G	Stipa lettermani	a-	c40	b8	-	19	5	1.21	.27
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		196	437	286	85	172	113	14.90	10.13
Total for Grasses		196	437	286	85	172	113	14.90	10.13
F	Achillea millefolium	26	32	40	10	14	16	.89	1.39
F	Agoseris glauca	a-	a-	b6	-	-	4	-	.02
F	Arenaria congesta	1	3	6	1	1	4	.03	.12
F	Artemisia ludoviciana	b8	a-	a-	3	-	-	-	-
F	Aster chilensis	a-	b5	b14	-	3	7	.06	.06
F	Castilleja linariaefolia	b25	a2	a-	14	1	-	.00	-
F	Calochortus nuttallii	-	-	3	-	-	1	-	.00
F	Chenopodium spp. (a)	-	5	-	-	2	-	.01	-
F	Comandra pallida	2	-	1	1	-	1	-	.00
F	Collinsia parviflora (a)	-	-	3	-	-	2	-	.01
F	Epilobium brachycarpum (a)	-	b8	a-	-	3	-	.04	-
F	Erigeron divergens	a10	b23	a1	4	11	1	.30	.00
F	Erigeron eatonii	-	3	-	-	1	-	.03	-
F	Erigeron flagellaris	57	92	94	22	35	36	2.71	2.15
F	Eriogonum racemosum	b21	a5	ab14	11	4	6	.05	.08
F	Gilia aggregata	-	4	4	-	2	2	.03	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	02	09
F	<i>Heterotheca villosa</i>	-	3	-	-	1	-	.63	-
F	<i>Ipomopsis aggregata</i>	-	-	-	-	-	-	-	.00
F	<i>Lathyrus lanszwertii</i>	<sub>b</sub> 77	<sub>a</sub> 49	<sub>ab</sub> 58	30	21	26	.93	1.61
F	<i>Lupinus sericeus</i>	28	13	31	16	6	14	.14	.91
F	<i>Microsteris gracilis</i> (a)	-	<sub>a</sub> 3	<sub>b</sub> 35	-	1	17	.00	.18
F	<i>Oenothera</i> spp.	-	2	-	-	1	-	.03	-
F	<i>Penstemon strictus</i>	<sub>b</sub> 35	<sub>a</sub> 16	<sub>a</sub> 5	20	8	4	.10	.07
F	<i>Phacelia</i> spp.	-	4	-	-	2	-	.01	.03
F	<i>Phlox longifolia</i>	41	60	46	18	27	19	.43	.11
F	<i>Polygonum douglasii</i> (a)	-	<sub>b</sub> 74	<sub>a</sub> 18	-	31	8	.42	.04
F	<i>Senecio canus</i>	<sub>b</sub> 28	<sub>a</sub> 4	<sub>a</sub> 7	13	2	3	.01	.01
F	<i>Senecio multilobatus</i>	-	-	2	-	-	1	.00	.00
F	<i>Stellaria jamesiana</i>	-	1	4	-	1	2	.03	.03
F	<i>Taraxacum officinale</i>	<sub>a</sub> -	<sub>b</sub> 26	<sub>b</sub> 27	-	11	13	.49	.29
F	<i>Tragopogon dubius</i>	<sub>a</sub> -	<sub>b</sub> 8	<sub>b</sub> 3	-	4	1	.20	.03
F	Unknown forb-annual (a)	-	<sub>b</sub> 8	<sub>a</sub> -	-	4	-	.07	-
F	Unknown forb-perennial	<sub>ab</sub> 2	<sub>b</sub> 12	<sub>a</sub> -	1	5	-	.02	-
Total for Annual Forbs		0	98	56	0	41	27	0.55	0.23
Total for Perennial Forbs		361	367	366	164	161	161	7.18	7.00
Total for Forbs		361	465	422	164	202	188	7.73	7.24

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

#### BROWSE TRENDS --

Herd unit 14, Study no: 19

Type	Species	Strip Frequency		Average Cover %	
		02	09	02	09
B	<i>Artemisia tridentata vaseyana</i>	44	41	3.44	2.59
B	<i>Ceanothus fendleri</i>	0	0	-	-
B	<i>Chrysothamnus depressus</i>	1	1	-	-
B	<i>Mahonia repens</i>	30	29	.71	1.04
B	<i>Pinus edulis</i>	0	0	-	-
B	<i>Pinus ponderosa</i>	8	8	19.45	1.32
B	<i>Populus tremuloides</i>	0	0	-	-
B	<i>Prunus virginiana</i>	1	0	-	-
B	<i>Purshia tridentata</i>	8	9	.97	.21
B	<i>Quercus gambelii</i>	36	37	5.79	6.10
B	<i>Rosa woodsii</i>	2	1	.00	-
B	<i>Symphoricarpos oreophilus</i>	58	53	12.09	11.84
Total for Browse		188	179	42.47	23.13

CANOPY COVER --  
Herd unit 14 , Study no: 19

Species	Percent Cover 09
Pinus ponderosa	21
Quercus gambelii	3

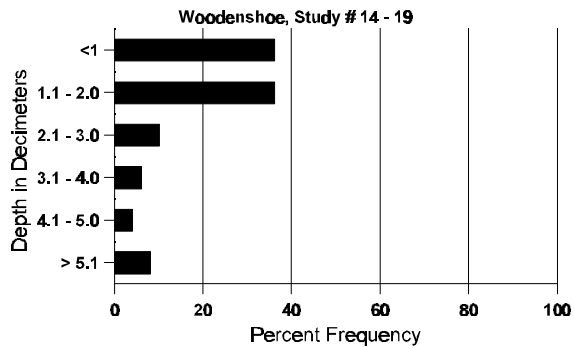
BASIC COVER --  
Herd unit 14 , Study no: 19

Cover Type	Nested Frequency		Average Cover %		
	02	09	'86	'92	'99
Vegetation	321	320	8.75	54.92	40.18
Rock	14	50	3.50	2.12	1.31
Pavement	4	30	0	0	.16
Litter	233	377	79.25	61.79	62.31
Cryptogams	24	8	0	.92	.07
Bare Ground	124	135	8.50	14.34	11.56

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 19, Study Name: Woodenshoe

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.9	54.0 (16.9)	6.5	48.4	31.1	20.6	3.8	7.6	204.8	0.4

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 14 , Study no: 19

Type	Quadrat Frequency	
	02	09
Rabbit	11	3
Grouse	4	-
Elk	4	1
Deer	11	8
Cattle	4	8

Pellet Transect Days Use/Acre (ha) 09
N/A
N/A
3 (7)
7 (17)
26 (64)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 19

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																		
S	86	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	92	4	-	-	1	-	-	18	-	-	23	-	-	-	460		23	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	86	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	28	1	-	3	-	-	-	-	-	32	-	-	-	640		32	
	99	20	3	-	-	-	-	-	-	-	23	-	-	-	460		23	
M	86	8	1	1	-	-	-	-	-	-	9	-	-	1	666	26 18	10	
	92	20	5	1	-	-	-	-	-	-	26	-	-	-	520	- -	26	
	99	38	7	1	-	-	-	-	-	-	46	-	-	-	920	25 35	46	
D	86	10	8	1	-	-	-	-	-	-	14	-	-	5	1266		19	
	92	12	6	1	4	2	-	-	-	-	19	-	5	1	500		25	
	99	4	-	1	-	1	-	-	-	-	5	-	-	1	120		6	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		33%			07%			20%			-17%							
'92		17%			02%			07%			-10%							
'99		15%			03%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	1998	Dec:	63%				
											'92	1660		30%				
											'99	1500		8%				
<i>Ceanothus fendleri</i>																		
Y	86	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	1	-	-	-	-	-	-	-	-	1	-	-	-	66	7 20	1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	132	Dec:	-				
											'92	0		-				
											'99	0		-				

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
<b>Chrysothamnus depressus</b>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	92	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1	
	99	-	-	1	-	-	-	-	-	-	-	-	-	20	-	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			+ 0%							
'92		00%			00%			00%										
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'92	20		-			
												'99	20		-			
<b>Mahonia repens</b>																		
S	86	4	-	-	-	-	-	-	-	-	3	1	-	-	266		4	
	92	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	86	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	83	-	-	30	-	-	15	-	-	128	-	-	-	2560		128	
	99	56	-	-	-	-	-	-	-	-	56	-	-	-	1120		56	
M	86	67	-	-	-	-	-	-	-	-	67	-	-	-	4466	6	6	67
	92	41	5	-	26	-	-	30	-	-	102	-	-	-	2040	-	-	102
	99	126	-	-	-	-	-	-	-	-	126	-	-	-	2520	4	8	126
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			+ 0%							
'92		02%			00%			00%			-21%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	4599	Dec:	-			
												'92	4600		-			
												'99	3640		-			
<b>Pinus edulis</b>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'92	0		-			
												'99	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<b>Pinus ponderosa</b>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	92	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	7	-	7	-	-	-	140	-	7
	99	-	-	-	-	-	-	-	7	-	7	-	-	-	140	-	7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			+26%						
'92		00%			00%			00%			-11%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	133	Dec:	-		
												'92	180		-		
												'99	160		-		
<b>Populus tremuloides</b>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	0		-		
												'99	0		-		
<b>Prunus virginiana</b>																	
Y	86	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			-80%						
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	200	Dec:	-		
												'92	40		-		
												'99	0		-		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	4	1	1	-	-	-	-	-	6	-	-	-	120		6	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	86	-	1	-	-	-	-	-	-	-	1	-	-	-	66	19	13	1
	92	-	-	2	1	-	-	-	-	-	3	-	-	-	60	-	-	3
	99	-	5	2	-	-	-	-	-	-	7	-	-	-	140	11	23	7
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	1	-	-	1	-	-	-	-	1	-	-	1	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		100%			00%			00%			+67%							
'92		50%			30%			00%			+ 0%							
'99		70%			20%			10%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	66	Dec:	0%			
												'92	200		10%			
												'99	200		20%			
Quercus gambelii																		
S	86	38	2	1	-	-	-	-	-	-	37	4	-	-	2733		41	
	92	461	-	-	5	-	-	5	-	-	471	-	-	-	9420		471	
	99	61	-	-	-	-	-	-	-	-	61	-	-	-	1220		61	
Y	86	30	-	-	-	-	-	-	-	-	27	3	-	-	2000		30	
	92	96	17	-	27	1	-	12	-	-	153	-	-	-	3060		153	
	99	106	-	-	19	-	-	5	-	-	130	-	-	-	2600		130	
M	86	8	1	-	-	-	-	-	1	-	9	1	-	-	666	77	44	10
	92	13	13	-	7	9	-	-	-	-	40	2	-	-	840	-	-	42
	99	29	1	-	8	-	-	-	7	-	45	-	-	-	900	49	44	45
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	3	1	-	-	-	-	-	-	4	-	1	-	100		5	
	99	3	-	-	1	-	-	-	-	-	2	-	-	2	80		4	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		03%			00%			00%			+33%							
'92		22%			.50%			.50%			-11%							
'99		.55%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	2666	Dec:	0%			
												'92	4000		3%			
												'99	3580		2%			



A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total						
		1	2	3	4									
Rosa woodsii														
Y	86	5	-	-	-	-	-	4	-	1	-	333		5
	92	3	-	-	1	-	-	4	-	-	-	80		4
	99	-	-	-	-	-	-	-	-	-	-	0		0
M	86	3	-	-	-	-	-	3	-	-	-	200	24 17	3
	92	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	2	-	-	-	-	-	2	-	-	-	40	11 15	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>			
'86		00%			00%			13%			-85%			
'92		00%			00%			00%			-50%			
'99		00%			00%			00%						
Total Plants/Acre (excluding Dead & Seedlings)										'86	533	Dec:	-	
										'92	80		-	
										'99	40		-	
Symphoricarpos oreophilus														
S	86	35	1	-	-	-	-	25	1	-	10	2400		36
	92	9	-	-	11	-	-	21	-	2	-	460		23
	99	12	-	-	-	-	-	12	-	-	-	240		12
Y	86	89	1	-	-	-	-	65	1	24	-	6000		90
	92	27	4	-	26	-	-	66	-	2	-	1360		68
	99	59	-	-	-	-	-	59	-	-	-	1180		59
M	86	128	8	-	-	-	-	95	-	40	1	9066	26 16	136
	92	90	19	5	25	4	-	140	-	3	-	2860	- -	143
	99	102	-	-	3	-	-	105	-	-	-	2100	31 50	105
D	86	-	-	-	-	-	-	-	-	-	-	0		0
	92	2	1	-	2	-	-	4	-	1	-	100		5
	99	-	-	-	-	-	-	-	-	-	-	0		0
X	86	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>			
'86		04%			00%			29%			-71%			
'92		13%			02%			03%			-24%			
'99		00%			00%			00%						
Total Plants/Acre (excluding Dead & Seedlings)										'86	15066	Dec:	0%	
										'92	4320		2%	
										'99	3280		0%	

Trend Study 14-20-99

Study site name: Gooseberry .

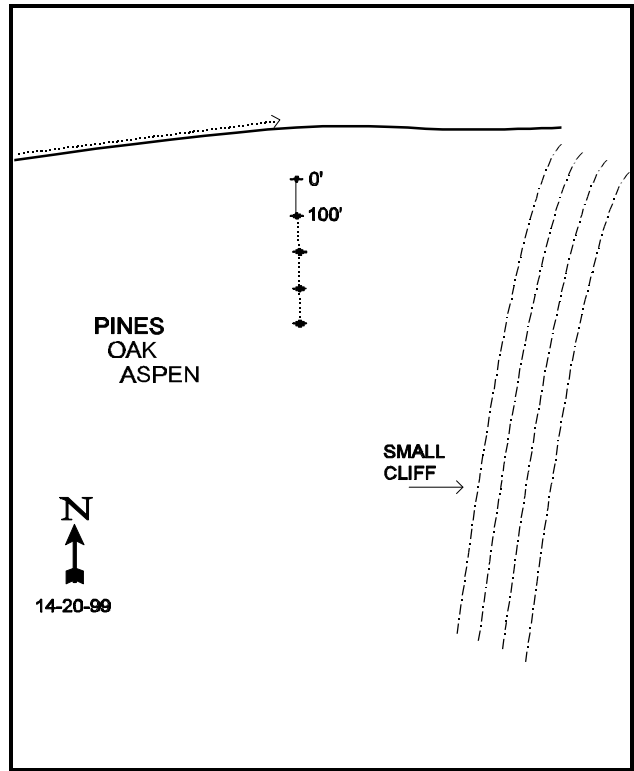
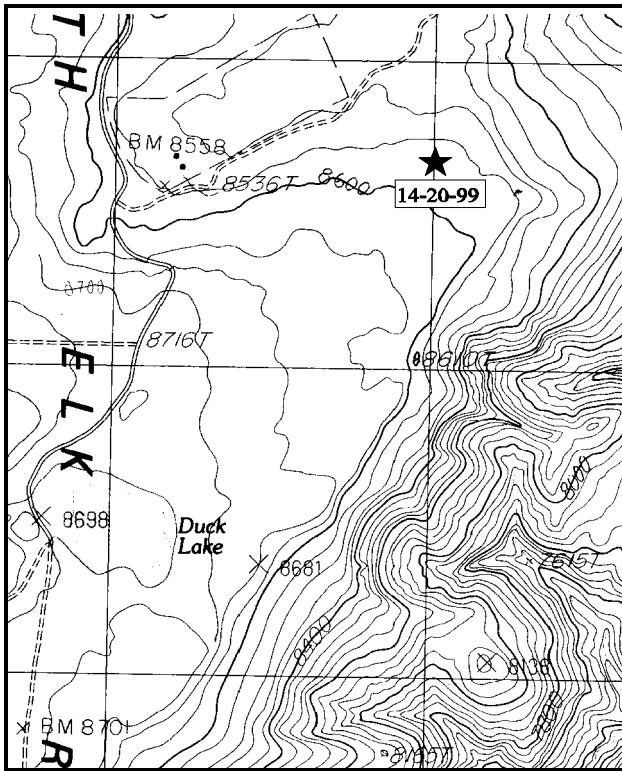
Range type: Selective Logged-Ponderosa Pine.

Compass bearing: frequency baseline 165°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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 (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

UTM 4187261.436 N, 609065.383 E

## DISCUSSION

### Trend Study No. 14-20 (36-8)

The Gooseberry Interagency trend study samples mixed ponderosa pine-aspen summer range on North Elk Ridge. The study is found at an elevation of 8,500 feet and just west of the rim where the level plateau drops off a steep and deep rocky cliff into Cottonwood Canyon. 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 estimate 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). Cattle pats appear to be from last season, but most of the deer and elk pellet groups appeared more recent.

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 which may limit plant growth and development where 10 ppm is thought to be the minimum. 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. Total litter cover exceeds 90%. 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. Therefore, aspen is more prevalent here than in surrounding areas where more Ponderosa pine predominate. Point quarter data from 1999 estimate 48 aspen and 157 Ponderosa pine trees/acre. Average diameter of aspen is estimated at 5 inches while Ponderosa averages 5.7 inches. The aspen are mainly mature trees averaging 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. The one young aspen classified on the density plots in 1986 was 16 feet tall, vigorous and unavailable. Most of the young plants are smaller and showed moderate to heavy browsing use, yellowed leaves and poor vigor in 1992.

The most abundant and available browse is mountain snowberry. It contributes to most of the available browse. The community has an open aspect because of the low-growing shrub understory. More than 50% of the snowberry population were young plants in 1986 and 1992. Use has varied from moderate to heavy in 1986 and 1992, to light in 1999. Density increased in 1992, but this would mostly be due to observer differences in counting this rhizomatous shrub between years. Strip frequency between years is within 1%, 90% vs 89%. Density estimates for 1999 are similar to 1986 estimates at about 7,800 plants/acre. A variety of other palatable browse species also occur including, low-growing myrtle pachystima, serviceberry, and scattered oak. Oregon grape is numerous and could provide some forage although it is not a very palatable plant.

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, and slender

wheatgrass. Only light use was noted on the grasses in 1999. Diversity of forbs is also high. The most conspicuous species was thicketleaf peavine, which showed light use. Low growing forbs like yarrow, spreading fleabane, starwort, and longleaf phlox are abundant.

#### 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 in its population. Its density is still moderately low at 680 plants/acre, reflective of the 11% decrease in its population. Being the most preferred species, 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 (biomass). 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

browse - up

herbaceous understory - stable

#### 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

browse - down slightly

herbaceous understory - stable

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 20

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	Agropyron intermedium	b13	a-	3	5	-	1	-	.03
G	Agropyron scribneri	a-	b22	a-	-	9	-	1.42	-
G	Agropyron spicatum	3	-	-	2	-	-	-	-
G	Agropyron trachycaulum	a-	b44	c101	-	18	44	1.59	.96
G	Bromus anomalus	b50	b68	a19	26	26	7	5.02	.11
G	Bromus inermis	18	25	25	8	8	11	.31	.52
G	Carex spp.	a-	b64	b47	-	28	20	1.70	.91
G	Dactylis glomerata	b10	a-	a1	4	-	1	-	.00
G	Festuca ovina	a-	b10	ab4	-	5	2	.33	.31
G	Koeleria cristata	b12	b14	a-	6	6	-	.08	-
G	Muhlenbergia montana	b46	a5	a4	16	3	2	.06	.03
G	Phleum pratense	b19	b16	a-	8	8	-	.45	-
G	Poa fendleriana	16	17	5	7	8	3	.09	.01
G	Poa pratensis	182	161	194	67	56	65	7.88	3.19
G	Sitanion hystrix	b69	c105	a14	30	41	6	3.54	.10
G	Stipa columbiana	b83	a39	a31	35	17	13	1.07	.53
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		521	590	448	214	233	175	23.59	6.74
Total for Grasses		521	590	448	214	233	175	23.59	6.74
F	Achillea millefolium	b171	a111	a76	63	47	31	1.43	.99
F	Antennaria rosea	a-	b11	b10	-	6	4	.63	.36
F	Arenaria congesta	-	3	3	-	1	2	.00	.03
F	Aster chilensis	6	6	2	2	2	2	.15	.06
F	Calochortus nuttallii	-	2	4	-	2	2	.01	.01
F	Collinsia parviflora (a)	-	a-	b21	-	-	8	-	.04
F	Crepis acuminata	-	-	3	-	-	1	-	.00
F	Delphinium nuttallianum	a-	a-	b26	-	-	13	-	.06
F	Draba spp. (a)	-	b11	a-	-	6	-	.03	-
F	Erigeron flagellaris	b37	ab26	a17	13	11	7	.61	.13
F	Geranium spp.	2	-	-	2	-	-	-	-
F	Lathyrus lanszwertii	132	106	138	50	42	49	2.11	4.80
F	Lomatium spp.	a-	ab4	b5	-	2	3	.03	.04
F	Lychnis drummondii	4	-	-	2	-	-	-	-
F	Microsteris gracilis (a)	-	-	5	-	-	2	-	.03
F	Penstemon spp.	a-	b4	ab1	-	3	1	.02	.00
F	Phlox longifolia	b97	a36	a17	41	18	8	.76	.06
F	Polygonum douglasii (a)	-	2	13	-	2	6	.01	.05
F	Pterospora andromedea	-	-	3	-	-	2	-	.04

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'02	'09
F	Senecio integerrimus	<sub>b</sub> 61	<sub>a</sub> 12	<sub>a</sub> 9	28	7	4	.17	.05
F	Sisymbrium altissimum (a)	-	-	2	-	-	1	-	.00
F	Smilacina stellata	1	-	-	1	-	-	-	-
F	Stellaria jamesiana	<sub>a</sub> 2	<sub>b</sub> 81	<sub>c</sub> 168	1	35	64	.55	3.21
F	Taraxacum officinale	59	64	56	32	29	25	.57	.96
F	Thalictrum fendleri	-	-	4	-	-	2	-	.03
F	Thlaspi spp.	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 10	-	-	4	-	.02
F	Trifolium repens	49	42	45	18	15	18	.42	1.30
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
Total for Annual Forbs		0	13	41	0	8	17	0.03	0.13
Total for Perennial Forbs		622	508	597	254	220	242	7.52	12.21
Total for Forbs		622	521	638	254	228	259	7.56	12.35

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

#### BROWSE TRENDS --

Herd unit 14 , Study no: 20

Type	Species	Strip Frequency		Average Cover %	
		'02	'09	'02	'09
B	Amelanchier utahensis	13	9	.13	.07
B	Mahonia repens	68	62	3.37	1.80
B	Pachistima myrsinites	19	4	.50	.06
B	Pinus ponderosa	13	16	30.55	.98
B	Populus tremuloides	13	5	10.94	.03
B	Purshia tridentata	-	-	.03	-
B	Quercus gambelii	5	3	1.37	.06
B	Rosa woodsii	22	7	.05	.03
B	Symphoricarpos oreophilus	90	89	20.68	15.04
Total for Browse		243	195	67.66	18.07

#### CANOPY COVER --

Herd unit 14 , Study no: 20

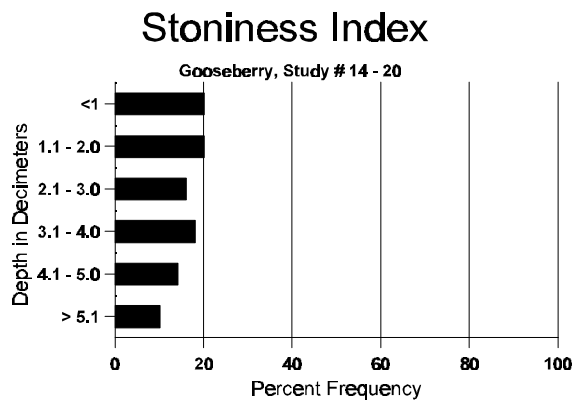
Species	Percent Cover '09
Pinus ponderosa	35
Populus tremuloides	13

BASIC COVER --  
Herd unit 14 , Study no: 20

Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	329	337	9.25	64.87	37.21
Rock	-	6	0	.37	.09
Pavement	7	6	0	0	.01
Litter	219	397	81.25	84.88	93.13
Cryptogams	19	10	.50	.76	.12
Bare Ground	16	45	9.00	1.52	1.28

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 20, Study Name: Gooseberry

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.8	49.8 (17.1)	6.1	45.4	34.0	20.6	3.0	4.0	89.6	0.4



PELLET GROUP DATA --  
Herd unit 14 , Study no: 20

Type	Quadrat Frequency	
	'02	'09
Rabbit	4	1
Elk	6	2
Deer	8	-
Cattle	3	1

Pellet Transect Days Use/Acre (ha)
'09
N/A
11 (27)
11 (27)
26 (64)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 20

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	86	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7	
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	5	-	-	5	-	-	-	-	-	10	-	-	-	200		10	
Y	86	9	3	1	-	-	-	-	-	-	13	-	-	-	433		13	
	92	-	15	14	-	2	-	-	-	-	20	11	-	-	620		31	
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
M	86	10	-	-	-	-	-	-	-	-	10	-	-	-	333	11	5	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	3	-	-	-	-	-	-	-	3	-	-	-	60		3	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		13%			04%			00%			-11%							
'92		59%			41%			00%			-68%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	766	Dec:	0%				
											'92	680		9%				
											'99	220		0%				
Mahonia repens																		
S	86	21	-	-	-	-	-	-	-	-	18	-	3	-	700		21	
	92	37	2	-	15	-	-	-	-	-	54	-	-	-	1080		54	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	86	41	-	-	-	-	-	-	-	-	39	-	2	-	1366		41	
	92	280	-	-	104	-	-	6	-	-	367	13	10	-	7800		390	
	99	35	-	-	-	-	-	-	-	-	35	-	-	-	700		35	
M	86	73	-	-	-	-	-	-	-	-	63	-	10	-	2433	6	6	
	92	231	8	-	131	-	-	-	-	-	327	8	35	-	7400	-	-	
	99	244	-	-	22	-	-	-	-	-	266	-	-	-	5320	4	7	
D	86	12	-	-	-	-	-	-	-	-	12	-	-	-	400		12	
	92	3	1	-	1	-	-	-	-	-	1	3	1	-	100		5	
	99	2	-	-	-	-	-	-	-	-	-	-	2	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			10%			+73%							
'92		01%			00%			06%			-60%							
'99		00%			00%			.66%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	4199	Dec:	10%				
											'92	15300		1%				
											'99	6060		1%				



A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Pachistima myrsinites</b>																		
S	86	36	-	-	-	-	-	-	-	-	36	-	-	-	1200		36	
	92	3	1	-	8	-	-	-	-	-	12	-	-	-	240		12	
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	86	12	-	2	-	-	-	-	-	-	14	-	-	-	466		14	
	92	16	53	-	22	1	-	1	-	-	93	-	-	-	1860		93	
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	86	20	-	-	-	-	-	-	-	-	20	-	-	-	666	5	6	20
	92	-	19	-	-	-	-	7	-	-	26	-	-	-	520	-	-	26
	99	-	-	-	4	-	-	-	-	-	4	-	-	-	80	5	18	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			06%			00%			+52%							
'92		61%			00%			00%			-92%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	1132	Dec:	-			
												'92	2380		-			
												'99	180		-			
<b>Pinus ponderosa</b>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	17	1	-	1	-	-	-	-	-	19	-	-	-	380		19	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	86	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	92	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	2	-	-	2	-	-	1	2	-	7	-	-	-	140	-	-	7
	99	3	-	-	-	-	-	-	2	1	6	-	-	-	120	-	-	6
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			+41%							
'92		00%			00%			00%			+18%							
'99		00%			06%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	166	Dec:	0%			
												'92	280		0%			
												'99	340		6%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<b>Populus tremuloides</b>																	
S	86	-	-	1	-	-	-	-	-	-	-	-	1	-	33		1
	92	4	24	-	-	-	-	-	-	-	-	-	21	-	560		28
	99	4	-	-	-	-	-	-	-	-	-	-	4	-	80		4
Y	86	-	-	-	-	-	-	1	-	-	-	-	1	-	33		1
	92	-	5	2	-	-	-	3	-	-	-	-	7	-	200		10
	99	5	-	-	-	-	-	-	-	-	-	-	5	-	100		5
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	4	1	-	-	5	-	100	-	5
	99	-	-	-	-	-	-	-	3	-	-	-	3	-	60	-	3
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	2	1	-	-	-	-	2	-	-	-	1	-	100		5
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			+92%						
'92		35%			20%			35%			-60%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	33	Dec:	0%		
												'92	400		25%		
												'99	160		0%		
<b>Quercus gambelii</b>																	
S	86	2	-	-	-	-	-	-	-	-	-	-	2	-	66		2
	92	1	1	-	1	-	-	-	-	-	-	-	3	-	60		3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	18	-	1	6	-	-	-	-	-	-	-	25	-	500		25
	99	14	-	-	-	-	-	-	-	-	-	-	14	-	280		14
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	7	-	-	-	-	-	-	-	-	6	-	140		7
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			25%			03%			-56%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%		
												'92	640		22%		
												'99	280		0%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4							
Rosa woodsii												
S	86	3	-	-	-	-	-	3		3		
	92	10	3	-	-	-	-	13		13		
	99	-	-	-	-	-	-	0		0		
Y	86	15	-	-	-	-	-	15		15		
	92	22	7	1	2	1	-	36	1	37		
	99	8	-	-	-	-	-	8		8		
M	86	5	2	-	-	-	-	7	10	8		
	92	-	-	-	6	-	-	6	-	6		
	99	-	-	-	-	-	-	0	-	0		
D	86	-	1	-	-	-	-	1		1		
	92	2	-	-	-	-	-	2		2		
	99	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		13%		00%		00%		+15%				
'92		18%		02%		02%		-82%				
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'86	766	Dec:	4%
									'92	900		4%
									'99	160		0%
Symphoricarpos oreophilus												
S	86	44	-	-	-	-	-	44		44		
	92	57	9	-	26	-	2	94		94		
	99	32	-	-	1	-	-	33		33		
Y	86	87	43	-	-	-	-	130		130		
	92	202	88	10	38	6	-	333	3	345		
	99	89	-	-	7	-	-	95	1	96		
M	86	35	56	13	-	-	-	104	22	20		
	92	173	115	14	1	-	-	300	3	303		
	99	289	-	-	-	-	-	289	19	24		
D	86	2	1	-	-	-	-	3		3		
	92	4	6	-	2	-	-	11		12		
	99	7	-	-	-	-	-	7		7		
X	86	-	-	-	-	-	-	0		0		
	92	-	-	-	-	-	-	0		0		
	99	-	-	-	-	-	-	160		8		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		42%		05%		00%		+40%				
'92		33%		04%		02%		-41%				
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'86	7899	Dec:	1%
									'92	13200		2%
									'99	7840		2%

Trend Study 14-21-99

Study site name: North Long Point .

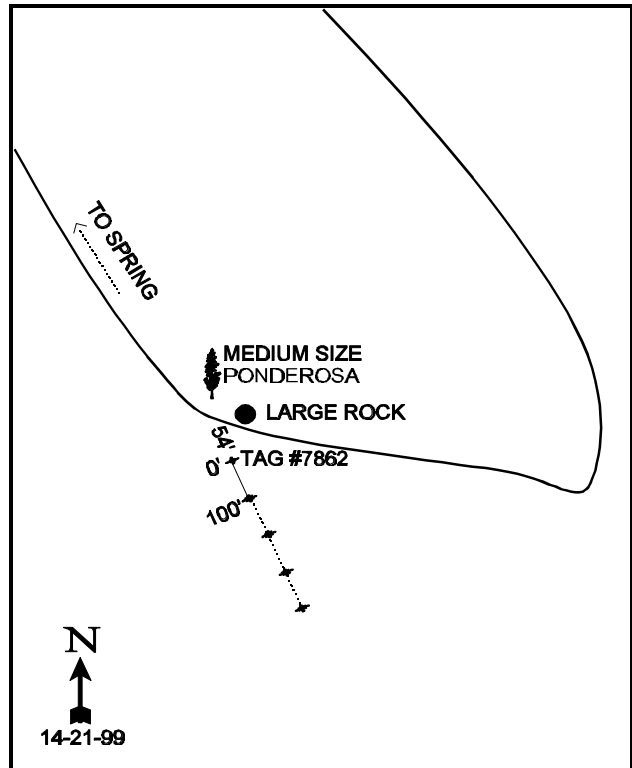
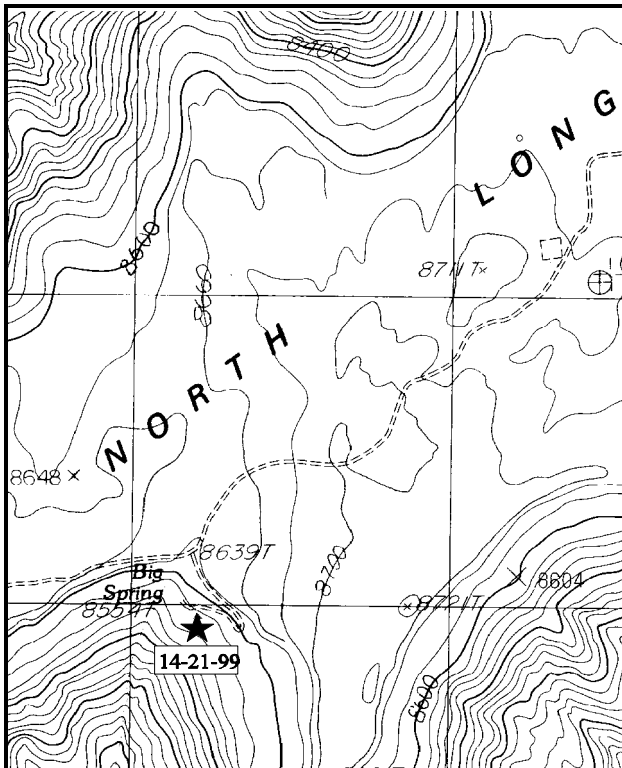
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 135°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From the road junction located approximately 1.5 miles north of Gooseberry Guard Station, continue north for 3.3 miles to a fork. Turn left and travel 4.5 miles on North Long Point towards the Dark Canyon Plateau. At the sign indicating "Big Spring" turn left. Continue 0.35 miles (stay right at 0.1 miles) further to a brushy ponderosa pine located inside the second sharp right bend in the road. Walk 12 paces southeast on an indistinct game trail to the short red-painted and green steel fencepost which marks the start of the baseline. From the PIPO the 0' baseline stake is 125°M and 12 paces from the road.



Map Name: Poison Canyon

Diagrammatic Sketch

Township 34S , Range 19E , Section 8

UTM 4188969.617 N, 601200 E

## DISCUSSION

### Trend Study No. 14-21 (36-9)

The North Long Point trend study is found on the southern rim of North Long Point, an extension of the northwest portion of Elk Ridge. The plateau drops off steeply from the rim into Poison Canyon, which drains into Dark Canyon. The transect runs south along the edge of the plateau rim through Ponderosa pines, oakbrush, mixed mountain brush stands, and small groves of aspen. The site has a generally west aspect with an elevation of 8,400 feet. The area is readily accessible by a road which turns off the main North Long Point road going toward Big Spring. This perennial spring has been developed for cattle use. The transect is below the open flats on top of North Long Point, much of which was treated (2,4-D) and seeded to grass in the early 1960's. No treatments, other than some over story removal of old growth Ponderosa pine, are evident on the actual transect. The study baseline samples Gambel oak, meadow areas, and an open Ponderosa pine forest. Point quarter data from 1999 estimate 30 Ponderosa pine, 31 pinyon, and 27 Rocky mountain juniper trees/acre. Average diameter of Ponderosa pine is 21 inches, while diameter of pinyon and juniper is 4.5 and 6.4 inches respectively. Overhead canopy cover of Ponderosa pine is variable on the site, yet averages 32%. Pinyon pine and Rocky mountain juniper overhead canopy cover averages 2% for each species. Total shrub and tree overhead cover averages over 56% over the whole site.

Cattle grazing is a major resource use in the area and cows were on site in 1992. The large Cottonwood allotment is managed by the Forest Service under a rest-rotation grazing system from June 16 to Sept 15. One of the three pastures is rested each grazing season. Currently, the allotment permits 676 head of cattle (3,718 AUMs) per year and an increase is being considered. Deer pellet groups were not frequently encountered during past readings. The area generally receives fairly moderate summer/fall deer use. Pellet group data from 1999 estimate 13 deer days use/acre (32 ddu/ha), 11 elk days use/acre (27 edu/ha), and 9 cow days use/acre (22 cdu/ha). All of the cow sign was from last season, however the site was read (6/23/99) before livestock were able to get onto the site. Rabbit sign was common. As with the rest of Elk Ridge, the area is open to oil and gas leasing, mining claims, and uranium exploration.

The soil is variable in depth. Effective rooting depth varies from 12 inches to 26 inches. Average effective rooting depth is estimated at over 17 inches over the whole site. Scattered rock slabs, some exposed and others just under the surface layer, are responsible for the variability. Soil texture is a loam with a slightly acid pH (6.1). Phosphorus is low at 8.7 ppm, when values less than 10 ppm have been determined to limit normal plant growth and development. Due to the fairly thick vegetation and litter cover, the soil has continuous ground cover with percent bare ground at less than 5% during all readings.

This study was set up in place of the Big Spring permanent line intercept study and samples an oakbrush opening surrounded by ponderosa pine. Many browse species were encountered on the frequency baseline, including such palatable species as snowberry, bitterbrush, aspen, and serviceberry. Also present is a small and declining population of lightly hedged mountain big sagebrush. Oak is the most abundant species which provided 26% of the browse cover in 1992, increasing to 48% by 1999. Most of the oak has received only light use since 1986. Vigor has been normal over the years and percent decadence low. Snowberry is also abundant. It provided 16% of the shrub cover in 1992, increasing to 35% in 1999. Density has remained similar between 1986 and 1999 at about 2,500 plants/acre. Many plants were moderately browsed in 1986 and 1992, although current use is light. The less common serviceberry and bitterbrush are vigorous, but are sought out and more heavily utilized.

A variety of grasses are present on the site, but none are particularly numerous. Grass abundance is fairly low over much of this site considering the elevation. The most common grasses include, smooth brome, sedge, mutton bluegrass, and Kentucky bluegrass. Forbs are moderately diverse but only a few species are abundant (Western yarrow, silky lupine, and goldenrod). Utilization of herbaceous plants appears to be light.

### 1986 TREND ASSESSMENT

Data from the old line intercept transects and the new Interagency study indicate a basically stable vegetative trend. The area is dominated by woody plants, so it would seem reasonable to continue management to maintain this valuable forage source in addition to a balance of grasses and forbs. The increase in oak numbers and production is in contrast to the possible decline of big sagebrush. Snowberry also has the potential to increase. Herbaceous forage is limited, but grass is plentiful nearby on top of the plateau. Possible future logging treatments could create more openings along the rim. The soil has a fairly continuous ground cover. There is evidence of some normal surface erosion in areas where the land drops off sharply to the rocky canyons below. Erosion is not a problem on the site and soil trend is stable.

### 1992 TREND ASSESSMENT

Soil trend is stable with a slight increase in percent bare ground to 4%. Percent litter cover has decreased, but this has happened on most all sites with the continuing prolonged drought. This would change with increased amounts of moisture. Of the preferred browse species, only serviceberry had a downward trend. The downward trend was because of its small population which is highly preferred and heavily hedged. It should be noted that it only makes up <1% of the browse cover (biomass) and should not be considered a key management species on this site. The overall trend for browse is up. The trend for the herbaceous understory is slightly down for both the grasses and forbs have lower nested frequency values.

#### TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - slightly downward

### 1999 TREND ASSESSMENT

Trend for soil is up slightly with a decline in percent bare ground and an increase in litter cover. Protective ground cover is abundant and erosion is not a problem on the site. Trend for browse is down slightly due to a decline in density, strip frequency, and cover of the key species, Gambel oak and snowberry. Density of the more preferred serviceberry and mountain big sagebrush also declined but they are less heavily hedged. The amount of overhead canopy cover (shading) may be starting to negatively effect the understory shrubs. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses declined slightly while frequency of perennial forbs increased slightly. Grasses provide 64% of the herbaceous cover, however the overall herbaceous trend is considered stable since the dominant grass, smooth brome which is shade tolerant, increased significantly in nested frequency. Western yarrow and silky lupine are the two most common forbs to increase significantly in nested frequency. The only other common forb, goldenrod, remained at a similar frequency compared to 1992.

#### TREND ASSESSMENT

soil - up slightly

browse - down slightly

herbaceous understory - stable

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 21

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	Agropyron cristatum	2	-	-	1	-	-	-	-
G	Bromus anomalus	9	14	3	3	6	1	.36	.03
G	Bromus inermis	<sub>a</sub> 78	<sub>a</sub> 68	<sub>b</sub> 117	25	23	36	2.77	4.64
G	Bromus tectorum (a)	-	-	4	-	-	1	-	.03
G	Carex spp.	<sub>b</sub> 73	<sub>b</sub> 58	<sub>a</sub> 30	33	29	12	1.06	.91
G	Dactylis glomerata	-	-	2	-	-	1	-	.15
G	Koeleria cristata	<sub>b</sub> 19	<sub>b</sub> 27	<sub>a</sub> -	10	13	-	.55	-
G	Poa fendleriana	<sub>b</sub> 89	<sub>ab</sub> 59	<sub>a</sub> 45	34	25	20	1.07	.59
G	Poa pratensis	<sub>a</sub> 6	<sub>a</sub> 42	<sub>b</sub> 43	2	16	15	.90	.69
G	Sitanion hystrix	<sub>b</sub> 52	<sub>a</sub> 23	<sub>a</sub> 3	24	10	1	.36	.03
G	Stipa comata	2	6	1	1	3	1	.04	.00
G	Stipa lettermani	<sub>b</sub> 10	<sub>b</sub> 10	<sub>a</sub> -	5	5	-	.07	-
Total for Annual Grasses		0	0	4	0	0	1	0	0.03
Total for Perennial Grasses		340	307	244	138	130	87	7.21	7.05
Total for Grasses		340	307	248	138	130	88	7.21	7.08
F	Achillea millefolium	<sub>a</sub> 19	<sub>ab</sub> 29	<sub>b</sub> 48	9	13	19	.53	1.00
F	Artemisia ludoviciana	<sub>b</sub> 28	<sub>a</sub> 7	<sub>a</sub> 2	11	2	1	.06	.00
F	Aster chilensis	<sub>a</sub> -	<sub>b</sub> 7	<sub>c</sub> 19	-	3	9	.04	.24
F	Calochortus nuttallii	-	-	3	-	-	1	-	.00
F	Cirsium spp.	-	1	-	-	1	-	.03	-
F	Comandra pallida	8	2	5	3	1	2	.00	.01
F	Collinsia parviflora (a)	-	<sub>a</sub> -	<sub>b</sub> 13	-	-	5	-	.05
F	Crepis acuminata	5	-	-	2	-	-	-	-
F	Delphinium nuttallianum	-	-	2	-	-	1	-	.00
F	Erigeron flagellaris	<sub>c</sub> 18	<sub>b</sub> 4	<sub>a</sub> -	10	3	-	.07	-
F	Eriogonum racemosum	<sub>b</sub> 15	<sub>a</sub> 6	<sub>a</sub> 3	8	2	1	.03	.00
F	Gilia inconspicua (a)	-	<sub>b</sub> 11	<sub>a</sub> -	-	7	-	.06	-
F	Lappula occidentalis (a)	-	-	1	-	-	1	-	.00
F	Lupinus sericeus	<sub>b</sub> 83	<sub>a</sub> 10	<sub>a</sub> 29	38	5	14	.08	1.16
F	Penstemon comarrhenus	2	3	-	1	2	-	.01	-
F	Phacelia hastata	4	3	-	2	2	-	.03	-
F	Phlox longifolia	<sub>a</sub> -	<sub>b</sub> 13	<sub>b</sub> 12	-	6	5	.05	.02
F	Polygonum douglasii (a)	-	10	3	-	4	2	.02	.01
F	Senecio canus	4	1	2	4	1	1	.00	.00
F	Solidago sparsiflora	42	44	44	17	20	17	1.72	.93
F	Stellaria jamesiana	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 24	-	-	8	-	.40
F	Thalictrum fendleri	<sub>a</sub> -	<sub>b</sub> 7	<sub>b</sub> 6	-	3	3	.06	.18
F	Unknown forb-perennial	<sub>b</sub> 8	<sub>ab</sub> 1	<sub>a</sub> -	4	1	-	.00	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'02	'09
	Total for Annual Forbs	0	21	17	0	11	8	0.07	0.06
	Total for Perennial Forbs	236	138	199	109	65	82	2.75	3.99
	Total for Forbs	236	159	216	109	76	90	2.83	4.05

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

#### BROWSE TRENDS --

Herd unit 14 , Study no: 21

Type	Species	Strip Frequency		Average Cover %	
		'02	'09	'02	'09
B	Amelanchier utahensis	10	7	.18	.21
B	Artemisia tridentata vaseyana	33	28	6.07	2.41
B	Juniperus scopulorum	0	1	1.00	.41
B	Mahonia repens	24	18	4.48	.15
B	Pinus edulis	1	2	.63	.63
B	Pinus ponderosa	0	1	23.22	-
B	Populus tremuloides	1	2	-	-
B	Purshia tridentata	5	5	.56	.21
B	Quercus gambelii	64	62	16.25	11.52
B	Symphoricarpos oreophilus	55	43	9.89	8.51
	Total for Browse	193	169	62.31	24.07

#### CANOPY COVER --

Herd unit 14 , Study no: 21

Species	Percent Cover '09
Amelanchier utahensis	.40
Juniperus scopulorum	2
Pinus edulis	2
Pinus ponderosa	32
Populus tremuloides	2
Quercus gambelii	18

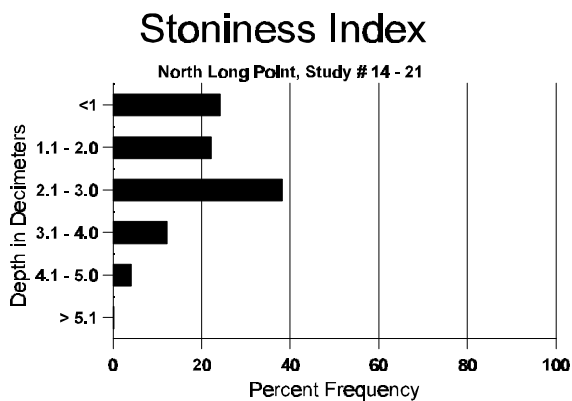


BASIC COVER --  
Herd unit 14 , Study no: 21

Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	256	273	7.25	58.70	31.86
Rock	62	54	9.25	5.44	3.25
Pavement	-	4	0	0	.03
Litter	223	389	80.50	75.71	85.71
Cryptogams	3	6	0	.06	.01
Bare Ground	50	45	3.00	3.60	1.61

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 21, Study Name: North Long Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.3	50.0 (16.0)	6.1	46.4	33.1	20.6	3.1	8.7	137.6	0.5



PELLET GROUP DATA --  
Herd unit 14 , Study no: 21

Type	Quadrat Frequency	
	'02	'09
Rabbit	5	9
Elk	-	2
Deer	4	1
Cattle	1	2

Pellet Transect Days Use/Acre (ha)
'09
N/A
11 (27)
13 (32)
9 (22)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 21

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total					
		1	2	3	4									
<i>Amelanchier utahensis</i>														
Y	86	3	4	1	-	-	-	-	8	-	8			
	92	2	7	-	-	-	1	-	5	5	10			
	99	2	-	-	-	-	-	-	2	-	2			
M	86	-	-	-	-	-	-	-	-	-	0			
	92	-	2	1	-	-	-	-	-	3	3			
	99	4	-	-	-	-	1	-	5	-	5			
X	86	-	-	-	-	-	-	-	-	-	0			
	92	-	-	-	-	-	-	-	-	-	0			
	99	-	-	-	-	-	-	-	-	-	1			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
'86		50%		13%		00%		-51%						
'92		69%		08%		00%		-46%						
'99		00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'86	533	Dec:	-	
										'92	260		-	
										'99	140		-	
<i>Artemisia tridentata vaseyana</i>														
S	86	1	-	-	-	-	-	-	-	1	66	-	1	
	92	1	-	-	-	-	-	-	-	1	20	-	1	
	99	-	-	-	-	-	-	-	-	-	0	-	0	
Y	86	-	-	-	-	-	-	-	-	-	0	-	0	
	92	1	-	-	-	-	-	-	-	1	20	-	1	
	99	-	-	-	-	-	-	-	-	-	0	-	0	
M	86	-	1	-	-	-	-	-	-	-	66	32	25	1
	92	7	23	5	-	-	-	-	-	35	700	-	-	35
	99	26	4	-	-	-	-	-	-	30	600	27	34	30
D	86	9	-	-	-	-	-	-	-	5	600	-	-	9
	92	8	11	1	2	3	-	1	-	18	520	-	-	26
	99	7	-	-	-	-	-	-	-	2	140	-	-	7
X	86	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	360	-	-	18
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
'86		10%		00%		50%		+46%						
'92		60%		10%		13%		-40%						
'99		11%		00%		14%								
Total Plants/Acre (excluding Dead & Seedlings)										'86	666	Dec:	90%	
										'92	1240		42%	
										'99	740		19%	

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Juniperus scopulorum</b>																		
Y	86	1	-	-	-	-	-	-	-	-	-	1	-	-	66		1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	-	-	-	-	-	-	-	-	1	1	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%										
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	66	Dec:	-			
												'92	0		-			
												'99	20		-			
<b>Mahonia repens</b>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	25	-	-	1	-	-	2	-	-	28	-	-	-	560		28	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	149	-	-	-	-	-	15	-	-	164	-	-	-	3280		164	
	99	34	-	-	-	-	-	1	-	-	35	-	-	-	700		35	
M	86	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	13	
	92	27	1	-	4	-	-	-	-	-	32	-	-	-	640	-	32	
	99	55	-	-	-	-	-	4	-	-	59	-	-	-	1180	4	6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			+98%							
'92		.51%			00%			00%			-52%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	66	Dec:	-			
												'92	3920		-			
												'99	1880		-			
<b>Pinus edulis</b>																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%			+50%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'92	20		-			
												'99	40		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Pinus ponderosa													
S	86	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	-	1	-	1
	99	1	-	-	-	-	-	-	-	-	1	-	1
M	86	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	0	-	0
	99	-	-	-	-	-	-	-	2	-	40	-	2
X	86	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'86		00%		00%		00%							
'92		00%		00%		00%							
'99		00%		100%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-
										'92	0		-
										'99	40		-
Populus tremuloides													
S	86	-	-	-	-	-	-	-	-	-	0		0
	92	1	1	-	-	-	-	-	-	-	40		2
	99	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	2	-	-	-	-	-	40		2
	99	3	-	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'86		00%		00%		00%							
'92		00%		00%		00%		+33%					
'99		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-
										'92	40		-
										'99	60		-

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
	1	2	3	4	5	6	7	8	9	1	2	3	4			
Purshia tridentata																
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	-	-	-	20		1
	99	2	-	-	-	-	-	-	-	-	-	-	-	40		2
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	2	-	-	-	-	-	-	-	-	-	40		2
	99	3	-	-	-	-	-	-	-	-	-	-	-	60		3
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	1	2	1	-	-	-	-	-	-	-	-	80	-	4
	99	2	-	-	-	-	-	-	-	-	-	-	-	40	20 28	2
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'86		00%			00%			00%								
'92		17%			67%			00%			+ 0%					
'99		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	0%		
											'92	120		0%		
											'99	120		17%		
Quercus gambelii																
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	45	6	3	57	-	-	2	-	-	-	-	-	91	20	113
	99	11	-	-	1	-	-	-	-	-	-	-	-	12	-	12
Y	86	40	3	1	-	-	-	-	-	-	-	-	-	2933		44
	92	267	99	-	8	-	-	18	-	-	-	-	-	7840		392
	99	118	-	-	7	-	-	-	-	-	-	-	-	2500		125
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	53	62	9	17	-	-	-	12	-	-	-	-	3060	-	153
	99	138	-	-	6	-	-	1	11	12	-	-	-	3360	51 37	168
D	86	1	-	-	-	-	-	-	-	-	-	-	-	66		1
	92	2	2	3	-	-	-	-	-	-	-	-	-	140		7
	99	1	-	-	-	-	-	-	-	-	-	-	-	20		1
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	720		36
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'86		07%			02%			11%			+73%					
'92		30%			02%			.90%			-47%					
'99		00%			04%			00%								
Total Plants/Acre (excluding Dead & Seedlings)											'86	2999	Dec:	2%		
											'92	11040		1%		
											'99	5880		0%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total		
		1	2	3	4					
Symphoricarpos oreophilus										
S	86	2	-	-	-	-	-	2	-	2
	92	20	1	-	3	-	-	3	-	27
	99	3	-	-	-	-	-	1	-	4
Y	86	16	2	-	-	-	-	-	1	18
	92	71	33	1	-	1	-	10	-	116
	99	42	-	-	-	-	-	3	-	45
M	86	3	14	-	-	-	-	-	4	17
	92	16	57	5	2	3	-	-	-	83
	99	72	-	-	-	-	-	-	-	72
D	86	1	4	1	-	-	-	-	2	6
	92	-	-	-	-	1	-	-	1	1
	99	1	-	-	-	-	-	-	-	1
X	86	-	-	-	-	-	-	-	-	0
	92	-	-	-	-	-	-	-	-	0
	99	-	-	-	-	-	-	-	-	40
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
'86		49%		02%		20%		+32%		
'92		48%		03%		.50%		-41%		
'99		00%		00%		00%				
Total Plants/Acre (excluding Dead & Seedlings)						'86	2733	Dec:	15%	
						'92	4000		1%	
						'99	2360		1%	

Trend Study 14-22-99

Study site name: Wild Cow Point .

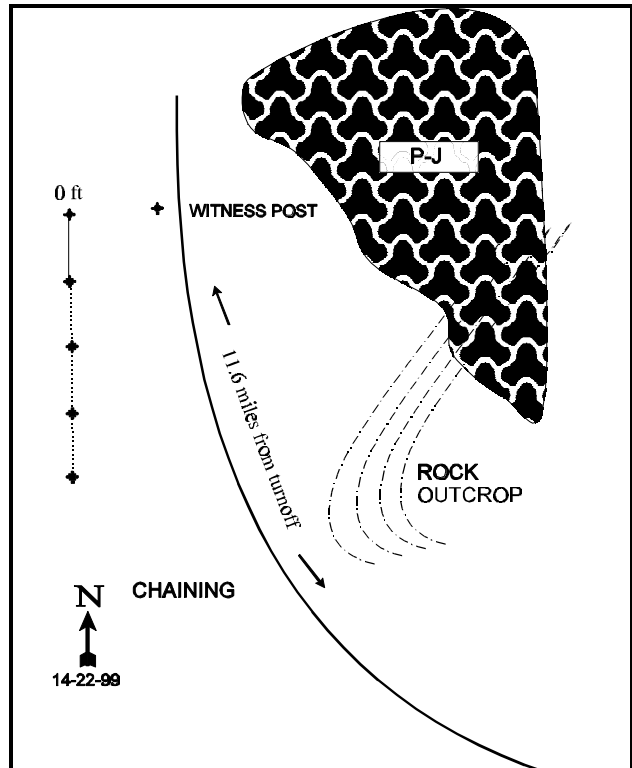
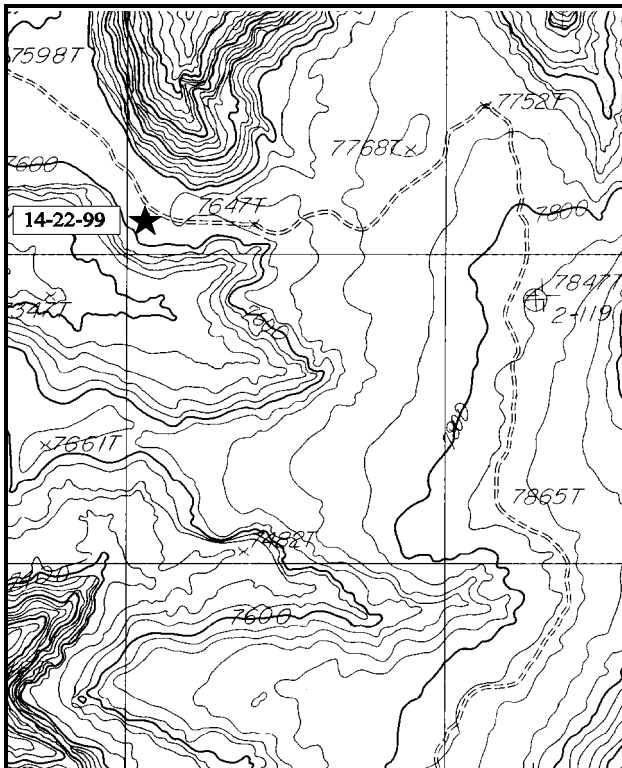
Range type: Chained, Cabled, Seeded P-J.

Compass bearing: frequency baseline 165°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

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. The transect is on the west side of the 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

UTM 4194647.228 N, 593557 E

## DISCUSSION

### Trend Study No. 14-22 (36-10)

The Wild Cow Point transect samples a chained and seeded area on the northwestern extension 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 cattle on the point from January to June 15. 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, estimate 38 deer days use/acre (94 ddu/ha), 1 elk days use/acre (2 edu/ha), and 3 cow days use/acre (7 cdu/ha). Most of the deer pellet groups and all of the cow pats were from last fall. Adequate cover is provided by the surviving pinyon-juniper and both browse and grass forage are plentiful.

The reddish sandy loam soil is derived from a hematite sandstone parent material. Depth of the loose soil varies from 1½ 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, but overall less than 25% of the ground is bare soil.

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 averaged about 7 feet tall in 1986, with some producing seed. Point quarter data from 1999, estimate 59 pinyon and 40 juniper trees/acre. Average diameter of pinyon is estimated at 4.2 inches while juniper is 11.6 inches. Seventy three percent of the juniper 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. Overhead canopy cover, first sampled in 1999, averaged 7% for pinyon and 4% for juniper.

The sagebrush community is composed of black sagebrush in association with Wyoming big sagebrush. Utilization was mostly moderate to heavy in 1986 and percent decadency was high at 42% for black sagebrush and 50% for Wyoming big sagebrush. The much larger sample taken in 1992 estimated a similar density for black sagebrush, however density of Wyoming big sagebrush increased from 399 to 2,560 plants/acre. The placement of the much smaller sample size from the 1986 survey greatly over estimated the Wyoming big sagebrush density. Browsing was moderate to heavy on all sagebrush, yet percent decadence has declined from 42% to 11% for black sagebrush and 50% to 20% for Wyoming big sagebrush. Density of black sagebrush and Wyoming big sagebrush declined in 1999 to 3,260 plants/acre and 1,840 plants/acre respectively. Use is mostly light to moderate, with only 27% of the Wyoming big sagebrush displaying heavy use. Vigor is generally good and percent decadency is relatively low. Dwarf rabbitbrush, common in the understory, 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% by 1999. The large bunches form a dense stand over much of the area. Mutton bluegrass and blue grama are also found in good numbers. 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. There is light utilization on some of the other forbs.



## 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. They were either lost or overexposed. 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 its density. This is more reflective of the greatly enlarged baseline which has been lengthened from 100 feet to 400 feet, giving a much better representative sample of the vegetation. 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.

### TREND ASSESSMENT

soil - stable

browse - stable to slightly improving

herbaceous understory - stable

## 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 (1:3.23 vs 1:3.13). 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.

### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - down slightly

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 22

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	<i>Agropyron cristatum</i>	<sub>a</sub> 108	<sub>b</sub> 181	<sub>b</sub> 194	47	68	65	8.47	10.26
G	<i>Bouteloua gracilis</i>	<sub>b</sub> 57	<sub>b</sub> 49	18	24	18	8	2.04	.14
G	<i>Bromus tectorum</i> (a)	-	<sub>a</sub> -	<sub>b</sub> 8	-	-	3	-	.01
G	<i>Poa fendleriana</i>	<sub>b</sub> 168	<sub>ab</sub> 129	<sub>a</sub> 119	61	50	43	6.62	6.46
G	<i>Sitanion hystrix</i>	<sub>b</sub> 33	<sub>b</sub> 42	<sub>a</sub> 4	14	19	3	.29	.04
Total for Annual Grasses		0	0	8	0	0	3	0	0.01
Total for Perennial Grasses		366	401	335	146	155	119	17.42	16.91
Total for Grasses		366	401	343	146	155	122	17.42	16.93
F	<i>Allium</i> spp.	<sub>a</sub> 2	<sub>ab</sub> 6	<sub>b</sub> 12	2	3	7	.01	.11
F	<i>Antennaria neglecta</i>	<sub>b</sub> 8	<sub>ab</sub> 6	<sub>a</sub> 1	4	2	1	.53	.00
F	<i>Arabis</i> spp.	3	-	3	1	-	2	-	.18
F	<i>Astragalus convallarius</i>	<sub>b</sub> 41	<sub>a</sub> 7	<sub>a</sub> 2	20	4	2	.19	.01
F	<i>Castilleja linariaefolia</i>	-	3	2	-	1	1	.00	.00
F	<i>Calochortus nuttallii</i>	1	-	-	1	-	-	-	-
F	<i>Cordylanthus kingii</i> (a)	<sub>a</sub> 5	<sub>b</sub> 26	<sub>ab</sub> 9	4	11	5	.89	.07
F	<i>Cryptantha flavoculata</i>	2	-	-	1	-	-	-	-
F	<i>Erigeron flagellaris</i>	-	1	2	-	1	1	.03	.03
F	<i>Erigeron pumilus</i>	<sub>b</sub> 32	<sub>a</sub> 3	<sub>a</sub> 1	17	2	1	.01	.00
F	<i>Eriogonum racemosum</i>	<sub>b</sub> 60	<sub>a</sub> 22	<sub>a</sub> 8	28	14	5	.20	.10
F	<i>Eriogonum umbellatum</i>	12	8	10	5	5	5	.10	.10
F	<i>Heterotheca villosa</i>	-	2	-	-	1	-	.00	-
F	<i>Lesquerella rectipes</i>	16	9	15	7	5	7	.20	.58
F	<i>Machaeranthera canescens</i>	<sub>a</sub> -	<sub>b</sub> 6	13	-	4	5	.02	.10
F	<i>Penstemon strictus</i>	10	3	3	5	2	1	.01	.03
F	<i>Phlox austromontana</i>	46	41	24	23	21	13	1.54	.60
F	<i>Polygonum douglasii</i> (a)	-	<sub>b</sub> 11	<sub>a</sub> 1	-	6	1	.03	.00
F	<i>Senecio multilobatus</i>	<sub>b</sub> 15	<sub>a</sub> 4	<sub>a</sub> 3	8	2	2	.03	.01
F	<i>Thlaspi montanum</i>	<sub>b</sub> 9	<sub>a</sub> -	-	3	-	-	-	-
F	<i>Townsendia incana</i>	<sub>a</sub> -	<sub>b</sub> 8	<sub>ab</sub> 5	-	3	2	.06	.01
Total for Annual Forbs		5	37	10	4	17	6	0.91	0.08
Total for Perennial Forbs		257	129	104	125	70	55	2.96	1.88
Total for Forbs		262	166	114	129	87	61	3.88	1.97

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

BROWSE TRENDS --  
Herd unit 14 , Study no: 22

Type	Species	Strip Frequency		Average Cover %	
		'02	'09	'02	'09
B	Artemisia nova	47	43	9.66	6.71
B	Artemisia tridentata wyomingensis	36	43	7.38	6.64
B	Chrysothamnus depressus	41	22	2.36	1.02
B	Chrysothamnus viscidiflorus	0	1	-	-
B	Echinocereus spp.	1	0	.00	-
B	Gutierrezia sarothrae	1	4	-	.03
B	Juniperus osteosperma	5	4	3.31	2.82
B	Juniperus osteosperma (chained)	0	0	-	-
B	Opuntia spp.	4	3	.00	.03
B	Pinus edulis	9	8	4.99	6.15
Total for Browse		144	128	27.73	23.43

CANOPY COVER --  
Herd unit 14 , Study no: 22

Species	Percent Cover '09
Juniperus osteosperma	4
Pinus edulis	7

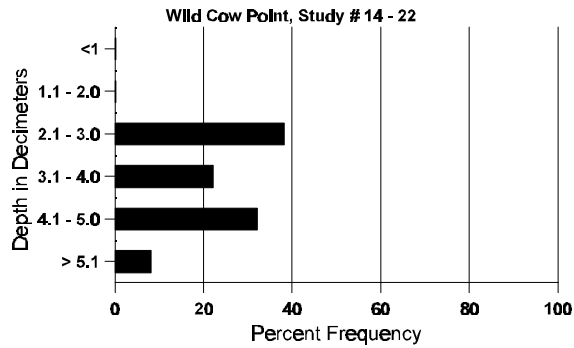
BASIC COVER --  
Herd unit 14 , Study no: 22

Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	307	293	12.25	43.56	38.62
Rock	8	14	.25	1.17	1.22
Pavement	-	6	.25	0	.06
Litter	292	360	65.50	46.42	50.02
Cryptogams	59	97	.50	5.09	2.24
Bare Ground	204	240	21.25	15.97	24.81

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 22, Study Name: Wild Cow Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.5	58.4 (17.7)	7.4	72.4	15.1	12.6	1.6	4.8	60.8	0.5

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 14 , Study no: 22

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'82	'89	
Rabbit	49	39	N/A
Elk	1	2	1 (2)
Deer	29	18	38 (94)
Cattle	1	-	3 (7)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 22

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total									
		1	2	3	4												
Artemisia nova																	
S	'86	1	-	-	-	-	-	-	1	-	-	-	33		1		
	'92	10	-	-	2	-	-	-	-	12	-	-	-	240		12	
	'99	6	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	'86	12	6	1	-	-	-	-	-	18	1	-	-	633		19	
	'92	15	16	8	4	1	-	1	-	43	-	2	-	900		45	
	'99	14	-	-	-	-	-	-	-	14	-	-	-	280		14	
M	'86	20	23	26	-	-	-	-	-	68	-	1	-	2300	8 13	69	
	'92	63	87	23	11	-	-	-	-	175	-	9	-	3680	- -	184	
	'99	89	25	6	-	-	-	-	-	120	-	-	-	2400	11 18	120	
D	'86	8	15	42	-	-	-	-	-	50	-	2	13	2166		65	
	'92	12	11	1	4	-	1	-	-	13	-	4	12	580		29	
	'99	27	-	1	1	-	-	-	-	23	-	-	6	580		29	
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	200		10	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>							
'86		29%		45%		10%				+ 1%							
'92		45%		13%		10%				-37%							
'99		15%		04%		04%											
Total Plants/Acre (excluding Dead & Seedlings)										'86		5099		Dec:		42%	
										'92		5160				11%	
										'99		3260				18%	

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																	
S	86	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2
	92	1	-	-	1	-	-	-	-	-	1	1	-	-	40		2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	2	-	-	-	-	-	-	1	-	-	1	66		2
	92	3	15	24	1	-	-	5	-	-	43	-	5	-	960		48
	99	7	-	1	-	-	-	-	-	-	8	-	-	-	160		8
M	86	-	3	1	-	-	-	-	-	-	4	-	-	-	133	16 15	4
	92	4	16	34	1	-	-	-	-	-	55	-	-	-	1100	- -	55
	99	31	23	14	1	-	4	-	-	-	73	-	-	-	1460	20 33	73
D	86	1	2	3	-	-	-	-	-	-	6	-	-	-	200		6
	92	2	7	14	2	-	-	-	-	-	22	-	2	1	500		25
	99	4	1	6	-	-	-	-	-	-	9	-	-	2	220		11
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		42%			50%			08%			+84%						
'92		30%			56%			06%			-28%						
'99		26%			27%			02%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	399	Dec:	50%		
												'92	2560		20%		
												'99	1840		12%		
<i>Chrysothamnus depressus</i>																	
S	86	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	92	-	1	-	2	-	-	-	-	-	3	-	-	-	60		3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	6	2	-	-	-	-	-	-	-	8	-	-	-	266		8
	92	2	3	3	7	-	-	1	-	-	14	-	2	-	320		16
	99	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2
M	86	37	19	2	-	-	-	-	-	-	57	-	1	-	1933	4 6	58
	92	17	22	16	6	1	-	3	-	-	60	-	5	-	1300	- -	65
	99	22	4	7	-	1	1	-	-	-	35	-	-	-	700	5 10	35
D	86	3	1	1	-	-	-	-	-	-	3	-	2	-	166		5
	92	4	13	17	-	-	-	-	-	1	23	-	-	12	700		35
	99	1	-	5	-	1	-	-	-	-	4	-	-	3	140		7
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		31%			04%			04%			- 2%						
'92		34%			32%			16%			-62%						
'99		14%			30%			07%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	2365	Dec:	7%		
												'92	2320		30%		
												'99	880		16%		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Chrysothamnus viscidiflorus</b>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20	35	53
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	0		-		
												'99	20		-		
<b>Echinocereus spp.</b>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	20		-		
												'99	0		-		
<b>Gutierrezia sarothrae</b>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	2	-	-	-	-	-	-	-	2	-	-	-	40			2
M	86	1	-	-	-	-	-	-	-	1	-	-	-	33	4	3	1
	92	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	2	-	-	-	-	-	-	-	2	-	-	-	40	7	11	2
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			+45%						
'92		00%			00%			00%			+40%						
'99		00%			20%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	33	Dec:	0%		
												'92	60		0%		
												'99	100		20%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4							
Juniperus osteosperma												
S	86	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	1	-	1	-	1	
	99	1	-	-	-	-	-	-	1	-	1	
Y	86	-	-	-	-	-	-	-	0		0	
	92	3	-	-	1	-	-	-	4	-	4	
	99	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	0	-	0	
	92	3	-	-	-	-	-	-	3	-	3	
	99	3	-	-	-	-	-	1	4	61 63	4	
X	86	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'92		00%		00%		00%		-43%				
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'86	0	Dec:	-
									'92	140		-
									'99	80		-
Juniperus osteosperma (chained)												
Y	86	3	-	-	-	-	-	-	3	-	3	
	92	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	0		0	
M	86	2	-	-	-	-	-	-	66	93 89	2	
	92	-	-	-	-	-	-	-	0	-	0	
	99	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'92		00%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'86	166	Dec:	-
									'92	0		-
									'99	0		-
Opuntia spp.												
S	86	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	1	-	1	
	99	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	0	-	0	
	92	4	-	-	-	-	-	-	2	-	4	
	99	3	-	-	-	-	-	-	3	4 8	3	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'92		00%		00%		50%		-25%				
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'86	0	Dec:	-
									'92	80		-
									'99	60		-

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus edulis																	
Y	'86	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7
	'92	4	-	-	-	-	-	1	-	-	5	-	-	-	100		5
	'99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'92	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	4
	'99	-	-	-	-	-	-	-	5	-	5	-	-	-	100	-	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			-23%						
'92		00%			00%			00%			-11%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	233	Dec:	-			
											'92	180		-			
											'99	160		-			



Trend Study 14-23-99

Study site name: South Plain .

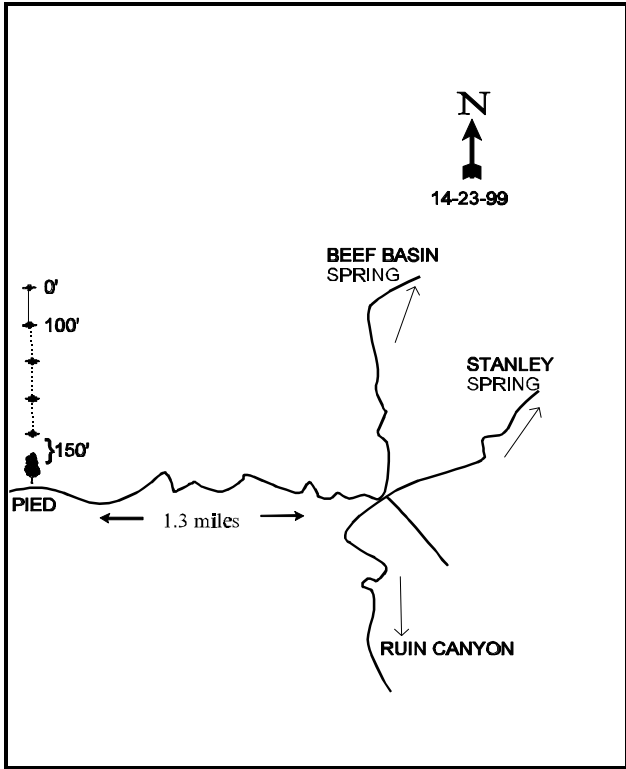
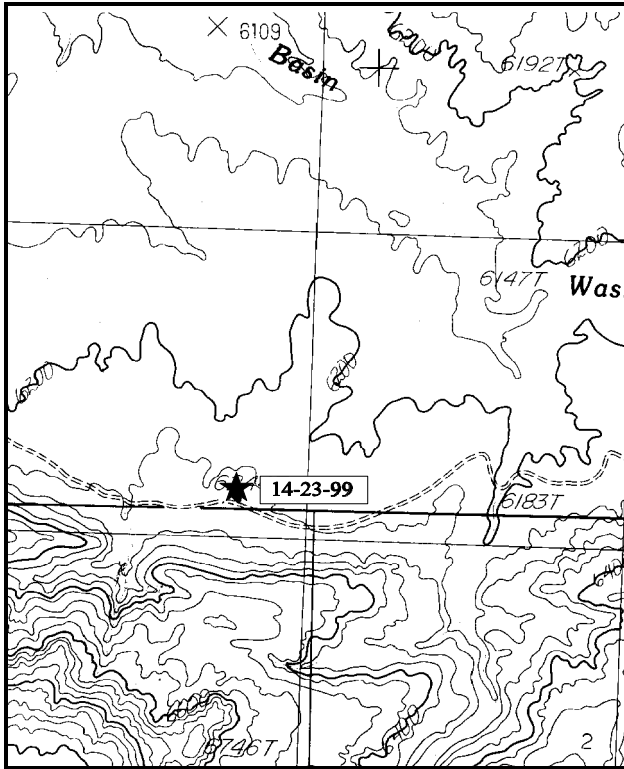
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 165°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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 6.4 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 enclosure. 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 500-stake of the transect starts 150 feet north of the pinyon.



Map Name: Warren Canyon

Diagrammatic Sketch

Township 32S , Range 18E , Section 34

UTM 4200279.614 N, 594761.637 E

## DISCUSSION

### Trend Study No. 14-23 (36-11)

The South Plain 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 sod. 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 450 cattle in December and 250 cattle January to June 15. There are plans for additional water developments to help distribute livestock use to the north part of the basin. A pellet group trend transect in the area shows years of continuous high use. The 5-year average was 110 deer days use/acre (274 ddu/ha) from 1982-1986 (Jense et al. 1986) which was coincidentally 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 estimate 76 deer days use/acre (188 ddu/ha) and 13 cow days use/acre (32 cdu/ha). Most of the cattle pats were old, but about 10% were from this spring. Nearly all of the deer pellet groups were from winter.

The soil is a light red, sandy loam with a slightly alkaline pH (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 is high at nearly 71°F at an average depth of about 17 inches. High soil temperatures give winter annuals like cheatgrass a competitive advantage over perennial grasses, especially during dry years (especially summers). 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 in 1992, but the change is mostly due to the much larger sample size beginning that year. Use was still heavy, vigor poor on most plants, and percent decadence increased from 47% to 81%. By 1999, the population has declined to only 1,160 plants/acre. Use is similar to 1992, vigor is poor on 52% of the sagebrush sampled, and percent decadence has increased to 91%. In addition, almost 50% of the decadent plants sampled were classified as dying. Recruitment is poor with few seedlings and young plants present. There is relatively good leader growth on sagebrush, but seed production is non-existent. The livestock enclosure in Beef Basin is a dramatic example of overuse and subsequent decline of sagebrush compared to a protected stand.

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 moderate vigor. The population has shown a steady decline in density since 1986 combined with heavy use. Narrowleaf low rabbitbrush is common. It has shown moderate to heavy use on some plants. 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, 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 currently ('99) provides 88% of the grass cover, 87% of the total herbaceous cover and 68% of the total vegetation cover on the site. 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 when they tend to green-up causing a loss of most of the grasses. Consequently, cattle have put a great deal of pressure on the Wyoming big sagebrush with the prolonged drought since 1985. Perennial forbs are relatively scarce and provide little forage. Dusty penstemon shows signs of light utilization.

### 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 severely impact the 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 continuing downward soil trend. However, it 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 much larger sample size 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, biotic potential (proportion of seedlings to the population) is less than 1% and the proportion of the 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, but still very poor condition and poor site potential.

#### TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - stable, but poor condition

### 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 3 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 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 1999, cheatgrass quadrat frequency increased to 97% with a cover value of almost 27%. Nested frequency of perennial grasses declined since 1992, and 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 dry summers in this area since 1992. Forbs are still an insignificant contributor of cover.

TREND ASSESSMENT

soil - stable, but poor

browse - down and in very poor condition

herbaceous understory - down and now dominated by cheatgrass

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 23

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	<i>Bouteloua gracilis</i>	<sub>b</sub> 141	<sub>c</sub> 192	<sub>a</sub> 58	54	62	27	18.76	1.20
G	<i>Bromus tectorum</i> (a)	-	<sub>a</sub> 27	<sub>b</sub> 336	-	11	97	1.95	26.46
G	<i>Oryzopsis hymenoides</i>	<sub>a</sub> -	<sub>b</sub> 7	<sub>ab</sub> 2	-	3	2	.21	.03
G	<i>Sitanion hystrix</i>	<sub>a</sub> 42	<sub>b</sub> 96	<sub>a</sub> 48	19	46	24	1.10	.46
G	<i>Sporobolus cryptandrus</i>	<sub>b</sub> 95	<sub>b</sub> 92	20	37	32	9	4.32	.32
G	<i>Stipa comata</i>	67	54	74	29	25	35	1.50	1.57
G	<i>Vulpia octoflora</i> (a)	-	<sub>b</sub> 21	<sub>a</sub> 5	-	11	3	.10	.01
Total for Annual Grasses		0	48	341	0	22	100	2.06	26.47
Total for Perennial Grasses		345	441	202	139	168	97	25.90	3.60
Total for Grasses		345	489	543	139	190	197	27.97	30.07
F	<i>Astragalus mollissimus</i>	9	18	12	4	8	7	.06	.06
F	<i>Calochortus nuttallii</i>	-	1	-	-	1	-	.00	-
F	<i>Chenopodium</i> spp. (a)	-	<sub>b</sub> 11	<sub>a</sub> -	-	5	-	.03	-
F	<i>Descurainia pinnata</i> (a)	-	-	1	-	-	1	-	.00
F	<i>Eriogonum cernuum</i> (a)	-	4	-	-	2	-	.01	-
F	<i>Erigeron pumilus</i>	<sub>b</sub> 35	<sub>a</sub> 7	<sub>a</sub> 2	14	3	2	.06	.06
F	<i>Gayophytum ramosissimum</i> (a)	-	<sub>a</sub> -	<sub>b</sub> 5	-	-	3	-	.01
F	<i>Machaeranthera canescens</i>	12	8	7	6	4	4	.07	.09
F	<i>Phlox austromontana</i>	-	3	-	-	2	-	.03	-
F	<i>Phlox longifolia</i>	-	-	2	-	-	1	-	.00
F	<i>Plantago patagonica</i> (a)	-	18	28	-	7	14	.03	.16
F	<i>Sphaeralcea coccinea</i>	2	-	-	1	-	-	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'02	'09
	Total for Annual Forbs	0	33	34	0	14	18	0.07	0.18
	Total for Perennial Forbs	58	37	23	25	18	14	0.24	0.21
	Total for Forbs	58	70	57	25	32	32	0.31	0.40

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

BROWSE TRENDS --

Herd unit 14 , Study no: 23

Type	Species	Strip Frequency		Average Cover %	
		'02	'09	'02	'09
B	Artemisia tridentata wyomingensis	60	38	4.69	2.00
B	Atriplex canescens	3	2	.00	.15
B	Ceratoides lanata	10	7	.30	.53
B	Chrysothamnus viscidiflorus stenophyllus	47	51	3.82	4.67
B	Gutierrezia sarothrae	0	1	-	-
B	Juniperus osteosperma	0	1	-	.03
B	Opuntia spp.	6	4	.15	.15
B	Pinus edulis	0	2	.85	.63
B	Sclerocactus whipplei	5	8	.04	.12
	Total for Browse	131	114	9.87	8.31

BASIC COVER --

Herd unit 14 , Study no: 23

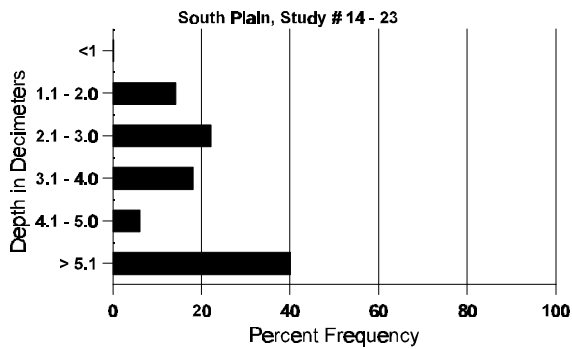
Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	309	351	9.50	39.09	37.93
Rock	8	18	0	1.76	.06
Pavement	41	69	0	0	.65
Litter	244	345	52.75	30.99	34.20
Cryptogams	80	34	0	.68	.33
Bare Ground	306	305	37.75	33.59	33.42

SOIL ANALYSIS DATA --

Herd Unit 14, Study # 23, Study Name: South Plain

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.8	70.8 (16.7)	7.6	60.0	23.4	16.6	0.8	5.3	67.2	.4

# Stoniness Index



## PELLET GROUP DATA -- Herd unit 14 , Study no: 23

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'82	'89	
Rabbit	25	28	N/A
Deer	47	47	76 (188)
Cattle	1	6	13 (32)

## BROWSE CHARACTERISTICS -- Herd unit 14 , Study no: 23

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4												
<i>Artemisia tridentata wyomingensis</i>																	
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'92	-	-	-	1	-	-	-	-	1	-	-	-	20		1	
	'99	6	-	1	-	-	-	-	-	7	-	-	-	140		7	
Y	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'92	1	15	-	7	8	-	-	-	31	-	-	-	620		31	
	'99	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'86	-	-	24	-	-	-	-	-	19	-	1	4	1600	19	23	24
	'92	-	-	3	-	-	-	-	-	3	-	-	-	60	-	-	3
	'99	-	2	2	-	-	-	-	-	4	-	-	-	80	18	23	4
D	'86	2	-	19	-	-	-	-	-	10	-	-	11	1400		21	
	'92	-	5	128	-	5	4	-	-	35	-	87	20	2840		142	
	'99	6	11	22	-	-	14	-	-	23	-	4	26	1060		53	
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	1120		56	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'86		00%		96%		36%		+15%									
'92		19%		77%		61%		-67%									
'99		22%		66%		52%											
Total Plants/Acre (excluding Dead & Seedlings)										'86	3000	Dec:	47%				
										'92	3520		81%				
										'99	1160		91%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total							
		1	2	3	4		1	2								
Atriplex canescens																
M	86	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	2	-	-	-	-	-	-	3	-	-	60	-	-	3
	99	2	-	-	-	-	-	-	-	2	-	-	40	39	58	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>		<u>%Change</u>						
'86		00%			00%			00%								
'92		67%			00%			00%		-33%						
'99		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-			
										'92	60		-			
										'99	40		-			
Ceratoides lanata																
S	86	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	1	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	86	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	6	9	5	-	-	-	-	21	-	-	420			21
	99	-	-	-	-	-	-	-	-	-	-	-	0			0
M	86	-	5	-	-	-	-	-	-	5	-	-	333	11	8	5
	92	-	1	-	-	1	-	-	-	2	-	-	40	-	-	2
	99	-	-	17	-	-	2	-	-	19	-	-	380	16	12	19
D	86	-	-	9	-	-	-	-	-	9	-	-	600			9
	92	1	-	8	-	-	-	-	-	5	-	4	180			9
	99	-	-	1	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>		<u>%Change</u>						
'86		36%			64%			00%		-31%						
'92		25%			53%			13%		-38%						
'99		00%			100%			05%								
Total Plants/Acre (excluding Dead & Seedlings)										'86	933	Dec:	64%			
										'92	640		28%			
										'99	400		5%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus stenophyllus</i>																	
S	86	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8
	92	21	7	-	8	-	-	-	-	-	27	-	9	-	720		36
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
M	86	4	1	1	-	-	-	-	-	-	5	-	1	-	400	12 14	6
	92	57	3	-	-	-	-	-	-	-	59	-	1	-	1200	- -	60
	99	64	9	-	1	-	-	-	-	-	74	-	-	-	1480	18 28	74
D	86	15	5	1	-	-	-	-	-	-	14	-	5	2	1400		21
	92	19	1	-	-	-	-	-	-	-	5	-	15	-	400		20
	99	13	3	2	-	-	-	-	-	-	15	-	-	3	360		18
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		17%			06%			23%			- 1%						
'92		09%			00%			22%			-17%						
'99		13%			02%			03%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	2333	Dec:	60%		
												'92	2320		17%		
												'99	1920		19%		
<i>Gutierrezia sarothrae</i>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20	9 10	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		100%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	0		-		
												'99	20		-		
<i>Juniperus osteosperma</i>																	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	0		-		
												'99	20		-		



A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	3	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	9	-	-	1	-	-	-	-	-	-	-	-	200			10
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	-	-	-	60	6	13	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			30%			-60%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	200		-		
												'99	80		-		
Pinus edulis																	
S	86	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	0		-		
												'99	40		-		
Sclerocactus whipplei																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	3	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	2	-	-	-	-	-	-	-	-	-	-	-	40	-	-	2
	99	8	-	-	-	-	-	-	-	-	-	-	-	160	4	6	8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%			+38%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	100		-		
												'99	160		-		

Trend Study 14-24-99

Study site name: Ruin Park .

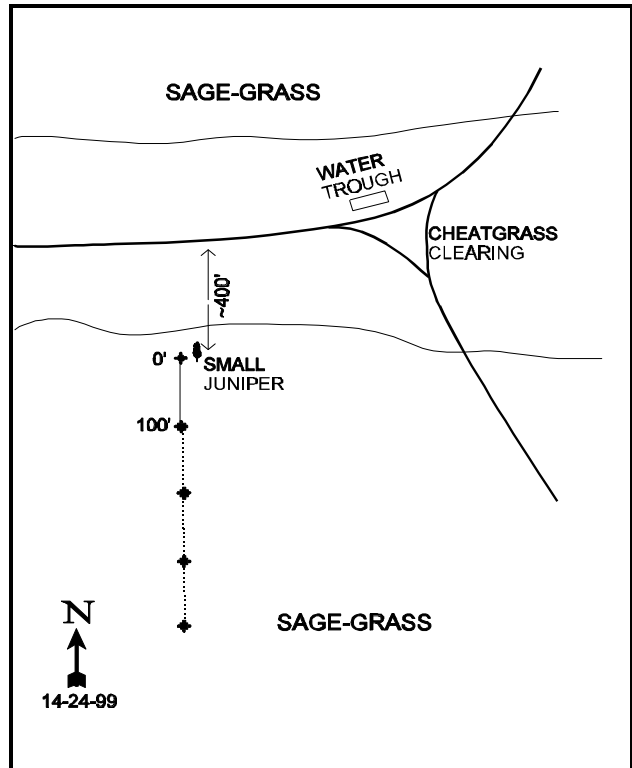
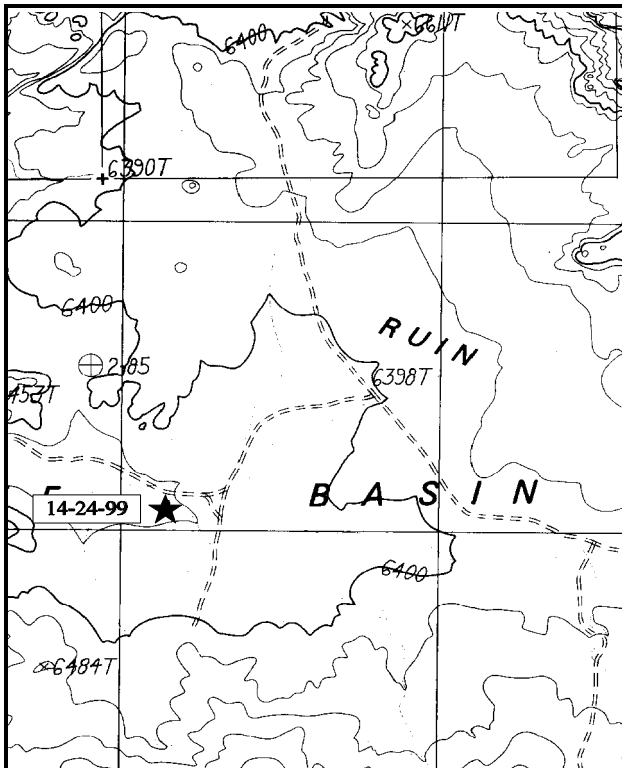
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 165°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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 6.4 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

UTM 4206935.132 N, 595157.578 E

## DISCUSSION

### Trend Study No. 14-24 (36-12)

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 generally northern aspect and drainage to the intermittent gully running west down the center of Ruin Park. A new 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 the previous study. Cattle distribution is controlled mainly by water and there are few fences. Deer use is 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 estimate 70 deer days use/acre (173 ddu/ha) and 26 cow days use/acre (64 cdu/ha). Deer pellet groups appear to be from the previous winter. Cattle pats were mostly older, but a few were from this spring.

The reddish sandy loam soil is fairly deep with an effective rooting depth estimated at 18 inches. It has a moderately alkaline pH (7.9) with low organic matter (0.6%) and phosphorus (5.9 ppm). Phosphorus values of 10 ppm are considered minimal for normal plant growth and development. Due to the sandy nature of the soil, average soil temperature is high at 76°F at an depth of 18 inches. High soil temperatures would 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 soil was bare in 1986, due to the patchy distribution of the vegetative cover. Percent bare ground has declined to 34% in 1992 and 1999, this would mostly be due to the increase in cheatgrass cover. A buildup of litter and soil, along with some cryptogamic development, is found at the base of the 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 dominant plant and key browse species in Ruin Park. The plants are severely hedged with 58% being classified as decadent in 1986. Percent decadence increased substantially to 77% in 1992. This trend is continuing with further increases to 91% in 1999. Protected plants show better growth and vigor. There were few young plants and no seedlings encountered during any reading. Estimated density on the study site was 2,198 sagebrush/acre in 1986, declining to 1,520 by 1992. Density declined further in 1999 to only 640 plants/acre. Dead plants, first counted in 1999, are twice as numerous as live plants. 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. Narrowleaf low rabbitbrush is fairly common and appears to be slowly increasing.

Perennial grasses provide 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 its abundance had exploded to where it now dominates the site by providing 69% of the grass cover and 61% of the total vegetation cover. Although several species of forbs were encountered on the transect most species are rare in their occurrence. Forage production is limited, but the forbs provide some early spring green forage.

### 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 mostly 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 is obviously down. Soil is lost from wind and water much faster than it is created, therefore, soil trend is also down.

## 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 of the herbaceous understory. With this in mind, the trend for the herbaceous understory is stable, but only fair condition.

### TREND ASSESSMENT

soil - stable, but only fair to poor condition

browse - downward

herbaceous understory - stable

## 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 1,040 to only 300 plants/acre. Trend for the herbaceous understory is also down. Sum of nested frequency of perennial grasses has declined and 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.

### TREND ASSESSMENT

soil - stable, but poor condition

browse - downward

herbaceous understory - down and dominated by cheatgrass

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 24

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	<i>Bouteloua gracilis</i>	a <sub>95</sub>	b <sub>146</sub>	a <sub>58</sub>	33	49	25	9.26	.80
G	<i>Bromus tectorum</i> (a)	-	a <sub>5</sub>	b <sub>336</sub>	-	3	97	.04	21.28
G	<i>Oryzopsis hymenoides</i>	a <sub>56</sub>	a <sub>61</sub>	b <sub>96</sub>	27	30	42	1.40	2.20
G	<i>Sitanion hystrix</i>	b <sub>47</sub>	a <sub>11</sub>	a <sub>3</sub>	22	4	1	.07	.00
G	<i>Sporobolus cryptandrus</i>	ab <sub>10</sub>	b <sub>12</sub>	a <sub>1</sub>	5	6	1	.15	.00
G	<i>Stipa comata</i>	b <sub>278</sub>	b <sub>262</sub>	a <sub>176</sub>	92	94	76	16.82	6.71
G	<i>Vulpia octoflora</i> (a)	-	9	5	-	4	3	.02	.01
Total for Annual Grasses		0	14	341	0	7	100	0.05	21.30
Total for Perennial Grasses		486	492	334	179	183	145	27.72	9.74
Total for Grasses		486	506	675	179	190	245	27.78	31.04
F	<i>Astragalus mollissimus</i>	7	8	6	5	3	4	.04	.02
F	<i>Chenopodium leptophyllum</i> (a)	b <sub>8</sub>	c <sub>68</sub>	a <sub>-</sub>	3	31	-	1.44	-
F	<i>Eriogonum</i> spp.	-	2	-	-	1	-	.03	-
F	<i>Erigeron pumilus</i>	4	7	2	2	3	1	.06	.00
F	<i>Euphorbia fendleri</i>	11	3	10	5	2	4	.06	.24
F	<i>Helianthus annuus</i> (a)	-	2	-	-	1	-	.00	-
F	<i>Lappula occidentalis</i> (a)	-	a <sub>-</sub>	b <sub>6</sub>	-	-	3	-	.06
F	<i>Machaeranthera canescens</i>	a <sub>4</sub>	b <sub>40</sub>	a <sub>7</sub>	2	19	3	1.79	.02
F	<i>Microsteris gracilis</i> (a)	-	-	1	-	-	1	-	.00
F	<i>Penstemon</i> spp.	-	1	-	-	1	-	.03	-
F	<i>Phlox hoodii</i>	a <sub>3</sub>	ab <sub>20</sub>	b <sub>14</sub>	2	8	7	.17	.28
F	<i>Phlox longifolia</i>	b <sub>32</sub>	b <sub>23</sub>	a <sub>2</sub>	17	10	1	.10	.00
F	<i>Plantago patagonica</i> (a)	-	-	28	-	-	12	-	.06
F	<i>Ranunculus testiculatus</i> (a)	-	-	3	-	-	1	-	.00
F	<i>Salsola iberica</i> (a)	-	3	-	-	2	-	.15	-
F	<i>Senecio multilobatus</i>	4	-	-	2	-	-	-	-
F	<i>Sphaeralcea coccinea</i>	b <sub>15</sub>	a <sub>2</sub>	a <sub>-</sub>	8	2	-	.16	-
F	<i>Tragopogon dubius</i>	-	-	2	-	-	1	-	.00
F	Unknown forb-annual (a)	-	2	-	-	2	-	.01	-
Total for Annual Forbs		8	75	38	3	36	17	1.61	0.13
Total for Perennial Forbs		80	106	43	43	49	21	2.45	0.57
Total for Forbs		88	181	81	46	85	38	4.06	0.71

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

BROWSE TRENDS --  
Herd unit 14 , Study no: 24

Type	Species	Strip Frequency		Average Cover %	
		'02	'09	'02	'09
B	Artemisia frigida	4	2	.03	-
B	Artemisia tridentata wyomingensis	43	23	4.15	1.77
B	Ceratoides lanata	13	8	.51	.18
B	Chrysothamnus nauseosus albicaulis	1	1	-	-
B	Chrysothamnus viscidiflorus stenophyllus	25	28	1.24	1.43
B	Opuntia spp.	1	0	-	-
B	Sclerocactus	0	0	-	-
Total for Browse		87	62	5.93	3.39

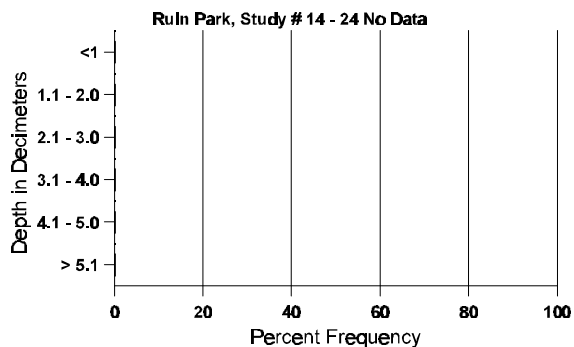
BASIC COVER --  
Herd unit 14 , Study no: 24

Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	328	351	6.50	36.31	36.66
Rock	-	-	0	.83	0
Pavement	8	75	0	0	.30
Litter	274	375	41.00	22.78	34.33
Cryptogams	20	22	2.50	.55	.24
Bare Ground	265	316	50.00	33.97	34.17

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 24, Study Name: Ruin Park

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.1	76.0 (18.1)	7.9	60.0	21.8	16.6	0.6	5.9	80.0	0.4

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 14 , Study no: 24

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'82	'89	
Rabbit	17	19	N/A
Elk	1	-	0
Deer	57	40	70 (173)
Cattle	10	12	26 (64)

BROWSE CHARACTERISTICS --  
Herd unit 14 , Study no: 24

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
<i>Artemisia frigida</i>																		
Y	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'99	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	3	-	-	4	-	-	-	-	-	7	-	-	-	140	-	-	7
	'99	1	1	-	-	-	-	-	-	-	2	-	-	-	40	7	7	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			-57%							
'92		00%			00%			00%										
'99		67%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	-				
											'92	140		-				
											'99	60		-				
<i>Artemisia tridentata wyomingensis</i>																		
Y	'86	-	3	1	-	-	-	-	-	-	4	-	-	-	266			4
	'92	2	2	-	-	-	-	-	-	-	4	-	-	-	80			4
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'86	-	-	10	-	-	-	-	-	-	10	-	-	-	666	24	27	10
	'92	2	8	4	-	-	-	-	-	-	14	-	-	-	280	-	-	14
	'99	-	-	2	-	1	-	-	-	-	3	-	-	-	60	21	29	3
D	'86	-	2	17	-	-	-	-	-	-	19	-	-	-	1266			19
	'92	10	18	25	-	5	-	-	-	-	40	-	9	9	1160			58
	'99	-	-	19	-	2	7	1	-	-	13	-	4	12	580			29
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	1320			66
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		15%			85%			00%			-31%							
'92		43%			38%			24%			-58%							
'99		09%			88%			50%										
Total Plants/Acre (excluding Dead & Seedlings)											'86	2198	Dec:	58%				
											'92	1520		76%				
											'99	640		91%				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Ceratoides lanata</i>																		
S	86	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	86	-	4	1	-	-	-	-	-	-	5	-	-	-	333		5	
	92	21	-	-	-	-	-	-	-	-	10	-	-	-	420		21	
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	86	1	6	-	-	-	-	-	-	-	7	-	-	-	466	8	9	7
	92	24	3	2	-	-	-	-	-	-	18	-	-	-	580	-	-	29
	99	-	-	2	-	1	1	-	-	-	4	-	-	-	80	13	13	4
D	86	-	9	5	-	-	-	-	-	-	14	-	-	-	933		14	
	92	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	-	-	2	-	1	1	-	-	-	3	-	-	1	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		73%			23%			00%			-40%							
'92		08%			04%			00%			-71%							
'99		13%			40%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	1732	Dec:	54%			
												'92	1040		4%			
												'99	300		27%			
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20	14	19	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%			+ 0%							
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'92	20		-			
												'99	20		-			



A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Chrysothamnus viscidiflorus stenophyllus</b>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	11	-	-	-	-	-	-	-	-	-	-	-	220			11
	99	3	-	-	-	-	-	-	-	-	-	-	-	60			3
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	34	-	-	-	-	-	-	-	-	-	-	-	680	-	-	34
	99	32	2	-	-	-	-	-	-	-	-	-	-	680	12	21	34
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	13	-	-	-	-	-	-	-	-	-	-	-	260			13
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%			+10%						
'99		04%			00%			08%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%		
												'92	900		0%		
												'99	1000		26%		
<b>Opuntia spp.</b>																	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	6	24	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	40		-		
												'99	0		-		
<b>Sclerocactus</b>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	4	6	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	0		-		
												'99	0		-		

**THIS SITE WAS DROPPED**

Trend Study 14-25-99

Study site name: Davis Pocket .

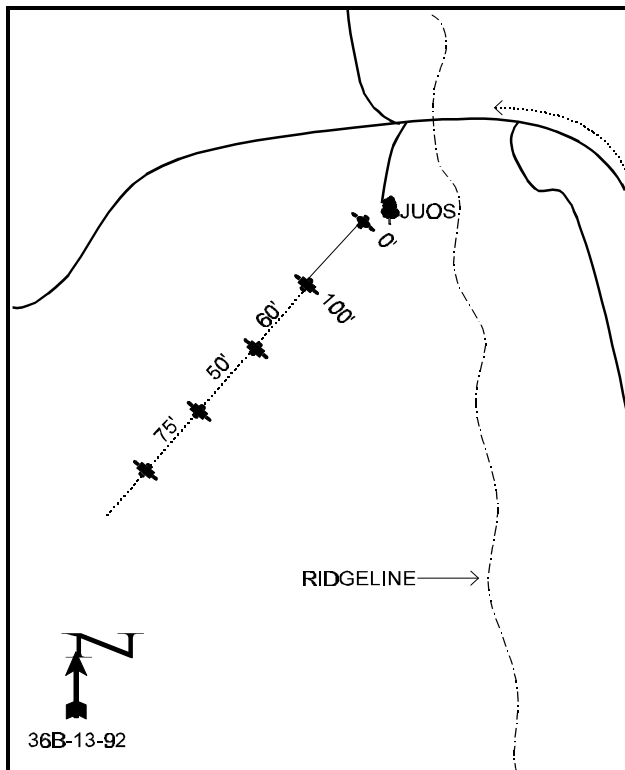
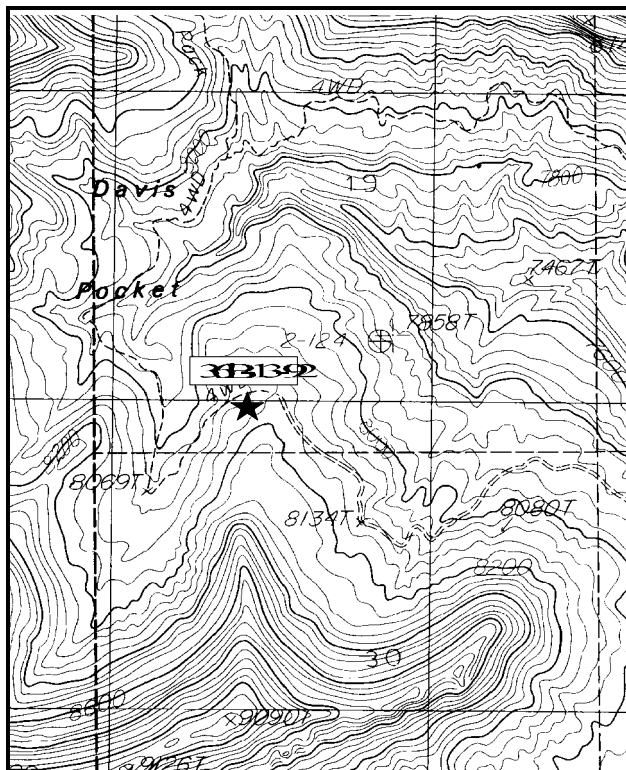
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 242 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (59ft), line 3 (34ft), line 4 (95ft).

**LOCATION DESCRIPTION**

From the Gooseberry Guard Station, travel 4 miles east towards The Causeway to a junction with a sign to "Mormon Pasture". Turn left onto this road and proceed north 1.2 miles. Turn left 100 feet before two cabins near an open pit uranium mine. Go west up this road for 3.1 miles to a fork just beyond a grove of large ponderosa pines. Take the right hand fork and drive .6 mile to the forks at the top of the ridge (4 x 4 may be necessary). Go approximately 200 feet up the southwest fork to the end of the road. The transect starts in the brush at the end of the clearing. The frequency baseline is marked by 2-foot high red steel fence posts. The density plots are marked by 3 1/2 foot tall green fence posts, starting 60 feet off the 100-foot end of the baseline.



Map Name: House Park Butte

Diagrammatic Sketch

Township 33S , Range 20E , Section 18

## DISCUSSION

### Trend Study No. 14- 25 (36-13)

\*\*\*This study has been discontinued. Text has been retained for your information, however you must refer to the "1992 Utah Big Game Range Trend Studies" report for maps and data tables.

Davis Pocket is a unique basin on the east side of the 9,200-foot Horse Mountain, which is on the northern end of Elk Ridge. The conifer covered ridges mix into oakbrush dominated slopes in the basin. The study samples thick oak and mixed browse across a low ridge in the center of the basin at an elevation of about 8,100 feet. The site is located on the Manti-LaSal National Forest.

Livestock grazing and mining are activities that are emphasized in the area. As part of the Cottonwood allotment, a rest-rotation system is used for the 3 units. The season of use is June 16 to October 20, where each unit is rested every third year. The stocking rate is 676 head (3,718 AUMs) and an increase was being considered. Heavy uranium mining activities have occurred to the east, but mining activity is very slow at this time. The soil is shallow to moderately deep with loam over sandy loams. The surface is rocky and the loose dry soil is easily disturbed on the steep inclines. Ground cover is variable with percent bare ground at only 12%. Even with this low percentage of bare ground, there are bare spots and eroded cattle trails that are a source of soil loss and gullying. Litter cover is good under much of the vegetation, but it is lost under the brush where the slope is steep and herbaceous cover is lacking.

The Interagency frequency-density study replaces line 1 of the old line intercept study. The baseline uses the same end points as the old line intercept transect, starting near the end of the road at the top of the ridge, then southwest across the oak covered side hill. The study site has a Northwestern aspect on a 30% slope.

Although oak is the dominant species, many other valuable browse species are present in the community, leading to its designation as a mixed mountain brush type. The density of oak is estimated to be 10,712 stems/acre, the majority of which are young. The oak is vigorous and only lightly browsed, although there is some defoliation by insects. The other common browse species are snowberry, serviceberry, mountain big sagebrush, and birchleaf mountain mahogany. Most are vigorous and moderately utilized except for mountain big sagebrush where 46% are decadent. Other valuable species are less abundant, but provide a variety of forage, these include chokecherry and bitterbrush. Most of the shrubs appear to have stable to increasing populations in terms of age class structure. The oak especially shows signs of increasing.

The herbaceous understory is diverse, but limited by the dense shrub overstory and selective grazing pressure. Most grasses show signs of current utilization. The most common grasses or grass-like species are: sedge, needle-and-thread, Kentucky bluegrass, and Letterman needlegrass. Forb quadrat frequency is fairly high with 22 species found on the sampled lines. Utilization of forbs is generally light, although some individuals have been heavily hedged. The grasses and forbs help provide important soil protection.

### 1986 TREND ASSESSMENT

Currently, the area provides abundant and diverse foraging opportunities for livestock and wildlife. However, a continued increase in oak is undesirable in terms of deer summer range and also range for elk and cattle. The thick oakbrush tends to limit production and availability of grasses and forbs on this site. Future management should be concerned with the increasing browse component. Both the old line intercept and newer Interagency data point to a definite increase in shrub dominance, where the herbaceous component was once very prominent. The increasing shrub cover, although providing a thick vegetative cover, adds little to actual ground cover and has confounding effects on the amount of litter and herbaceous ground cover. The main sources of erosion on the site are rocky, bare spots, and gullying cattle trails.

## 1992 TREND ASSESSMENT

Soil trend is considered stable, even with the slight increase in percent bare ground and a substantial decrease in percent litter cover. Cover from grasses, forbs, and shrubs is excellent. Of all the more than 12 browse species, only mountain big sagebrush has a high rate of decadence (46%), which is an improvement from what it was in 1986 (66%). The densities for many of the shrubs have changed because of the new larger sampling design giving better estimates, but trend would still be considered stable to slightly improving. With the browse component increasing its dominance, it would be expected that the competitive shading effect would be detrimental to the herbaceous understory. The trend for the herbaceous understory is down, with nested frequency values for both grasses and forbs going down significantly since 1986.

### TREND ASSESSMENT

soil - stable

browse - stable to slightly improving

herbaceous understory - down

Trend Study 14-26-99

Study site name: The Wilderness .

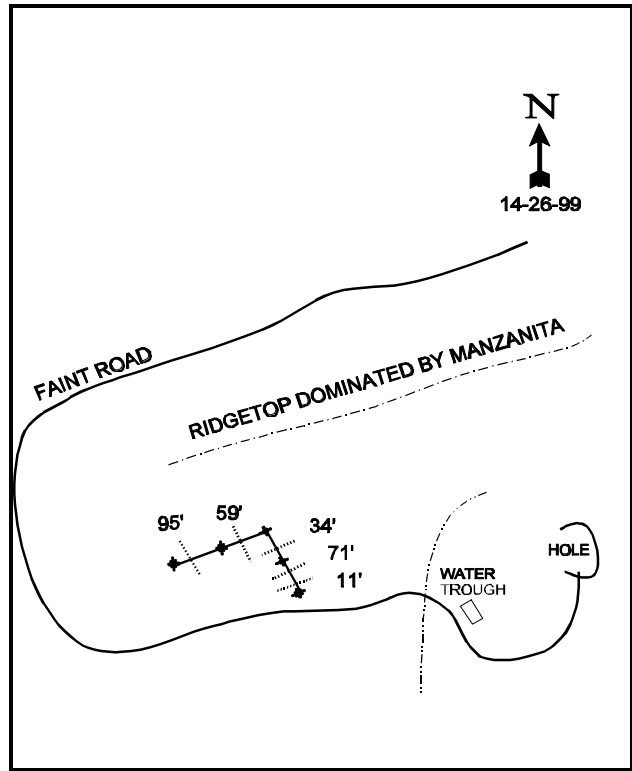
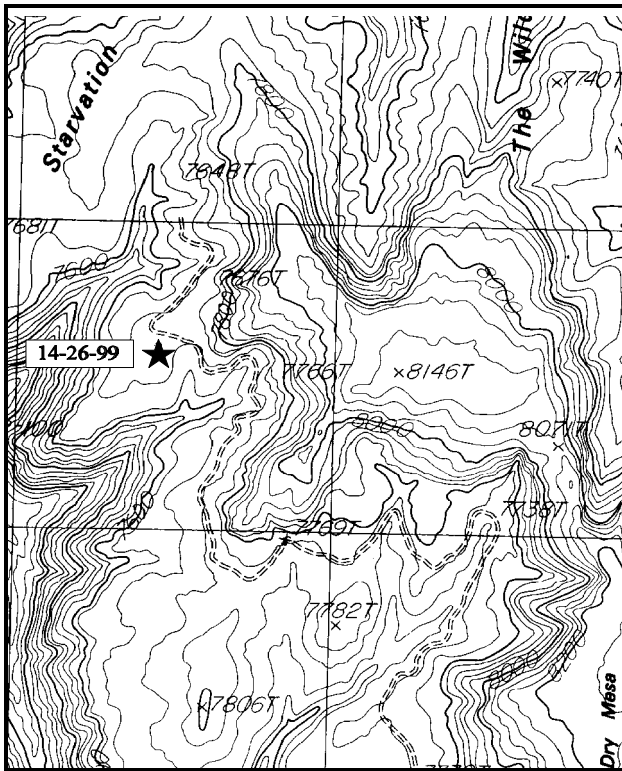
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 341°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

Just east of the Chippean Rocks on the Elk Ridge-Blanding Road there is a FS "Release Cutting" information sign. From this sign, travel 2.0 miles east to a little meadow on the left (approximately 4.0 miles west of 'The Causeway'). Turn left onto a very faint road that goes across the meadow to the northeast corner and continues through the PIPO forest in a northerly direction for about 4.0 miles. The road becomes washed out and impassable. Continue up the road on foot to a watering trough. From here, go 110 paces, across a stream and up the road to the transect. The transect starting point, a full-high steel fence post, is 5 paces east of the road in a snowberry-grass dominated opening. The 0, 100, and 200-foot stakes are full-high posts; the rest of the baseline is marked by half-high posts. The last 200' of the baseline dogleg at a bearing of 272°M.



Map Name: Chippean Rocks

Diagrammatic Sketch

Township 34S , Range 21E , Section 5

UTM 4191361.274 N , 619411.458 E

## DISCUSSION

### Trend Study No. 14-26 (36-14)

“The Wilderness” trend study is north of the Chippean Rocks-Causeway area and lies within the rolling country between high sandstone mesas and Vega Creek canyon. The area contains rugged country with limited road access. The road to the transect winds through Ponderosa montane forest, clumps of aspen, past steep canyons, springs, and mountain brush covered slopes. This old logging road is overgrown and washed out (impassable with vehicle) about 0.2 mile from the transect starting point. Elevation along the transect varies from 7,600 to 7,700 feet. Aspect also varies, but drainage is generally to the west into Vega Creek, which flows north into North Cottonwood Creek.

The transect was originally placed on the south and north side of a ridge with the frequency baseline on the south side and the 3 circular density plots 500 feet away on the north side. In 1992, the larger sample placed 3 of the of the frequency belts on the south side of the ridge and 2 belts on the north side 500 feet away where the old density plots were found. During the 1999 reading, the study site base line was realigned and placed entirely on the south side of the ridge in order to sample one homogeneous area. Some of the data changes, especially in shrub density are the result of this realignment. The study samples snowberry-grass openings surrounded by pine, oak clumps, and manzanita. The area is very diverse with microsites dominated by various plant communities. Elevation is 7,450 feet with a slope of 12% and a south aspect.

Cattle grazing is the dominant use of the area and is managed on a 3 pasture rest-rotation system as part of the Cottonwood grazing allotment. It is a large allotment with over 20,000 suitable acres. The current stocking rate is 676 head (3,718 AUMs) and an increase is being considered. The season of use is June 16 to Sept 15. The area is considered an important big game summer range, with both deer and elk being seen in the vicinity. Deer sign was frequently found in 1986, and overall use appeared moderate. Resting and escape cover is excellent. Pellet group data from 1999 estimate 5 deer days use/acre (12 ddu/ha), 5 elk days use/acre (12 edu/ha), and 12 cow days use/acre (30 cdu/ha). All of the cattle pats appeared to be from last season. About 20% of the deer and elk pellet groups were recent but the rest appear to be also from last year. Four dead elk (1 bull and 3 cows) were seen just off the road about 1 mile from the site. It appears that they were standing under a tree that was struck by lightning about 1 week before, sometime in mid June.

Soil at the site is very deep with an effective rooting depth estimated at over 30 inches. This is an underestimate since many measurements were limited only by the length of the soil penetrometer. Soil texture is a sandy loam with a neutral pH (6.6). Phosphorus is low at only 5.4 ppm and potassium is marginal at 70.4 ppm. Values less than 10 ppm for phosphorus and 70 ppm for potassium have been shown to limit normal plant growth and development. There is little rock on the surface or within the soil profile with the exception of some exposed sandstone bedrock on top of the ridge. There are some small gullies on the site which originate near the top of the ridge. Protective ground cover is abundant, especially litter cover, leaving little unprotected bare ground.

Although tall Ponderosa pines visually dominate the site, Gambel oak, snowberry, and manzanita are common in the understory. Point quarter data from 1999 estimate 98 Ponderosa trees/acre with an average diameter of nearly 7 inches. Overhead canopy cover is quite variable, but averages 21% for the site. Gambel oak and snowberry are the key understory browse species. Oak displayed moderate to heavy use in 1986, with moderate use noted in 1992. Current ('99) use is classified as light. Snowberry was light to moderately browsed in 1986 and 1992, but lightly used in 1999. Density for both species has declined, however the difference is due to the realigning of the baseline in 1999. Other valuable browse plants are less numerous, but together provide an abundance and great variety of browse forage. These species include Woods rose, chokecherry, bitterbrush (heavily hedged), Utah and Rocky Mountain juniper, ceanothus, serviceberry, aspen, and mountain mahogany. Greenleaf manzanita, an undesirable increaser, had a density of 760 plants/acre in 1992 and appeared to be expanding. This undesirable evergreen shrub tends to limit herbaceous cover.

Density was estimated with the realigned baseline at 1,360 plants/acre in 1999. Most of the plants sampled are mature (78%), in good vigor, and unutilized.

Grasses are quite common with 14 species occurring on the transect. The most abundant was needle-and-thread, Kentucky bluegrass, mutton grass, and intermediate wheatgrass. There has been some light utilization of the grasses, but grazing appears to have been heavy in the past. Signs include the presence of increaser and invader species and eroded cattle trails. Forbs also contribute significantly to forage production of the site. Some of the more available and palatable species such as dusty penstemon, redroot buckwheat, lobeleaf groundsel, and lupine show evidence of use. Horsetail, a perennial increaser, is common in the meadow. The occasional elkweed have been heavily utilized.

#### 1986 TREND ASSESSMENT

Based on the old line intercept data comparisons and observations on the study site, the apparent trend is towards thicker vegetative cover, and increased shrub density. The most obvious increase is occurring with manzanita, but that plant is mainly restricted to the rocky shallow soils, leaving the more productive sites to more desirable species. Other shrub populations are vigorous and stable. A continued increase in ponderosa pine could restrict production of the understory. The herbaceous component is productive and healthy, although heavy grazing could lead to a greater dominance of undesirable increasers and invaders. Grazing and logging have contributed to accelerated erosion and gullyng, but with the increasing vegetative cover, the soil has stabilized. Localized soil loss occurs on some bare spots and steeper rocky slopes.

#### 1992 TREND ASSESSMENT

The area is a diverse intermix of trees, shrubs, and herbaceous species with small scattered bare areas, eroding livestock trails, and small gullies. The soil trend for this site is stable, but it still has some small scattered bare areas throughout the site which could be improved with the establishment of herbaceous species. The browse trend is slightly upward. With the increase in the sample size, some species have shown either smaller or larger estimates because of their aggregated distribution. It is best to inspect percent decadence, form class, vigor, and biotic potential to help determine the health of each species. With the increase in browse (and related cover), as expected, the herbaceous understory trend is down, with losses for grasses and forbs. However, species diversity for both grasses (14) and forbs (33) are still very high.

#### TREND ASSESSMENT

soil - stable

browse - slightly up

herbaceous understory - down

#### 1999 TREND ASSESSMENT

Trend for soil appears to be down slightly due to a decline in litter cover and an increase in percent bare soil. Trend for browse appears to be down slightly. Utilization on most shrubs is lighter than during previous readings, but density of the key species, Gambel oak and snowberry, declined considerably. Some of the change is due to the realignment of the baseline in 1999, but that only changed 2 of the 5 frequency/density belts. Ponderosa pine density appears to be increasing with a current overhead canopy cover averaging 21%. Manzanita also appears to be increasing in density and size. Trend for the herbaceous understory is down with a decline in the sum of nested frequency for both grasses and forbs. Cover is also much lower than 1992 estimates.

#### TREND ASSESSMENT

soil - down slightly

browse - down slightly

herbaceous understory - down

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 26

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	Agropyron intermedium	26	30	42	8	9	13	2.62	1.37
G	Agropyron trachycaulum	<sub>b</sub> 45	<sub>a</sub> 3	-	20	1	-	.03	-
G	Bouteloua gracilis	12	1	5	6	1	2	.00	.18
G	Bromus anomalus	11	4	4	6	2	2	.06	.06
G	Bromus inermis	1	2	7	1	1	2	.03	.30
G	Bromus tectorum (a)	-	2	13	-	1	5	.00	.05
G	Carex spp.	6	3	9	2	1	3	.15	.04
G	Koeleria cristata	<sub>b</sub> 24	<sub>b</sub> 17	<sub>a</sub> 1	11	7	1	.37	.03
G	Poa fendleriana	21	31	12	9	12	6	1.05	.25
G	Poa pratensis	119	94	104	41	31	34	6.47	2.50
G	Sitanion hystrix	14	16	5	9	8	2	.23	.01
G	Sporobolus cryptandrus	<sub>b</sub> 25	<sub>a</sub> 2	<sub>a</sub> 1	12	1	1	.04	.00
G	Stipa columbiana	<sub>a</sub> -	<sub>b</sub> 14	<sub>ab</sub> 2	-	5	1	.24	.03
G	Stipa comata	<sub>b</sub> 148	<sub>b</sub> 128	<sub>a</sub> 56	59	48	23	6.64	1.63
Total for Annual Grasses		0	2	13	0	1	5	0.00	0.05
Total for Perennial Grasses		452	345	248	184	127	90	17.97	6.42
Total for Grasses		452	347	261	184	128	95	17.97	6.47
F	Achillea millefolium	<sub>a</sub> -	<sub>b</sub> 34	<sub>a</sub> -	-	13	-	.70	-
F	Agoseris glauca	-	-	3	-	-	1	-	.03
F	Arabis spp.	<sub>a</sub> -	<sub>b</sub> 5	<sub>ab</sub> 6	-	2	3	.03	.01
F	Artemisia dracuncululus	-	-	1	-	-	1	-	.03
F	Artemisia ludoviciana	17	3	15	7	1	5	.15	.36
F	Aster spp.	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 7	-	-	3	-	.06
F	Castilleja linariaefolia	<sub>b</sub> 6	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	Chenopodium album (a)	-	6	2	-	2	2	.01	.01
F	Comandra pallida	36	17	11	14	9	6	.17	.08
F	Collinsia parviflora (a)	-	<sub>a</sub> -	<sub>b</sub> 18	-	-	8	-	.04
F	Cryptantha flavoculata	<sub>b</sub> 14	<sub>b</sub> 7	<sub>a</sub> -	6	4	-	.09	-
F	Cymopterus spp.	<sub>a</sub> -	<sub>b</sub> 5	<sub>a</sub> -	-	3	-	.21	-
F	Descurainia pinnata (a)	-	-	2	-	-	1	-	.03
F	Epilobium brachycarpum (a)	-	-	1	-	-	1	-	.00
F	Equisetum arvense	<sub>b</sub> 162	<sub>a</sub> 47	<sub>a</sub> 25	57	18	11	.86	.05
F	Eriogonum alatum	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 7	-	-	3	-	.09
F	Erigeron spp.	<sub>b</sub> 36	<sub>a</sub> 14	<sub>a</sub> 22	20	6	10	.14	.58
F	Eriogonum racemosum	<sub>a</sub> 2	<sub>a</sub> 6	<sub>b</sub> 28	1	3	12	.18	.62
F	Eriogonum umbellatum	5	7	13	2	3	4	.18	.33
F	Frasera speciosa	-	1	-	-	1	-	.18	-
F	Geranium fremontii	8	8	7	6	5	3	.37	.33



Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
F	Geum spp.	a <sup>-</sup>	b <sup>7</sup>	a <sup>-</sup>	-	3	-	.45	-
F	Hackelia patens	a <sup>-</sup>	b <sup>7</sup>	a <sup>-</sup>	-	4	-	.12	-
F	Heterotheca villosa	11	6	4	5	4	2	.21	.15
F	Hymenoxys richardsonii	-	1	3	-	1	1	.03	.00
F	Lappula occidentalis (a)	-	a <sup>-</sup>	b <sup>10</sup>	-	-	4	-	.07
F	Lesquerella rectipes	a <sup>-</sup>	b <sup>6</sup>	b <sup>5</sup>	-	3	3	.01	.06
F	Lithospermum ruderales	a <sup>-</sup>	a <sup>-</sup>	b <sup>23</sup>	-	-	9	.00	.14
F	Lomatium spp.	-	1	-	-	1	-	.00	-
F	Lupinus sericeus	69	68	53	30	30	23	2.32	3.42
F	Machaeranthera canescens	b <sup>27</sup>	a <sup>9</sup>	a <sup>8</sup>	14	5	3	.02	.04
F	Oenothera pallida	b <sup>69</sup>	a <sup>24</sup>	a <sup>31</sup>	33	9	15	.12	.27
F	Penstemon comarrhenus	c <sup>114</sup>	b <sup>60</sup>	a <sup>18</sup>	47	29	10	1.22	.15
F	Phacelia hastata	b <sup>27</sup>	b <sup>14</sup>	a <sup>-</sup>	13	7	-	.19	-
F	Phlox longifolia	a <sup>-</sup>	c <sup>58</sup>	b <sup>16</sup>	-	24	7	1.22	.08
F	Physalis longifolia	-	2	-	-	2	-	.01	-
F	Polygonum douglasii (a)	-	b <sup>33</sup>	a <sup>4</sup>	-	14	3	.41	.01
F	Senecio multilobatus	b <sup>155</sup>	a <sup>26</sup>	a <sup>11</sup>	66	10	6	.27	.14
F	Stellaria jamesiana	a <sup>-</sup>	b <sup>7</sup>	a <sup>-</sup>	-	4	-	.12	-
F	Taraxacum officinale	1	3	-	1	1	-	.00	-
F	Thalictrum fendleri	a <sup>-</sup>	b <sup>15</sup>	a <sup>-</sup>	-	6	-	.30	-
F	Tragopogon dubius	b <sup>51</sup>	a <sup>8</sup>	a <sup>2</sup>	20	3	1	.04	.03
F	Unknown forb-annual (a)	-	b <sup>6</sup>	a <sup>-</sup>	-	4	-	.02	-
F	Unknown forb-perennial	b <sup>74</sup>	a <sup>-</sup>	ab <sup>3</sup>	31	-	1	-	.00
F	Vicia americana minor	a <sup>-</sup>	b <sup>24</sup>	a <sup>-</sup>	-	10	-	.33	-
F	Viguiera multiflora	3	-	-	1	-	-	-	-
Total for Annual Forbs		0	45	37	0	20	19	0.43	0.17
Total for Perennial Forbs		887	500	322	377	224	143	10.33	7.13
Total for Forbs		887	545	359	377	244	162	10.77	7.30

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

BROWSE TRENDS --  
Herd unit 14 , Study no: 26

Type	Species	Strip Frequency		Average Cover %	
		'02	'09	'02	'09
B	Amelanchier utahensis	15	3	1.17	.06
B	Arctostaphylos patula	19	35	14.35	16.36
B	Ceanothus fendleri	13	0	.89	-
B	Cercocarpus spp.	0	2	-	.41
B	Juniperus osteosperma	0	0	-	-
B	Mahonia repens	6	7	.24	.21
B	Pinus ponderosa	6	9	15.32	3.09
B	Populus tremuloides	3	0	1.25	-
B	Prunus virginiana	6	7	.15	.48
B	Purshia tridentata	2	1	.38	-
B	Quercus gambelii	21	5	7.59	.44
B	Rosa woodsii	30	16	1.54	.69
B	Symphoricarpos oreophilus	71	48	15.28	9.29
Total for Browse		192	133	58.20	31.04

CANOPY COVER --  
Herd unit 14 , Study no: 26

Species	Percent Cover '09
Amelanchier utahensis	.40
Pinus ponderosa	21
Prunus virginiana	2
Quercus gambelii	6

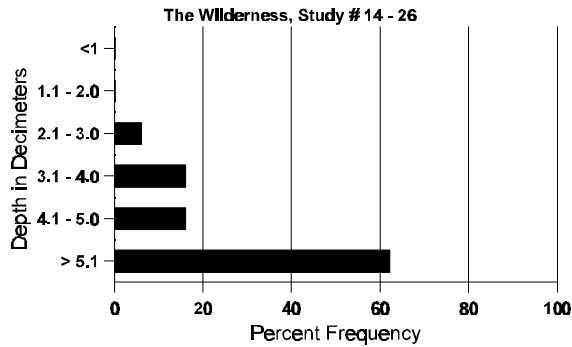
BASIC COVER --  
Herd unit 14 , Study no: 26

Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	298	275	7.00	64.96	41.85
Rock	4	6	0	1.53	.03
Pavement	4	-	0	0	0
Litter	249	371	71.75	75.31	63.02
Cryptogams	3	24	.25	.54	.31
Bare Ground	86	182	21.00	8.48	23.02

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 26, Study Name: The Wilderness

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
30.3	61.8 (17.7)	6.6	74.0	15.4	10.6	1.7	5.4	70.4	0.4

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 14 , Study no: 26

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	02	09	
Rabbit	3	8	N/A
Elk	6	4	5 (12)
Deer	7	2	5 (12)
Cattle	3	3	12 (30)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 26

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9				
Amelanchier utahensis														
S	86	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	2	-	-	-	60		3
	99	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	-	-	-	-	-	-	-	-	0		0
	92	3	17	3	1	-	-	6	-	-	-	600		30
	99	-	-	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	1	-	-	-	-	1	-	-	-	40	-	2
	99	2	-	1	-	-	-	-	-	-	-	60	42 40	3
D	86	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	1	-	-	-	-	-	-	1	20		1
	99	1	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>			
'86		00%			00%			00%						
'92		55%			12%			15%			-88%			
'99		00%			25%			00%						
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	0%
											'92	660		3%
											'99	80		25%

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
<b>Arctostaphylos patula</b>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	3	-	-	2	-	7	-	-	-	140		7	
	99	7	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	86	6	-	-	-	-	-	-	-	5	1	-	-	400	33	69	6
	92	26	-	-	-	-	-	-	-	25	-	1	-	520	-	-	26
	99	53	-	-	-	-	-	-	-	53	-	-	-	1060	39	75	53
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	-	2	-	-	-	1	-	4	-	100		5	
	99	8	-	-	-	-	-	-	-	6	-	-	2	160		8	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'86		00%		00%		00%		+47%									
'92		05%		00%		13%		+44%									
'99		00%		00%		03%											
Total Plants/Acre (excluding Dead & Seedlings)										'86	400	Dec:	0%				
										'92	760		13%				
										'99	1360		12%				
<b>Ceanothus fendleri</b>																	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	41	-	-	-	-	-	33	-	74	-	-	-	1480		74	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	-	2	-	-	-	-	-	2	-	-	-	133	11	6	2
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'86		00%		100%		00%		+91%									
'92		00%		00%		00%											
'99		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'86	133	Dec:	-				
										'92	1480		-				
										'99	0		-				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total						
		1	2	3	4									
<i>Cercocarpus</i> spp.														
S	86	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	0		0
	99	5	-	-	-	-	-	-	-	-	5	100		5
Y	86	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	0		0
	99	3	-	-	-	-	-	-	-	-	3	60		3
M	86	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	-	1	-	-	-	-	-	-	-	1	20	6 44	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>			
'86		00%			00%			00%						
'92		00%			00%			00%						
'99		25%			00%			00%						
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-	
										'92	0		-	
										'99	80		-	
<i>Juniperus osteosperma</i>														
S	86	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	1	20		1
	99	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>			
'86		00%			00%			00%						
'92		00%			00%			00%						
'99		00%			00%			00%						
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-	
										'92	0		-	
										'99	0		-	
<i>Mahonia repens</i>														
Y	86	-	-	-	-	-	-	-	-	-	-	0		0
	92	24	-	-	-	-	9	-	-	-	33	660		33
	99	2	-	-	-	-	-	-	-	-	2	40		2
M	86	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	12	-	-	-	-	4	-	-	-	16	320	-	16
	99	27	-	-	-	-	-	-	-	-	27	540	3 6	27
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>			
'86		00%			00%			00%						
'92		00%			00%			00%			-41%			
'99		00%			00%			00%						
Total Plants/Acre (excluding Dead & Seedlings)										'86	0	Dec:	-	
										'92	980		-	
										'99	580		-	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus ponderosa																	
S	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	'86	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	'92	1	-	-	-	-	-	1	-	-	2	-	-	-	40		2
	'99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'92	-	1	-	1	-	-	-	2	-	4	-	-	-	80	-	4
	'99	3	-	-	-	-	-	-	2	1	6	-	-	-	120	-	6
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			-10%						
'92		17%			00%			00%			+33%						
'99		00%			11%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	133	Dec:	-			
											'92	120		-			
											'99	180		-			
Populus tremuloides																	
Y	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'92	1	-	-	-	-	-	-	1	-	-	2	-	-	40		2
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'92	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	1
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	0	Dec:	-			
											'92	60		-			
											'99	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Prunus virginiana</b>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	3	-	-	-	-	-	3	-	-	-	60		3	
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
Y	86	2	1	1	1	-	-	-	-	-	5	-	-	-	333		5	
	92	7	3	-	1	-	-	1	-	-	12	-	-	-	240		12	
	99	22	-	-	-	-	-	-	-	-	22	-	-	-	440		22	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	-	-	-	-	-	-	2	-	-	2	-	-	-	40	60	40	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		20%			20%			00%			-28%							
'92		25%			00%			00%			+50%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	333	Dec:	-			
												'92	240		-			
												'99	480		-			
<b>Purshia tridentata</b>																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	3	-	-	3	-	-	-	60		3	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	1	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	8	21	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'92		00%			00%			00%			-75%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'92	80		-			
												'99	20		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
Quercus gambelii																	
S	86	24	1	-	26	-	-	-	-	49	2	-	-	3400		51	
	92	45	1	-	35	-	-	8	-	57	32	-	-	1780		89	
	99	21	-	-	-	-	-	-	-	21	-	-	-	420		21	
Y	86	10	3	14	6	1	-	-	-	32	-	2	-	2266		34	
	92	28	15	-	12	2	-	4	-	37	24	-	-	1220		61	
	99	10	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	86	-	-	1	1	-	-	-	-	2	-	-	-	133	59	13	2
	92	8	15	-	-	4	-	-	-	13	11	3	-	540	-	-	27
	99	-	-	-	-	-	-	5	-	5	-	-	-	100	59	39	5
D	86	-	-	6	-	-	-	-	-	4	1	1	-	400		6	
	92	2	3	-	1	-	-	-	-	5	-	-	1	120		6	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		10%			50%			07%			-33%						
'92		41%			00%			04%			-84%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	2799	Dec:	14%			
											'92	1880		6%			
											'99	300		0%			
Rosa woodsii																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	86	4	1	-	-	-	-	-	-	5	-	-	-	333		5	
	92	61	20	-	6	-	-	9	-	93	3	-	-	1920		96	
	99	14	-	-	1	-	-	-	-	15	-	-	-	300		15	
M	86	1	2	3	-	-	-	-	-	6	-	-	-	400	19	6	6
	92	-	12	3	3	-	-	-	-	18	-	-	-	360	-	-	18
	99	11	-	-	-	-	-	-	-	11	-	-	-	220	30	21	11
D	86	1	-	-	-	-	-	-	-	-	-	-	1	66		1	
	92	1	3	1	-	-	-	-	-	1	-	4	-	100		5	
	99	4	-	-	-	-	-	-	-	3	-	-	1	80		4	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		25%			25%			08%			+66%						
'92		29%			03%			03%			-75%						
'99		00%			00%			03%									
Total Plants/Acre (excluding Dead & Seedlings)											'86	799	Dec:	8%			
											'92	2380		4%			
											'99	600		13%			



A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Symphoricarpos oreophilus																	
S	86	2	-	-	-	4	-	-	-	-	6	-	-	-	400		6
	92	10	-	-	7	-	-	2	-	-	19	-	-	-	380		19
	99	26	-	-	-	-	-	-	-	-	26	-	-	-	520		26
Y	86	18	4	-	2	2	-	-	-	-	23	-	3	-	1733		26
	92	67	36	-	8	-	-	13	-	-	120	-	4	-	2480		124
	99	45	-	-	3	-	-	-	-	-	48	-	-	-	960		48
M	86	26	10	-	-	-	-	-	-	-	35	1	-	-	2400	31 20	36
	92	88	38	5	6	1	-	2	-	-	135	-	5	-	2800	- -	140
	99	130	-	-	4	-	-	-	-	-	133	-	-	-	2680	28 42	134
D	86	11	4	3	-	-	-	-	-	-	16	-	2	-	1200		18
	92	8	1	-	1	4	-	-	-	-	6	-	6	2	280		14
	99	4	-	-	-	-	-	-	-	-	2	-	-	2	80		4
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		25%			04%			06%			+ 4%						
'92		29%			02%			06%			-33%						
'99		00%			00%			01%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	5333	Dec:	23%		
												'92	5560		5%		
												'99	3720		2%		



## DISCUSSION

### Trend Study No. 14-27 (36-15)

The Mormon Pasture Point trend study is located in an open rolling valley between high red cliffs and the beginning of a deep canyon. The area drains to the north into Steven's Canyon. At the study site, aspect is east on a 10% slope and 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. Point quarter data from 1999 estimate 52 juniper and 41 pinyon trees/acre. Average diameter of juniper was 3.5 inches and that of pinyon 3.1 inches. Twenty-one percent of the juniper trees sampled were knocked down (tipped over) chained trees that are still living.

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 estimate 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 appear to be from last season, however there were some cows a few hundred yards south of the study site in 1999. Elk sign encountered was fairly recent.

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, but 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 have been shown to 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.

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 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 especially appears to have an expanding population with a large proportion of the population classified as young.

Perennial grasses are abundant and provide valuable forage. They currently ('99) provide 62% of the total vegetation cover. The most abundant grass in 1989 and 1992 was intermediate wheatgrass which provides good forage and erosion control. Crested wheatgrass was present in 1986, yet only in low numbers. It increased significantly in 1992 as did intermediate wheatgrass. In 1999, these two seeded grasses produce 96% of the grass cover. There are a few native perennial grasses present, however they occur in small numbers. The grasses are vigorous, reproducing, and show some utilization although abundant forage is still available for winter use. At least 12 species of forbs occur on the site, with none especially abundant, nor do they provide much forage. However, they do help provide some early spring green-up for migrating deer and elk.

### 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 such as fire or herbicide, 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 area being sampled, more shrub species have been picked up and some notably clumped species like oak, have estimated densities that are much closer to their true mean. 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.

#### TREND ASSESSMENT

soil - up slightly

browse - up

herbaceous understory - down

#### 1999 TREND ASSESSMENT

Trend for soil is down since 1992 due to a small decline in litter cover combined with a dramatic increase in percent cover of bare ground from 19% to 32%. Percent cover of vegetation also fell from 40% to 30%. Trend for browse is up slightly. Density of bitterbrush and Gambel oak have increased and Wyoming 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 stable. Sum of nested frequency of perennial grasses has declined slightly while frequency of forbs increased slightly. Nested frequency of the dominant grass, intermediate wheatgrass declined, but not significantly.

#### TREND ASSESSMENT

soil - down

browse - up slightly

herbaceous understory - stable

HERBACEOUS TRENDS --  
Herd unit 14 , Study no: 27

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	'92	'99
G	Agropyron cristatum	a <sub>32</sub>	b <sub>88</sub>	b <sub>80</sub>	11	35	31	4.67	2.90
G	Agropyron dasystachyum	b <sub>218</sub>	a <sub>3</sub>	a <sub>-</sub>	74	2	-	.15	-
G	Agropyron intermedium	a <sub>157</sub>	b <sub>313</sub>	b <sub>270</sub>	60	96	87	19.43	13.35
G	Carex spp.	12	9	14	6	6	7	.46	.16
G	Oryzopsis hymenoides	b <sub>36</sub>	a <sub>16</sub>	a <sub>19</sub>	16	6	7	.28	.26
G	Poa fendleriana	a <sub>1</sub>	b <sub>25</sub>	b <sub>22</sub>	1	12	9	.23	.29
G	Poa pratensis	7	-	-	2	-	-	-	-
G	Sitanion hystrix	b <sub>63</sub>	a <sub>-</sub>	a <sub>-</sub>	25	-	-	-	-
G	Stipa comata	-	-	3	-	-	1	-	.03
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		526	454	408	195	157	142	25.25	17.00
Total for Grasses		526	454	408	195	157	142	25.25	17.00
F	Arabis spp.	a <sub>-</sub>	a <sub>-</sub>	b <sub>6</sub>	-	-	3	-	.01
F	Astragalus tenellus	b <sub>68</sub>	a <sub>29</sub>	a <sub>9</sub>	32	12	7	.85	.49
F	Calochortus nuttallii	ab <sub>3</sub>	a <sub>-</sub>	b <sub>7</sub>	1	-	3	-	.01
F	Cirsium spp.	3	6	5	2	2	2	.18	.01
F	Cymopterus spp.	ab <sub>5</sub>	a <sub>-</sub>	b <sub>7</sub>	2	-	3	-	.04
F	Descurainia pinnata (a)	-	-	1	-	-	1	-	.00
F	Eriogonum racemosum	2	-	-	1	-	-	-	-
F	Gilia aggregata	-	3	-	-	2	-	.01	-
F	Heterotheca villosa	-	3	-	-	1	-	.03	.00
F	Hymenoxys acaulis	b <sub>22</sub>	a <sub>-</sub>	b <sub>12</sub>	9	-	4	-	.09
F	Ipomopsis aggregata	3	-	-	2	-	-	-	.00
F	Lesquerella rectipes	a <sub>17</sub>	b <sub>42</sub>	ab <sub>30</sub>	7	22	13	.28	.16
F	Lomatium spp.	a <sub>-</sub>	a <sub>-</sub>	b <sub>6</sub>	-	-	4	-	.02
F	Machaeranthera canescens	3	3	1	2	1	1	.00	.00
F	Pedicularis centranthera	-	-	4	-	-	1	-	.00
F	Penstemon pachyphyllus	26	20	18	12	10	9	.59	.20
F	Petradoria pumila	3	8	14	2	5	7	.66	.66
F	Phlox longifolia	11	11	25	4	4	9	.04	.07
F	Polygonum douglasii (a)	-	-	1	-	-	1	-	.00
F	Senecio multilobatus	2	-	3	1	-	1	-	.00
F	Sphaeralcea coccinea	b <sub>70</sub>	ab <sub>45</sub>	a <sub>38</sub>	29	20	16	.76	.35
F	Taraxacum officinale	1	1	-	1	1	-	.03	-
F	Tragopogon dubius	b <sub>22</sub>	a <sub>-</sub>	a <sub>-</sub>	14	-	-	-	-
F	Trifolium spp.	a <sub>-</sub>	b <sub>7</sub>	b <sub>12</sub>	-	3	5	.04	.07
Total for Annual Forbs		0	0	2	0	0	2	0	0.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'92	'99	'86	'92	'99	02	09
	Total for Perennial Forbs	261	178	197	121	83	88	3.49	2.23
	Total for Forbs	261	178	199	121	83	90	3.49	2.24

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

#### BROWSE TRENDS --

Herd unit 14 , Study no: 27

Type	Species	Strip Frequency		Average Cover %	
		02	09	02	09
B	Amelanchier utahensis	5	4	1.33	1.97
B	Artemisia tridentata wyomingensis	0	5	-	.01
B	Cercocarpus montanus	1	0	-	.15
B	Chrysothamnus nauseosus	0	0	-	-
B	Gutierrezia sarothrae	8	1	.00	.15
B	Juniperus osteosperma	5	2	1.67	1.38
B	Juniperus scopulorum	1	0	-	-
B	Opuntia spp.	5	6	.04	.03
B	Pinus edulis	0	2	3.08	.88
B	Purshia tridentata	2	7	1.00	.93
B	Quercus gambelii	4	13	2.00	2.59
B	Ribes spp.	1	0	-	-
B	Symphoricarpos oreophilus	1	0	-	-
	Total for Browse	33	40	9.17	8.13

#### CANOPY COVER --

Herd unit 14 , Study no: 27

Species	Percent Cover 09
Amelanchier utahensis	.40
Juniperus osteosperma	.80
Pinus edulis	2
Quercus gambelii	5

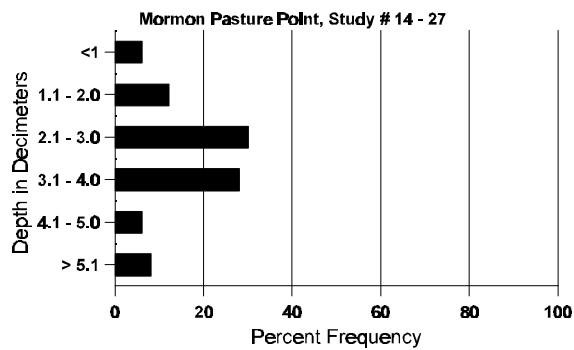
BASIC COVER --  
Herd unit 14 , Study no: 27

Cover Type	Nested Frequency		Average Cover %		
	'02	'09	'86	'92	'99
Vegetation	339	314	2.50	39.79	29.47
Rock	20	37	0	2.72	.47
Pavement	42	100	.75	0	1.24
Litter	251	368	69.50	51.04	48.66
Cryptogams	4	5	0	.24	.06
Bare Ground	201	273	27.25	18.57	31.65

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 27, Study Name: Mormon Pasture Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	57.4 (16.6)	7.5	53.6	17.8	28.6	1.4	3.9	118.4	0.6

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 14 , Study no: 27

Type	Quadrat Frequency	
	'02	'09
Rabbit	51	20
Elk	8	8
Deer	15	1
Cattle	7	5

Pellet Transect Days Use/Acre (ha)
'09
N/A
21 (52)
5 (12)
36 (89)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 27

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4		1	2				
<b>Amelanchier utahensis</b>												
Y	86	-	-	-	-	-	-	-	0	-	0	
	92	-	3	-	-	-	-	-	60	-	3	
	99	-	-	-	-	-	-	-	0	-	0	
M	86	-	-	-	-	-	-	-	0	-	0	
	92	1	-	-	1	-	-	-	40	-	2	
	99	-	1	1	-	-	2	-	80	89	90	4
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'92		60%		00%		00%		-20%				
'99		25%		25%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'86	0	Dec:	-			
						'92	100		-			
						'99	80		-			
<b>Artemisia tridentata wyomingensis</b>												
S	86	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	0	-	0	
	99	-	-	-	1	-	-	-	20	-	1	
Y	86	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	0	-	0	
	99	4	-	-	-	-	-	-	80	-	4	
M	86	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	0	-	0	
	99	1	4	1	-	-	-	-	120	16	24	6
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		00%		00%		00%						
'92		00%		00%		00%						
'99		40%		10%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'86	0	Dec:	-			
						'92	0		-			
						'99	200		-			
<b>Cercocarpus montanus</b>												
S	86	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	2	-	-	-	40	-	2	
	99	-	-	-	-	-	-	-	0	-	0	
M	86	-	1	-	-	-	-	-	33	55	43	1
	92	-	1	-	-	-	-	-	20	-	-	1
	99	-	-	-	-	-	-	-	0	44	39	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'86		100%		00%		00%		-39%				
'92		100%		00%		00%						
'99		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'86	33	Dec:	-			
						'92	20		-			
						'99	0		-			



A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus nauseosus</i>																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	21	32	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	0		-		
												'99	0		-		
<i>Gutierrezia sarothrae</i>																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	1	-	-	4	-	-	-	-	-	120			6
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	4	-	-	3	-	-	-	-	-	-	-	-	140			7
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	12	-	-	-	-	-	-	-	-	-	-	-	240	-	-	12
	99	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%			-89%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	380		-		
												'99	40		-		
<i>Juniperus osteosperma</i>																	
Y	86	1	-	-	-	-	-	-	-	-	-	-	-	33			1
	92	4	-	-	-	-	-	-	-	-	-	-	-	80			4
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	1	-	-	-	-	-	-	-	-	20	-	-	1
	99	1	-	-	-	-	-	-	1	-	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%			+67%						
'92		00%			00%			00%			-60%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	33	Dec:	-		
												'92	100		-		
												'99	40		-		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus scopulorum																	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	20		-		
												'99	0		-		
Opuntia spp.																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	6	-	-	-	-	-	-	-	-	-	-	-	120			6
	99	6	-	-	-	-	-	-	-	-	-	-	-	120			6
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	4	-	-	-	-	-	-	-	-	-	-	-	80	-	-	4
	99	4	-	-	-	-	-	-	-	-	-	-	-	80	4	13	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%			+ 0%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	200		-		
												'99	200		-		
Pinus edulis																	
S	86	2	-	-	-	-	-	-	-	-	-	-	-	66			2
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	86	1	-	-	-	-	-	-	-	-	-	-	-	33			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	1	-	-	-	-	-	-	-	-	20			1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	33	Dec:	-		
												'92	0		-		
												'99	40		-		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4											
Purshia tridentata																
Y	86	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	1	2	-	-	-	-	-	-	3	-	-	100	12 20	3
	92	-	-	4	-	-	-	-	-	-	4	-	-	80	- -	4
	99	-	1	1	-	2	1	-	-	-	4	-	-	100	19 50	5
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	1	2	-	-	-	1	-	-	60		3
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'86		33%			67%			00%			-20%					
'92		00%			100%			00%			+50%					
'99		50%			50%			38%								
Total Plants/Acre (excluding Dead & Seedlings)										'86	100	Dec:	0%			
										'92	80		0%			
										'99	160		38%			
Quercus gambelii																
S	86	23	1	-	-	-	-	-	-	20	3	1	-	800		24
	92	2	-	-	-	-	-	-	-	2	-	-	-	40		2
	99	1	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	86	17	21	-	-	-	-	-	-	21	17	-	-	1266		38
	92	17	-	-	-	-	-	-	-	17	-	-	-	340		17
	99	21	-	-	-	-	-	10	-	31	-	-	-	620		31
M	86	4	11	2	-	-	-	-	-	4	13	-	-	566	63 35	17
	92	4	-	-	-	-	-	-	-	4	-	-	-	80	- -	4
	99	19	-	-	3	-	-	5	-	10	37	-	-	740	61 40	37
D	86	2	8	-	-	-	-	-	-	1	7	1	1	333		10
	92	3	1	-	-	-	-	-	-	4	-	-	-	80		4
	99	1	-	-	-	-	-	-	-	1	-	-	-	20		1
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	140		7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'86		62%			03%			03%			-77%					
'92		04%			00%			00%			+64%					
'99		00%			14%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'86	2165	Dec:	15%			
										'92	500		16%			
										'99	1380		1%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Ribes spp.																	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	59 31	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	20		-		
												'99	0		-		
Symphoricarpos oreophilus																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28 72	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'92	20		-		
												'99	0		-		

Trend Study14-28-99

Study site name: North Cottonwood.

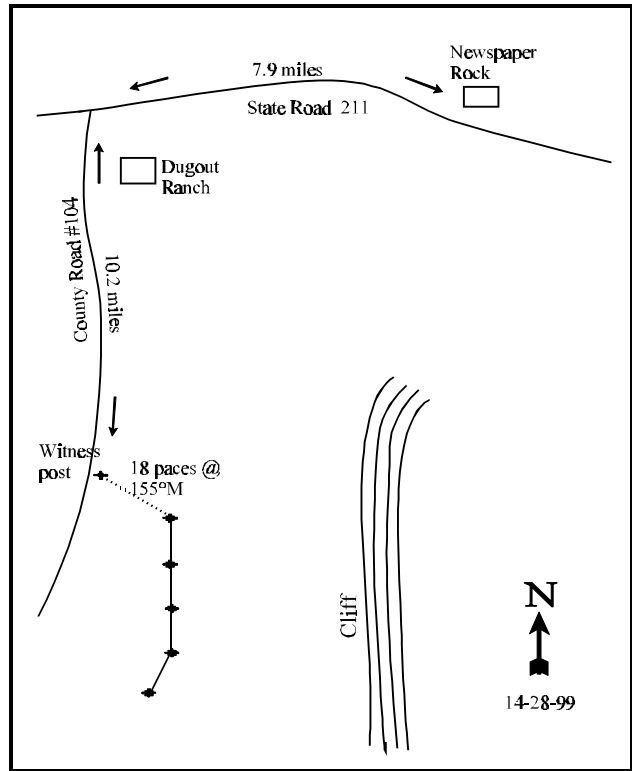
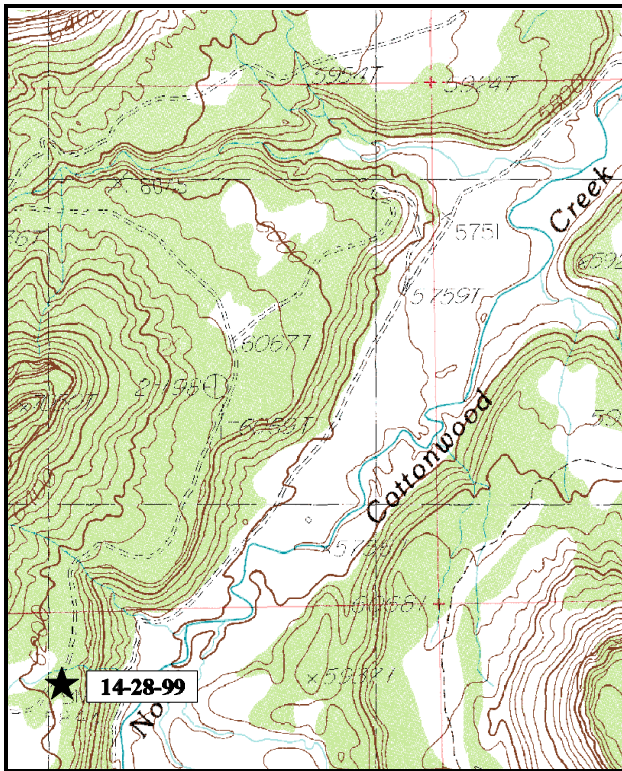
Range type: Pinyon-Juniper.

Compass bearing: frequency baseline 165°M-lines 1-3; 192°M-line 4.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1(11 and 95 ft), line 2(34 ft), line 3(59 ft), line 4(71ft).

LOCATION DESCRIPTION

Take the Canyonlands National Park turnoff from SR 191, and go west 20.8 miles to County Road #104 to Dugout Ranch (7.9 miles from Newspaper Rock). Turn left, and travel 10.2 miles, passing Dugout Ranch and several cattleguards to a witness post on the left side of the road. The 0 ft stake is 18 paces away from the witness post at a bearing of 155°M. The 0 foot stake has browse tag #7844 attached.



Map name: Shay Mountain

Diagrammatic Sketch

Township 32S, Range 21E, Section 28.

UTM 4203447.870 N, 621053.941 E

## DISCUSSION

### Trend Study No. 14-28 (36-16)

The North Cottonwood study is located on the rim of a narrow, rocky pinyon-juniper bench below Bridger Jack Mesa, above North Cottonwood Creek. It is bounded on the east and west by sheer sandstone cliffs. Administered by the BLM, this low country is primarily winter range. Two hundred cattle graze through the area for 1 - 3 months between June 15 and October 16. Forage for cattle is limited, so use does not appear concentrated and sign is scarce. The area is also utilized by wintering deer. The west Rim North Cottonwood pellet group transect, located parallel to the study site, averaged only 1 deer days use/acre (3 ddu/ha) between 1981 and 1986. Pellet group data taken along the trend study site baseline in 1999 estimate 3 deer days use/acre (7 ddu/ha) and 9 cow days use/acre (22 cdu/ha). All cattle pats and deer pellet groups appeared to be from last year. Rabbit sign was abundant.

Elevation of the site is 6,200 feet, approximately 500 feet above North Cottonwood Creek. Slope is less than 2% with a slight northeast aspect. The red-brown sandy loam soil is very prone to erosion. Because of the underlying sandstone layer, the soil is generally shallow with exposed bedrock outcrops. Effective rooting depth was estimated at almost 12 inches. Phosphorus and potassium are low at just 3.8 ppm and 57.6 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium have been shown to limit normal plant growth and development. Organic matter is also relatively low at 1.3%. In some places, vegetation, especially grasses and cryptogams, hold the soil. However, the predominance of bare soil and lack of vegetative cover contribute to occasional heavy soil losses during high intensity summer storms. During these intense summer storms, numerous gullies have been cut deeper by the rapid flow of soil-laden water. Protective ground cover is lacking with an average value of 41% for bare soil.

Mature pinyon and juniper dominate this arid bench. They provide excellent thermal cover, but forage is lacking. Understory vegetation is sparse, although the browse component is fairly diverse with 13 species being inventoried. The only shrubs to show signs of use are the more palatable species which includes: mountain mahogany, bitterbrush, and slenderbush eriogonum. The only common shrub on the site is broom snakeweed. It had a density of 2,866 plants/acre in 1986, increasing to 14,200 by 1999. Plants are relatively small, measuring only 6 inches in height. Mature juniper and pinyon visually dominate the site. Point quarter data from 1999 estimate 76 juniper and 97 pinyon trees/acre. The juniper are old mature trees with an average diameter of nearly 14 inches, while pinyon average only 5.5 inches in diameter.

The herbaceous understory is poor with a combined grass and forb cover of only 4%. Blue grama and Indian ricegrass are the most abundant perennial grasses. The forb composition is dominated by pepperweed and rock goldenrod. The herbaceous component provides very little forage and provides poor soil protection.

### 1986 APPARENT TREND ASSESSMENT

Site characteristics severely limit the potential for forage production. Erosion is a serious factor with management options being very limited. Severe erosion is to be expected on such a site. The overall soil trend appears to be declining. The pinyon-juniper woodland will maintain a mature stand. The vegetative community is probably fairly stable, although populations of increasers, especially broom snakeweed, and annuals will fluctuate. Continued management as a lightly used seasonal range seems to be the best plan. This site may not meet the criteria of a "key area" as defined in the Interagency range trend study manual and may not provide information that would facilitate effective habitat management on the unit.

### 1999 TREND ASSESSMENT

This site was revisited in 1999 to see if conditions had changed since the initial reading in 1986. The site appears stagnant with little use by wildlife or livestock. It will be discontinued as a trend study site in the

future. Trend for soil is stable but in very poor condition. Percent litter cover declined dramatically but percent bare ground remained stable. Rock and pavement cover increased three fold, indicating continued soil loss. Trend for browse is down slightly. The browse composition is diverse, yet condition is poor and no species is very abundant except for broom snakeweed which increased five fold since 1986. Preferred species are rare and bitterbrush, true mountain mahogany, and black sagebrush have declined in density. The herbaceous understory is very poor. Grasses produced only 1% cover in 1999, while forbs provided only 3%. Trend is considered stable but in very poor condition. Sum of nested frequency for grasses declined slightly, while frequency of forbs increased slightly.

TREND ASSESSMENT

soil - stable but poor

browse - down slightly and poor

herbaceous understory - stable but poor

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 28

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % 09
		'86	'99	'86	'99	
G	Agropyron cristatum	3	4	1	2	.06
G	Bouteloua gracilis	26	20	11	10	.32
G	Bromus tectorum (a)	-	23	-	10	.21
G	Hilaria jamesii	-	3	-	1	.00
G	Oryzopsis hymenoides	14	*4	9	3	.36
G	Sitanion hystrix	37	22	18	11	.08
G	Vulpia octoflora (a)	-	8	-	4	.02
Total for Annual Grasses		0	31	0	14	0.23
Total for Perennial Grasses		80	53	39	27	0.82
Total for Grasses		80	84	39	41	1.06
F	Arabis spp.	-	*6	-	4	.04
F	Astragalus miser	2	-	1	-	-
F	Chaenactis douglasii	-	*27	-	14	.12
F	Descurainia pinnata (a)	-	3	-	1	.03
F	Draba spp. (a)	-	50	-	18	.11
F	Euphorbia fendleri	9	5	6	3	.06
F	Holosteum umbellatum (a)	-	5	-	2	.01
F	Hymenoxys acaulis	14	11	7	7	.18
F	Lappula occidentalis (a)	-	3	-	1	.00
F	Lepidium montanum	66	*36	34	15	.80
F	Lesquerella spp.	-	6	-	2	.06
F	Penstemon comarrhenus	10	1	5	1	.00
F	Petradoria pumila	-	*22	-	12	1.12
F	Phlox hoodii	27	*11	13	5	.34

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % 09
		'86	'99	'86	'99	
F	Senecio multilobatus	14	7	9	4	.02
F	Townsendia incana	18	18	7	7	.08
Total for Annual Forbs		0	61	0	22	0.15
Total for Perennial Forbs		133	150	69	74	2.85
Total for Forbs		133	211	69	96	3.01

\* Indicates significant difference at % = 0.10

BROWSE TRENDS --  
Herd unit 14 , Study no: 28

Type	Species	Strip Frequency 09	Average Cover % 09
B	Artemisia nova	0	-
B	Artemisia tridentata wyomingensis	2	-
B	Atriplex canescens	0	-
B	Cercocarpus montanus	2	.30
B	Chrysothamnus nauseosus	0	-
B	Chrysothamnus viscidiflorus	3	.68
B	Cowania mexicana stansburiana	0	-
B	Coryphantha vivipara arizonica	1	-
B	Echinocereus spp.	1	-
B	Ephedra viridis	0	-
B	Eriogonum microthecum	8	.21
B	Gutierrezia sarothrae	74	2.92
B	Juniperus osteosperma	2	.15
B	Opuntia spp.	10	-
B	Philadelphus microphyllus	0	-
B	Pinus edulis	1	1.56
B	Purshia tridentata	0	-
B	Rhus trilobata trilobata	1	-
B	Sclerocactus	2	-
B	Symphoricarpos oreophilus	10	.89
B	Yucca baccata baccata	0	-
Total for Browse		117	6.73



CANOPY COVER --  
Herd unit 14 , Study no: 28

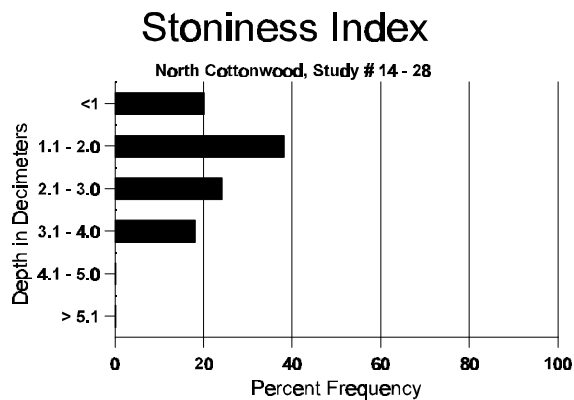
Species	Percent Cover '99
Juniperus osteosperma	1
Pinus edulis	3

BASIC COVER --  
Herd unit 14 , Study no: 28

Cover Type	Nested Frequency '89	Average Cover %	
		'86	'99
Vegetation	191	4.50	9.66
Rock	153	3.00	11.03
Pavement	201	2.50	7.75
Litter	331	44.00	24.40
Cryptogams	143	4.50	9.77
Bare Ground	335	41.50	40.75

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 28, Study Name: North Cottonwood

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.9	65.6 (14.1)	7.6	62.0	19.4	18.6	1.3	3.8	57.6	0.5



PELLET GROUP FREQUENCY --  
Herd unit 14 , Study no: 28

Type	Quadrat Frequency '89
Rabbit	24
Deer	-
Cattle	-

Pellet Transect Days Use/Acre (ha) '89
N/A
3 (7)
9 (22)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 28

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
<i>Artemisia nova</i>																		
M	86	2	-	-	-	-	-	-	-	-	2	-	-	-	66	6	14	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	66	Dec:	-			
												'99	0		-			
<i>Artemisia tridentata wyomingensis</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	16	13	2
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	40		-			
<i>Atriplex canescens</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	13	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	0		-			
<i>Cercocarpus montanus</i>																		
M	86	1	1	-	-	-	-	-	-	-	2	-	-	-	66	37	33	2
	99	-	2	-	-	-	-	-	-	-	2	-	-	-	40	42	60	2
D	86	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		33%			33%			00%			-60%							
'99		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	99	Dec:	33%			
												'99	40		0%			
<i>Chrysothamnus nauseosus</i>																		
M	86	1	-	-	-	-	-	-	-	-	1	-	-	-	33	55	48	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	33	Dec:	-			
												'99	0		-			

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	3	-	-	-	-	-	-	-	-	-	-	-	60	32	26	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	60		-			
<i>Cowania mexicana stansburiana</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	23	32	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	0		-			
<i>Coryphantha vivipara arizonica</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	20		-			
<i>Echinocereus spp.</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	2	-	-	-	-	-	-	-	-	-	-	-	40	3	8	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	40		-			
<i>Ephedra viridis</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	19	34	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	0		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
<i>Eriogonum microthecum</i>																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	10	1	6	-	-	1	-	-	-	18	-	-	-	360	4	8	18
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		06%			39%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	360		-			
<i>Gutierrezia sarothrae</i>																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
Y	86	14	-	-	-	-	-	-	-	-	14	-	-	-	466		14	
	99	155	-	-	-	-	-	-	-	-	155	-	-	-	3100		155	
M	86	69	-	-	-	-	-	-	-	-	69	-	-	-	2300	7	9	69
	99	553	-	-	-	-	-	-	-	-	553	-	-	-	11060	6	7	553
D	86	3	-	-	-	-	-	-	-	-	2	-	-	1	100		3	
	99	2	-	-	-	-	-	-	-	-	-	-	1	1	40		2	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			01%			+80%							
'99		00%			00%			.28%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	2866	Dec:	3%			
												'99	14200		0%			
<i>Juniperus osteosperma</i>																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	40		-			
<i>Opuntia spp.</i>																		
Y	86	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	5	-	-	-	-	-	-	-	-	5	-	-	-	166	7	10	5
	99	13	-	-	-	-	-	-	-	-	13	-	-	-	260	5	22	13
D	86	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			+11%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	232	Dec:	14%			
												'99	260		0%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Philadelphus microphyllus</i>																		
Y	86	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	4	1	-	-	-	-	-	-	-	5	-	-	-	166	15	14	5
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	86	3	-	-	-	-	-	-	-	-	1	-	-	2	100		3	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		10%			00%			20%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	332	Dec:	30%			
												'99	0		0%			
<i>Pinus edulis</i>																		
S	86	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	99	2	-	-	2	-	-	-	-	-	4	-	-	-	80		4	
Y	86	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			-80%							
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	100	Dec:	-			
												'99	20		-			
<i>Purshia tridentata</i>																		
Y	86	3	1	-	-	-	-	-	-	-	4	-	-	-	133		4	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	2	-	-	-	-	-	-	-	2	-	-	-	66	50	36	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		50%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	199	Dec:	-			
												'99	0		-			
<i>Rhus trilobata trilobata</i>																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	40		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Sclerocactus																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	2	2	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'99	40		-			
Symphoricarpos oreophilus																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	12	-	-	-	-	-	-	-	-	12	-	-	-	240	22	39	12
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'99	360		33%			
Yucca baccata baccata																		
M	86	3	-	-	-	-	-	-	-	-	3	-	-	-	100	21	24	3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	100	Dec:	-			
												'99	0		-			

Trend Study 14-29-99

Study site name: Salt Creek Mesa .

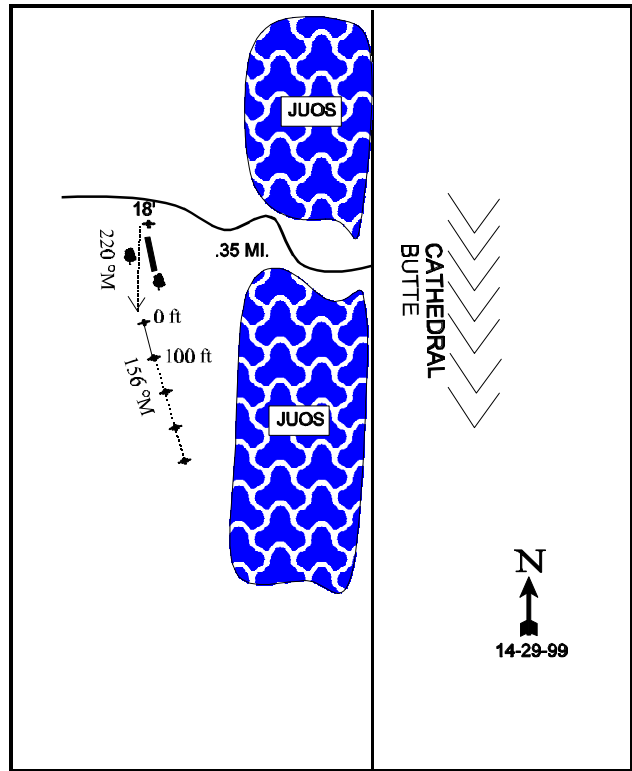
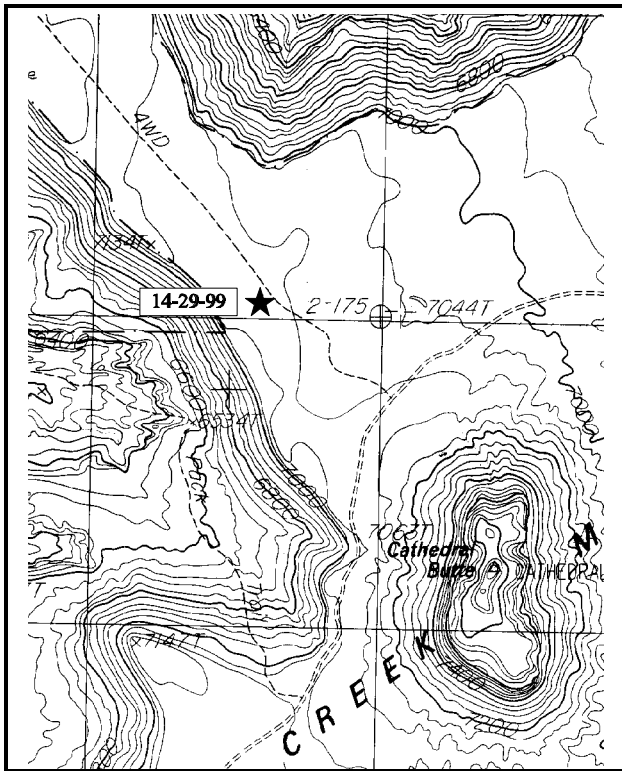
Range type: Chained, Seeded P-J.

Compass bearing: frequency baseline 156°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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 turnout. 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 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

UTM 4202030.680 N, 613622.030 E

## DISCUSSION

### Trend Study No. 14-29 (36-17)

The Salt Creek Mesa is a new study that was established in 1992 on an old chaining, mostly due to its importance to wintering deer and elk. The treated area appears to have been seeded with crested wheatgrass, intermediate wheatgrass, and alfalfa. Visually, the seeded grasses dominate the understory of this site which has a northeast aspect and a 3% slope. This chained site also supports a high density of released pinyon and juniper trees that are now in the 6 to 10 foot height. This would indicate that most of the trees are individuals that escaped the chaining because of their small size and now have been released from competition with the chained adult trees. Point quarter data estimated 59 pinyon trees/acre in 1992 and 60 pinyon trees/acre in 1999. Average diameter was estimated at 3.5 inches in 1999. Juniper density was about 33 trees/acre in 1992, increasing to 51 by 1999. Average diameter of juniper was estimated at 2.8 inches in 1999. Shrub strip data, which better estimates density of young and seedling trees, estimated 120 juniper and 140 pinyon seedlings/acre.

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 whole site. Soil texture is a sandy clay loam with a slightly alkaline pH (7.5). Phosphorus is low at 5.3 ppm. 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, comprised mostly pinyon-juniper debris from the chaining, is abundant but declining. Even with fairly good cover, there are small scattered bare areas where erosion (both wind and water) is occurring. Percent bare ground was quite high at 39% in 1999.

Useful browse are 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. The most abundant browse is broom snakeweed with an estimated population of 9,960 plants/acre in 1992. It has since increased to 23,760 plants/acre by 1999. Snakeweed grows in thick patches where there is little perennial grass. Mature plants are small, measuring only 6 inches in height. Density will likely not increase much in the future unless perennial grasses decline.

The dominant herbaceous species are intermediate wheatgrass, crested wheatgrass, and Indian ricegrass. Forbs are lacking with two species, dusty penstemon (a desirable species), and Fendler euphorbia (an undesirable increaser), providing 90% of the forb cover in 1992 and 73% in 1999. All other species occur rarely.

### 1992 APPARENT TREND ASSESSMENT

The soil trend is considered stable with percent bare ground at 22%. 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.

### 1999 TREND ASSESSMENT

Trend for soil is down due to a decline in litter cover from 50% to 33% and an increase in percent bare ground from 22% to 39%. Vegetation and litter distribution are variable with bare areas showing signs of wind and water erosion. Trend for browse is down due to stable, 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 down due to a significant decline in the sum of nested



frequency of 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.

TREND ASSESSMENT

soil - down

browse - down

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 29

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'92	'99	'92	'99	'92	'99
G	Agropyron cristatum	112	106	37	39	5.34	5.89
G	Agropyron intermedium	230	*169	66	59	13.05	2.52
G	Oryzopsis hymenoides	96	80	49	35	5.10	1.70
G	Sitanion hystrix	-	-	-	-	-	.00
G	Stipa comata	-	-	-	-	-	.00
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		438	355	152	133	23.50	10.13
Total for Grasses		438	355	152	133	23.50	10.13
F	Chenopodium album (a)	4	-	3	-	.01	-
F	Chaenactis douglasii	-	1	-	1	-	.03
F	Cryptantha spp.	-	3	-	2	-	.03
F	Descurainia pinnata (a)	5	2	4	1	.02	.00
F	Euphorbia fendleri	44	25	13	10	2.37	.52
F	Lesquerella spp.	14	25	7	13	.03	.09
F	Lupinus spp.	-	*4	-	3	-	.04
F	Machaeranthera canescens	2	1	2	1	.01	.03
F	Medicago sativa	7	*-	5	-	.22	-
F	Orobanche spp.	2	-	1	-	.00	-
F	Penstemon comarrhenus	43	*55	16	29	.82	1.06
F	Salsola pestifer (a)	10	-	4	-	.02	-
F	Senecio multilobatus	-	*14	-	9	-	.30
F	Sphaeralcea coccinea	-	1	-	1	-	.00
F	Streptanthus cordatus	1	-	1	-	.00	-
F	Townsendia spp.	-	3	-	2	-	.03
F	Tragopogon dubius	3	-	1	-	.00	-
Total for Annual Forbs		19	2	11	1	0.05	0.00
Total for Perennial Forbs		116	132	46	71	3.48	2.16
Total for Forbs		135	134	57	72	3.54	2.16

\* Indicates significant difference at % = 0.10

BROWSE TRENDS --  
Herd unit 14 , Study no: 29

Type	Species	Strip Frequency		Average Cover %	
		'92	'99	'92	'99
B	Amelanchier utahensis	2	2	1.36	1.77
B	Atriplex canescens	3	1	.03	-
B	Cercocarpus montanus	3	3	.03	1.00
B	Ephedra viridis	0	1	-	-
B	Gutierrezia sarothrae	80	87	3.77	6.47
B	Juniperus osteosperma	5	6	.18	.59
B	Mahonia fremontii	2	0	-	-
B	Mahonia repens	-	-	.15	-
B	Opuntia spp.	1	0	-	-
B	Pinus edulis	6	7	3.15	4.44
B	Purshia tridentata	0	0	-	-
B	Pseudotsuga menziesii	-	-	.03	-
B	Symphoricarpos oreophilus	2	1	.06	.38
Total for Browse		104	108	8.76	14.65

CANOPY COVER --  
Herd unit 14 , Study no: 29

Species	Percent Cover '99
Amelanchier utahensis	2
Pinus edulis	4

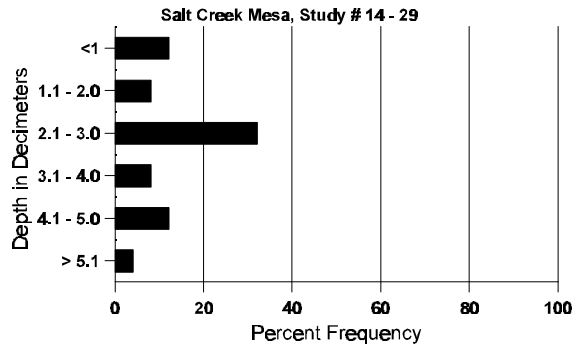
BASIC COVER --  
Herd unit 14 , Study no: 29

Cover Type	Nested Frequency		Average Cover %	
	'92	'99	'92	'99
Vegetation	362	347	32.15	25.35
Rock	37	84	8.50	2.85
Pavement	90	235	0	4.39
Litter	283	417	50.20	32.48
Bare Ground	265	408	22.32	39.33

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 29, Study Name: Salt Creek Mesa

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.5	62.6 (14.4)	7.5	56.0	21.4	22.6	2.7	5.3	92.8	0.6

# Stoniness Index



## PELLET GROUP FREQUENCY --

Herd unit 14 , Study no: 29

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'92	'99	
Rabbit	39	37	N/A
Elk	4	21	18 (44)
Deer	17	16	19 (47)
Cattle	8	10	23 (57)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 29

A Y G R E	Form Class (No. of Plants)	Vigor Class								Plants Per Acre	Average (inches) Ht. Cr.	Total						
		1	2	3	4	5	6	7	8				9					
<b>Amelanchier utahensis</b>																		
Y	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	92	-	-	1	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	-	-	-	1	-	-	-	1	-	2	-	-	-	40	98	125	2
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			50%			00%			+ 0%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)										'92	40	Dec:	-					
										'99	40		-					
<b>Atriplex canescens</b>																		
M	92	-	-	2	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	23	26	0
D	92	-	-	-	-	1	-	-	-	-	1	-	-	-	20		1	
	99	-	-	1	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			100%			00%			-67%							
'99		00%			100%			100%										
Total Plants/Acre (excluding Dead & Seedlings)										'92	60	Dec:	33%					
										'99	20		100%					

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Cercocarpus montanus</b>																		
Y	92	-	-	3	-	-	-	-	-	-	3	-	-	-	60		3	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	92	-	1	1	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	99	-	-	1	1	1	-	-	-	-	3	-	-	-	60	48	55	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		20%			80%			00%			-40%							
'99		33%			33%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	100	Dec:	-			
												'99	60		-			
<b>Ephedra viridis</b>																		
Y	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	0	Dec:	-			
												'99	20		-			
<b>Gutierrezia sarothrae</b>																		
S	92	16	-	-	1	1	-	-	-	-	18	-	-	-	360		18	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	92	101	-	-	-	-	-	-	-	-	101	-	-	-	2020		101	
	99	151	-	-	-	-	-	-	-	-	151	-	-	-	3020		151	
M	92	383	-	-	-	-	10	-	-	-	393	-	-	-	7860	-	-	393
	99	1029	-	-	-	-	-	-	-	-	1029	-	-	-	20580	6	9	1029
D	92	3	-	-	-	-	1	-	-	-	2	-	2	-	80		4	
	99	8	-	-	-	-	-	-	-	-	6	-	-	2	160		8	
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	200		10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			.40%			+58%							
'99		00%			00%			.16%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	9960	Dec:	1%			
												'99	23760		1%			
<b>Juniperus osteosperma</b>																		
Y	92	3	1	-	-	-	-	-	-	-	4	-	-	-	80		4	
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		20%			00%			00%			+17%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	100	Dec:	-			
												'99	120		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
<i>Mahonia fremontii</i>																		
M	92	-	1	1	-	-	-	-	-	-	1	1	-	-	40	-	-	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		50%			50%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	40	Dec:	-			
												'99	0		-			
<i>Opuntia spp.</i>																		
Y	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	20	Dec:	-			
												'99	0		-			
<i>Pinus edulis</i>																		
S	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	92	2	2	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	99	1	-	-	1	-	-	3	-	-	5	-	-	-	100	-	-	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		29%			00%			00%			+ 0%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	140	Dec:	-			
												'99	140		-			
<i>Purshia tridentata</i>																		
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	15	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	0	Dec:	-			
												'99	0		-			
<i>Symphoricarpos oreophilus</i>																		
M	92	-	-	2	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	39	82	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			100%			00%			-50%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	40	Dec:	-			
												'99	20		-			

Trend Study 14-30-99

Study site name: Milk Ranch Point .

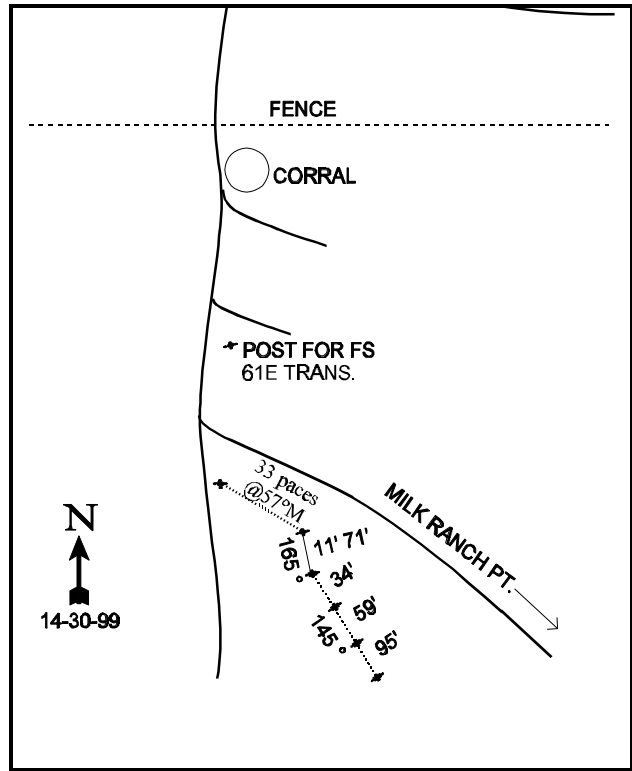
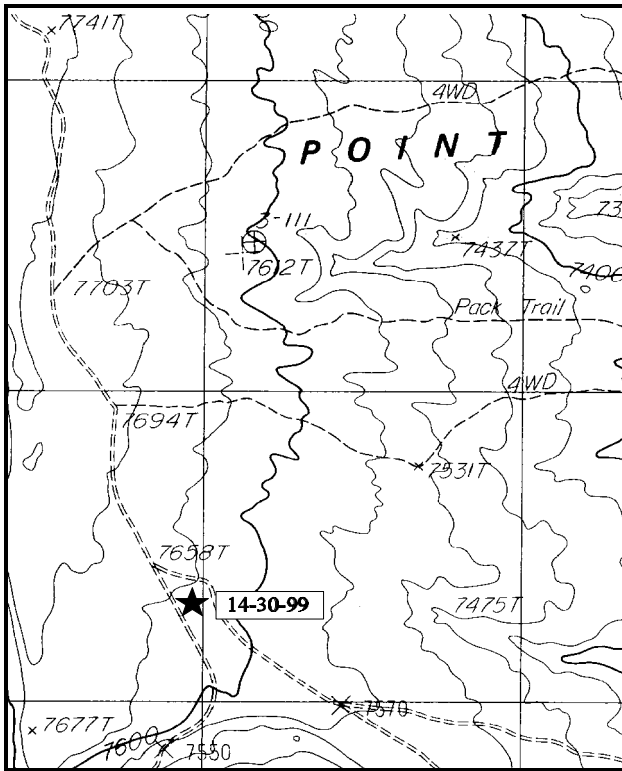
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 165°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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

UTM 4165242.883 N, 611010.909 E

## DISCUSSION

### Trend Study No. 14-30 (36-18)

The Milk Ranch Point site is a new study located on an essentially level bench called Milk Ranch Point. Elevation is 7,600 feet with an eastern aspect where the bench drops off to the south to low Pinyon-Juniper and sagebrush mesas above Arch Canyon. The site was originally plowed and seeded in 1953. The Forest Service and DWR have discussed the possibility of retreating the area with fire. There are many stock ponds along the bench which contained water in 1992 due to an exceptionally wet August. The major use for the area is 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 estimate 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). All pellet groups appeared to be from the previous season.

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. There is evidence that soil erosion has taken place, 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. 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 provides 45% of the browse cover however. Utilization was light to moderate in 1992, then categorized as moderate to heavy in 1999. Mountain big sagebrush has a stable population of about 1,500 plants/acre. It displayed light to moderate use in both 1994 and 1999. 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. By 1999, density remained relatively stable 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 estimate 84 pinyon and 20 juniper trees/acre. Average diameter of pinyon was 3.5 inches and that of juniper 4.5 inches.

The herbaceous understory is diverse, with 9 grass species and 32 forb species sampled in 1999. Seeded grasses, crested wheatgrass and intermediate wheatgrass, dominate the grass composition. They made up 61% of the grass cover in 1992 and 60% in 1999. The only other common grass is mutton bluegrass which currently provides 30% of the grass cover. Forbs are more abundant than grasses and provide twice as much cover. There are many useful and preferred species present including arrowleaf balsamroot, Indian paintbrush, winged eriogonum, redroot eriogonum, thicketleaf peavine, silvery lupine, and several species of penstemon. Currently, arrowleaf balsamroot, silvery lupine, Washington lupine, and rock goldenrod, dominate the forb composition by providing 72% of the forb cover.

### 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.

### 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 of grasses has remained stable. Nested frequency of crested wheatgrass increased significantly 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.

TREND ASSESSMENT

soil - down slightly

browse - down slightly, especially for serviceberry

herbaceous understory - down slightly

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 30

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'92	'99	'92	'99	'92	'99
G	Agropyron cristatum	59	*95	21	34	.43	1.48
G	Agropyron intermedium	173	*127	55	41	5.66	2.98
G	Bouteloua gracilis	4	4	2	1	.15	.03
G	Carex spp.	17	10	7	4	.39	.24
G	Koeleria cristata	7	5	2	1	.30	.03
G	Oryzopsis hymenoides	4	*19	3	9	.04	.29
G	Poa bulbosa	-	6	-	2	-	.01
G	Poa fendleriana	71	99	29	37	2.89	2.20
G	Poa pratensis	2	-	1	-	.03	-
G	Sitanion hystrix	9	-	2	-	.03	-
G	Stipa columbiana	3	4	1	1	.03	.15
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		349	369	123	130	9.97	7.43
Total for Grasses		349	369	123	130	9.97	7.43
F	Agoseris glauca	-	*7	-	5	-	.12
F	Androsace septentrionalis (a)	-	3	-	1	-	.00
F	Arabis spp.	-	2	-	1	-	.00
F	Balsamorhiza sagittata	46	*89	24	39	2.50	4.48
F	Castilleja linariaefolia	59	*38	26	19	.87	.46
F	Collinsia parviflora (a)	-	2	-	1	-	.00
F	Crepis acuminata	10	22	5	9	.12	.30



Type	Species	Nestled Frequency		Quadrat Frequency		Average Cover %	
		'92	'99	'92	'99	'92	'99
F	Cryptantha spp.	44	*-	11	-	1.86	-
F	Cymopterus spp.	-	*6	-	4	-	.05
F	Eriogonum alatum	102	*51	35	24	2.23	.48
F	Erigeron eatonii	18	9	9	5	.39	.07
F	Erigeron pumilus	16	14	8	6	.13	.05
F	Eriogonum racemosum	43	30	18	15	.56	.19
F	Euphorbia spp.	-	2	-	1	-	.00
F	Gilia aggregata	5	-	2	-	.01	-
F	Haplopappus acaulis	-	1	-	1	-	.00
F	Hymenoxys acaulis	95	*37	41	18	.90	.45
F	Ipomopsis aggregata	-	6	-	2	-	.18
F	Lathyrus lanszwertii	7	1	3	1	1.00	.03
F	Lesquerella spp.	98	63	45	30	.54	.30
F	Lupinus argenteus	79	96	33	40	2.85	2.36
F	Lupinus polyphyllus	6	*41	2	16	.03	1.72
F	Microsteris gracilis (a)	-	1	-	1	-	.00
F	Penstemon lentus	68	*30	29	14	.37	.28
F	Penstemon pachyphyllus	-	*27	-	10	-	1.10
F	Petradoria pumila	58	*35	21	15	2.45	1.73
F	Penstemon strictus	6	14	4	6	.04	.05
F	Phlox longifolia	77	72	32	28	.43	.23
F	Polygonum douglasii (a)	60	*1	30	1	.22	.00
F	Senecio integerrimus	-	3	-	1	-	.03
F	Senecio neomexicanus	25	16	11	9	.10	.07
F	Taraxacum officinale	-	4	-	2	-	.03
F	Unknown forb-perennial	3	-	2	-	.01	-
F	Vicia americana	-	2	-	1	-	.00
F	Zigadenus paniculatus	-	2	-	1	-	.00
Total for Annual Forbs		60	7	30	4	0.22	0.01
Total for Perennial Forbs		865	720	361	323	17.46	14.89
Total for Forbs		925	727	391	327	17.69	14.91

\* Indicates significant difference at % = 0.10

BROWSE TRENDS --  
Herd unit 14 , Study no: 30

Type	Species	Strip Frequency		Average Cover %	
		'92	'99	'92	'99
B	Amelanchier utahensis	41	36	16.15	11.07
B	Artemisia tridentata vaseyana	48	47	4.74	4.58
B	Chrysothamnus depressus	40	28	.28	.28
B	Gutierrezia sarothrae	44	20	1.19	.10
B	Juniperus osteosperma	1	0	.63	.15
B	Pinus edulis	6	5	2.55	2.09
B	Purshia tridentata	5	4	.41	.03
B	Quercus gambelii	19	16	6.48	6.48
B	Symphoricarpos oreophilus	2	0	-	-
Total for Browse		206	156	32.46	24.80

CANOPY COVER --  
Herd unit 14 , Study no: 30

Species	Percent Cover '99
Amelanchier utahensis	1
Pinus edulis	4
Quercus gambelii	6

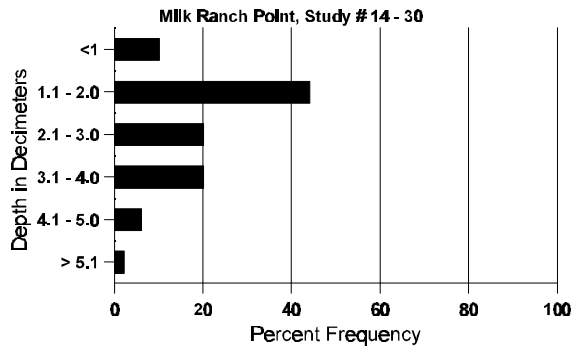
BASIC COVER --  
Herd unit 14 , Study no: 30

Cover Type	Nested Frequency		Average Cover %	
	'92	'99	'92	'99
Vegetation	389	379	47.50	44.46
Rock	30	54	2.67	.96
Pavement	30	91	0	1.31
Litter	305	465	52.97	50.88
Cryptogams	112	111	6.70	3.27
Bare Ground	219	277	18.52	26.10

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 30, Study Name: Milk Ranch Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.3	61.4 (16.6)	6.7	58.0	23.4	18.6	1.5	3.4	108.8	0.6

# Stoniness Index



## PELLET GROUP FREQUENCY --

Herd unit 14 , Study no: 30

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'92	'99	
Rabbit	29	44	N/A
Elk	2	-	1 (2)
Deer	5	12	11 (27)
Cattle	-	1	6 (15)

## BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 30

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4	5	6	7	8	9							
Amelanchier utahensis																	
S	'92	31	1	-	25	-	-	104	-	-	161	-	-	-	3220		161
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	'92	15	30	-	19	-	-	66	-	-	113	13	4	-	2600		130
	'99	2	2	1	3	-	-	-	-	-	8	-	-	-	160		8
M	'92	18	23	9	2	-	1	5	-	-	37	18	3	-	1160	-	58
	'99	7	10	11	4	3	2	1	-	2	39	1	-	-	800	53	40
D	'92	1	1	-	-	-	-	-	-	-	-	1	1	-	40		2
	'99	-	-	-	-	-	1	-	-	-	-	-	-	1	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		28%			05%			04%			-74%						
'99		31%			35%			02%									
Total Plants/Acre (excluding Dead & Seedlings)											'92	3800	Dec:	1%			
											'99	980		2%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																		
S	92	4	-	-	-	-	-	1	-	-	5	-	-	-	100		5	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	92	17	6	-	5	-	-	1	-	-	29	-	-	-	580		29	
	99	3	5	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	92	13	9	4	2	1	-	3	-	-	31	-	1	-	640	-	32	
	99	38	11	3	-	-	-	-	-	-	52	-	-	-	1040	18	52	
D	92	7	8	-	-	-	-	-	-	-	11	-	-	4	300		15	
	99	14	-	-	1	-	-	-	-	-	5	-	-	10	300		15	
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	180		9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		32%			05%			07%			- 1%							
'99		21%			04%			13%										
Total Plants/Acre (excluding Dead & Seedlings)											'92	1520	Dec:	20%				
											'99	1500		20%				
<i>Chrysothamnus depressus</i>																		
S	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	92	28	5	1	8	-	-	-	-	-	42	-	-	-	840		42	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	92	16	10	2	7	-	-	-	-	-	33	-	2	-	700	-	35	
	99	35	3	4	2	-	-	-	-	-	44	-	-	-	880	3	44	
D	92	1	2	-	-	-	-	-	-	-	2	-	-	1	60		3	
	99	2	-	-	-	-	-	-	-	-	-	-	-	2	40		2	
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		21%			04%			04%			-43%							
'99		07%			09%			04%										
Total Plants/Acre (excluding Dead & Seedlings)											'92	1600	Dec:	4%				
											'99	920		4%				
<i>Gutierrezia sarothrae</i>																		
S	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	92	104	-	-	2	-	-	-	-	-	105	-	1	-	2120	-	106	
	99	34	-	-	-	-	-	-	-	-	34	-	-	-	680	6	34	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			.92%			-66%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'92	2160	Dec:	-				
											'99	740		-				

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<b>Juniperus osteosperma</b>																	
Y	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	20	Dec:	-		
												'99	0		-		
<b>Pinus edulis</b>																	
S	92	1	-	-	3	-	-	3	-	-	7	-	-	-	140		7
	99	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1
Y	92	3	-	-	-	-	-	1	-	-	4	-	-	-	80		4
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
M	92	1	-	-	-	-	-	-	1	-	2	-	-	-	40	-	2
	99	-	-	-	-	-	-	1	-	1	2	-	-	-	40	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		00%			00%			00%			-17%						
'99		00%			20%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	120	Dec:	-		
												'99	100		-		
<b>Purshia tridentata</b>																	
Y	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	92	-	1	2	-	-	-	-	-	-	3	-	-	-	60	-	3
	99	1	1	1	-	-	-	-	-	-	3	-	-	-	60	13	33
D	92	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		40%			60%			00%			-20%						
'99		25%			25%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	100	Dec:	20%		
												'99	80		0%		
<b>Quercus gambelii</b>																	
S	92	2	-	-	1	-	-	16	-	-	18	1	-	-	380		19
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
Y	92	2	-	-	17	-	-	15	-	-	29	5	-	-	680		34
	99	20	-	-	10	-	-	-	-	-	30	-	-	-	600		30
M	92	16	15	-	1	6	-	9	-	-	42	5	-	-	940	-	47
	99	34	-	-	-	-	-	-	-	-	34	-	-	-	680	47	39
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		26%			00%			00%			-21%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	1620	Dec:	-		
												'99	1280		-		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Symphoricarpos oreophilus																	
Y	92	-	-	-	-	-	-	7	-	-	7	-	-	-	140		7
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
D	92	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		00%			00%			13%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	160	Dec:	13%		
												'99	0		0%		

Trend Study 14-31-99

Study site name: Chippean Ridge .

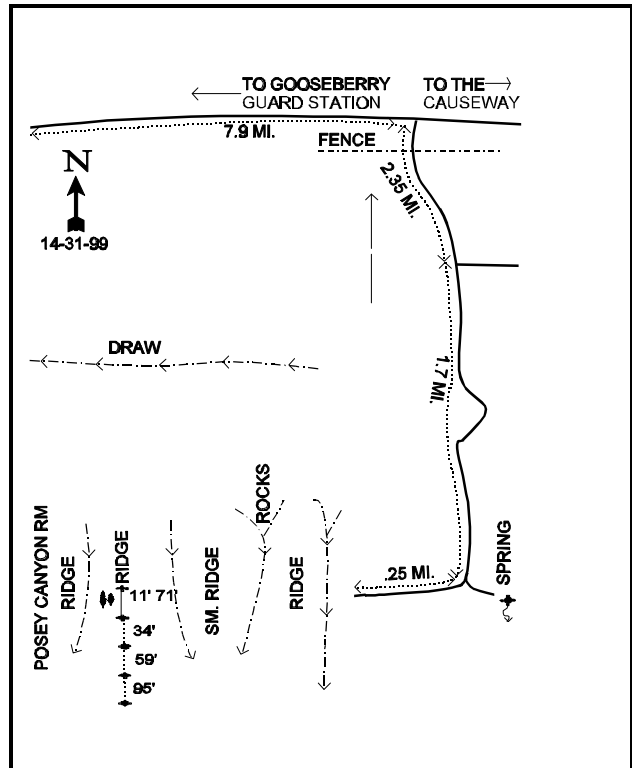
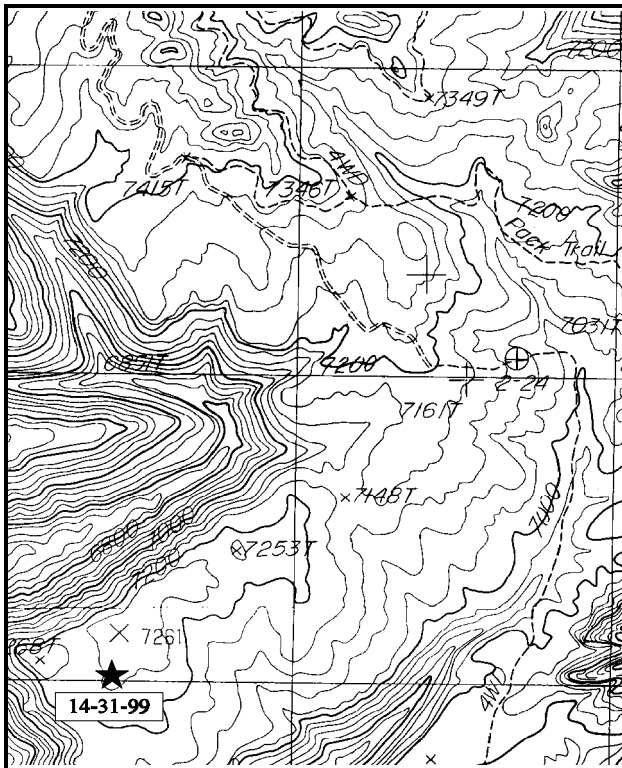
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 181°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) 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 PIPO at a bearing of 45° T. The baseline is marked with half high steel fence posts.



Map Name: Chippean Rocks

Diagrammatic Sketch

Township 34S , Range 20E , Section 36

UTM 4182118.618 N , 616540.741 E

## DISCUSSION

### Trend Study No. 14-31(36-19)

Chippean Ridge is a new study site that was initiated because of elk use on 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 estimate 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). Both elk and deer pellet groups were common, but not directly on the vegetative transects. Pellet group data from 1999 estimate 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). About 80% of the elk pellet groups appear to be from the previous fall, however some pellet groups were recent. All cattle pats were from the previous year. The area is currently closed to cattle grazing. Rabbit sign was abundant.

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 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 in 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. On the lower south end of the site, there is a fairly large active gully.

The shrub component is quite diverse with 11 species encountered on the sampling belts in 1992 and 13 in 1999. Browse is dominated by mature serviceberry, mountain big sagebrush, and true mountain mahogany. These species show moderate to heavy browsing and are in good health. Many of the serviceberry plants are tall and partly unavailable for use. Serviceberry provided 39% of the browse cover in 1992 and 31% by 1999. Density declined in 1999 due to a reduction in the number of young plants sampled.

The herbaceous understory is diverse with seeded crested wheatgrass and smooth brome dominating the site. They currently ('99) account for 47% of the grass cover. Bulbous bluegrass is also common and it provided 40% of the grass cover in 1992 and 38% in 1999. Forbs are diverse and several species are relatively common. However, all forbs combined produced only 3% cover in 1992 and 5% in 1999.

### 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.

### 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. The only significant change in the grass composition is a decline in the nested frequency of needle-and-thread. 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.

TREND ASSESSMENT

soil - slightly down

browse - stable

herbaceous understory - stable for grasses and up slightly for forbs, up slightly overall

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 31

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'92	'99	'92	'99	'92	'99
G	Agropyron cristatum	72	64	23	24	4.77	2.73
G	Bouteloua gracilis	7	13	2	3	.30	.45
G	Bromus inermis	143	132	49	53	2.80	3.42
G	Bromus tectorum (a)	2	-	1	-	.00	-
G	Carex spp.	4	1	3	1	.33	.03
G	Oryzopsis hymenoides	-	8	-	2	-	.15
G	Poa bulbosa	165	175	50	49	6.51	5.01
G	Poa fendleriana	13	8	5	2	.27	.06
G	Sitanion hystrix	3	-	1	-	.00	-
G	Stipa comata	74	61	35	32	1.29	1.23
G	Vulpia octoflora (a)	-	6	-	2	-	.01
Total for Annual Grasses		2	6	1	2	0.00	0.00
Total for Perennial Grasses		481	462	168	166	16.29	13.09
Total for Grasses		483	468	169	168	16.29	13.10
F	Castilleja linariaefolia	6	4	4	3	.04	.04
F	Calochortus nuttallii	-	3	-	1	-	.00
F	Chaenactis douglasii	67	*28	27	14	1.34	.34
F	Cirsium spp.	-	1	-	1	-	.03
F	Comandra pallida	35	*64	16	28	.14	1.09
F	Collinsia parviflora (a)	-	4	-	1	-	.03
F	Crepis acuminata	3	6	1	3	.00	.01
F	Epilobium brachycarpum (a)	-	3	-	2	-	.18

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'92	'99	'92	'99	'92	'99
F	Eriogonum racemosum	52	57	26	25	.84	.57
F	Eriogonum umbellatum	5	16	2	5	.03	.17
F	Heterotheca villosa	-	1	-	1	-	.03
F	Hymenoxys acaulis	9	26	4	13	.10	.19
F	Lesquerella rectipes	67	80	33	34	.26	.25
F	Lomatium spp.	3	*34	2	14	.06	.58
F	Lupinus sericeus	3	12	1	4	.03	.31
F	Machaeranthera canescens	7	*21	3	9	.01	.04
F	Penstemon comarrhenus	17	8	7	3	.06	.04
F	Phlox longifolia	26	*53	11	24	.10	.14
F	Polygonum douglasii (a)	38	*5	18	2	.11	.01
F	Senecio multilobatus	14	*60	8	27	.12	.75
F	Sphaeralcea coccinea	17	*1	8	1	.06	.00
F	Zigadenus paniculatus	-	3	-	2	.00	.03
Total for Annual Forbs		38	12	18	5	0.11	0.21
Total for Perennial Forbs		331	478	153	212	3.25	4.66
Total for Forbs		369	490	171	217	3.36	4.88

\* Indicates significant difference at % = 0.10

#### BROWSE TRENDS --

Herd unit 14 , Study no: 31

Type	Species	Strip Frequency		Average Cover %	
		'92	'99	'92	'99
B	Amelanchier utahensis	25	24	11.52	8.10
B	Artemisia nova	0	3	-	.00
B	Arctostaphylos patula	2	4	2.96	4.88
B	Artemisia tridentata vaseyana	55	57	5.14	4.48
B	Cercocarpus montanus	11	14	4.82	4.77
B	Chrysothamnus depressus	14	8	.69	.23
B	Coryphantha vivipara arizonica	0	1	.00	.00
B	Gutierrezia sarothrae	51	21	.98	.16
B	Juniperus osteosperma	1	1	.03	.15
B	Opuntia spp.	14	4	.06	.01
B	Pediocactus simpsonii	0	1	-	-
B	Pinus edulis	4	3	3.40	2.97
B	Purshia tridentata	1	0	.15	.00
B	Quercus gambelii	0	0	-	-
B	Symphoricarpos oreophilus	5	2	.15	.15
Total for Browse		183	143	29.92	25.94

CANOPY COVER --  
Herd unit 14 , Study no: 31

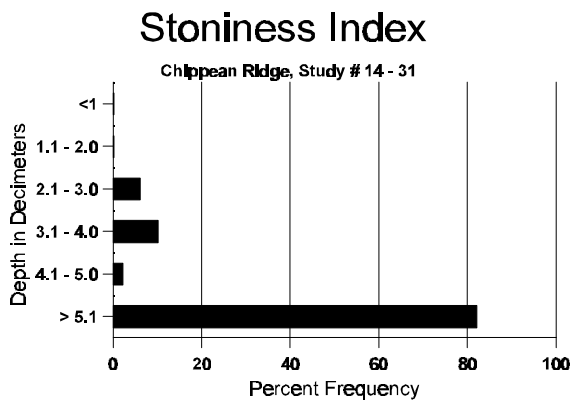
Species	Percent Cover '99
Amelanchier utahensis	2
Cercocarpus montanus	3
Juniperus osteosperma	.80
Pinus edulis	5
Quercus gambelii	1

BASIC COVER --  
Herd unit 14 , Study no: 31

Cover Type	Nested Frequency		Average Cover %	
	'92	'99	'92	'99
Vegetation	382	381	41.22	40.61
Rock	10	14	.49	.26
Pavement	-	27	0	.12
Litter	269	452	43.40	40.94
Cryptogams	136	147	6.87	8.56
Bare Ground	260	314	22.28	29.17

SOIL ANALYSIS DATA --  
Herd Unit 14, Study # 31, Study Name: Chippean Ridge

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
24.7	61.6 (17.8)	7.2	57.6	17.8	24.6	1.2	4.1	102.4	0.7



PELLET GROUP FREQUENCY --

Herd unit 14 , Study no: 31

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha) '99
	'92	'99	
Rabbit	15	34	N/A
Elk	1	3	24 (59)
Deer	10	6	7 (17)
Cattle	-	2	4 (10)

BROWSE CHARACTERISTICS --

Herd unit 14 , Study no: 31

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<b>Amelanchier utahensis</b>																		
S	92	4	-	-	-	-	-	13	-	-	17	-	-	-	340			17
	99	6	-	-	1	-	-	2	-	-	9	-	-	-	180			9
Y	92	17	4	1	3	-	-	10	-	-	35	-	-	-	700			35
	99	4	1	-	4	-	-	-	-	-	9	-	-	-	180			9
M	92	5	20	2	-	2	-	-	-	-	29	-	-	-	580	-	-	29
	99	3	1	6	-	-	13	1	1	-	25	-	-	-	500	64	87	25
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		41%			05%			00%			-47%							
'99		06%			56%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	1280	Dec:	-			
												'99	680		-			
<b>Artemisia nova</b>																		
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200	7	11	10
D	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	0	Dec:	0%			
												'99	240		17%			
<b>Arctostaphylos patula</b>																		
Y	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	44	143	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%			+50%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	40	Dec:	-			
												'99	80		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Artemisia tridentata vaseyana</i>																	
S	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
Y	92	16	60	8	1	-	-	5	-	-	90	-	-	-	1800		90
	99	8	2	-	1	-	-	-	-	-	11	-	-	-	220		11
M	92	10	26	21	3	-	-	6	-	-	64	1	1	-	1320	-	-
	99	39	15	10	3	3	2	-	-	-	72	-	-	-	1440	20	30
D	92	1	5	2	-	-	-	1	-	-	2	-	4	3	180		9
	99	10	3	2	2	-	-	-	-	-	11	-	-	6	340		17
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		55%			19%			05%			-39%						
'99		23%			14%			06%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	3300	Dec:	5%		
												'99	2000		17%		
<i>Cercocarpus montanus</i>																	
S	92	4	-	-	4	-	-	1	-	-	9	-	-	-	180		9
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	92	3	1	-	-	-	-	-	-	-	4	-	-	-	80		4
	99	2	1	-	1	-	-	-	-	-	4	-	-	-	80		4
M	92	-	5	1	1	1	-	-	-	-	8	-	-	-	160	-	-
	99	2	2	-	-	4	1	1	2	-	12	-	-	-	240	66	73
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		58%			08%			00%			+25%						
'99		44%			06%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	240	Dec:	-		
												'99	320		-		
<i>Chrysothamnus depressus</i>																	
S	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	92	6	5	-	1	-	-	-	-	-	12	-	-	-	240		12
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	92	19	2	-	-	-	-	1	-	-	22	-	-	-	440	-	-
	99	14	-	2	1	-	-	-	-	-	17	-	-	-	340	7	15
D	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	3	-	-	-	-	-	-	-	-	-	-	-	3	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		21%			00%			00%			-38%						
'99		00%			10%			14%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	680	Dec:	0%		
												'99	420		14%		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Coryphantha vivipara arizonica</i>																	
M	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	-	-	-	20	2	3	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	0	Dec:	-		
												'99	20		-		
<i>Gutierrezia sarothrae</i>																	
S	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	12	-	-	-	-	-	-	-	-	-	-	-	240			12
Y	92	7	-	-	-	-	-	-	-	-	-	-	-	140			7
	99	29	-	-	2	-	-	-	-	-	-	-	-	620			31
M	92	145	-	-	2	-	-	1	-	-	-	-	-	2960	-	-	148
	99	17	2	-	-	-	-	-	-	-	-	-	-	380	5	5	19
D	92	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		00%			00%			.64%			-68%						
'99		04%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	3120	Dec:	1%		
												'99	1000		0%		
<i>Juniperus osteosperma</i>																	
S	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	-	-	-	40			2
Y	92	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		00%			00%			00%			+ 0%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	20	Dec:	-		
												'99	20		-		
<i>Opuntia spp.</i>																	
Y	92	10	-	-	-	-	-	1	-	-	-	-	-	220			11
	99	2	-	-	-	-	-	-	-	-	-	-	-	40			2
M	92	7	-	-	1	-	-	-	-	-	-	-	-	160	-	-	8
	99	3	-	-	1	-	-	-	-	-	-	-	-	80	3	7	4
D	92	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		00%			00%			05%			-65%						
'99		00%			00%			29%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	400	Dec:	5%		
												'99	140		14%		

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Pediocactus simpsonii</i>																		
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	-	-	-	20	3	5	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	0	Dec:	-			
												'99	20		-			
<i>Pinus edulis</i>																		
S	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	99	1	-	-	1	-	-	-	-	-	-	-	-	40			2	
Y	92	-	-	-	-	-	1	-	-	-	-	-	-	20			1	
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1	
M	92	3	-	-	-	-	-	-	-	-	-	-	-	60	-	-	3	
	99	1	-	-	-	-	-	-	1	-	-	-	-	40	-	-	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%			-25%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	80	Dec:	-			
												'99	60		-			
<i>Purshia tridentata</i>																		
Y	92	-	1	-	-	-	-	-	-	-	-	-	-	20			1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		100%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	20	Dec:	-			
												'99	0		-			
<i>Quercus gambelii</i>																		
S	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1	
M	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	28	25	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	0	Dec:	-			
												'99	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Symphoricarpos oreophilus																		
S	92	1	-	-	-	-	-	1	-	-	2	-	-	-	40		2	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	92	3	1	-	-	-	-	1	-	-	5	-	-	-	100		5	
	99	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
M	92	1	-	-	-	-	-	2	-	-	3	-	-	-	60	-	3	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	31	47	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		13%			00%			00%			-75%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	160	Dec:	-			
												'99	40		-			



Trend Study 14-32-99

Study site name: Lower Deer Flat .

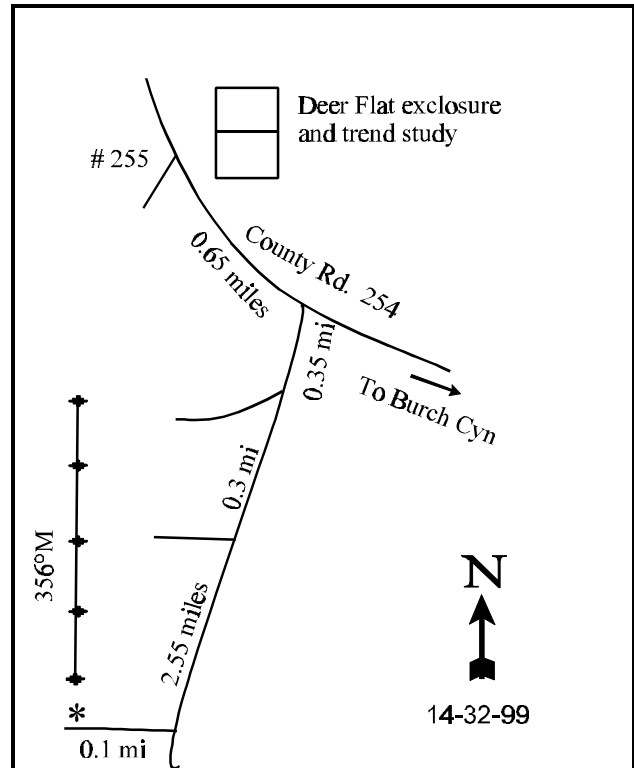
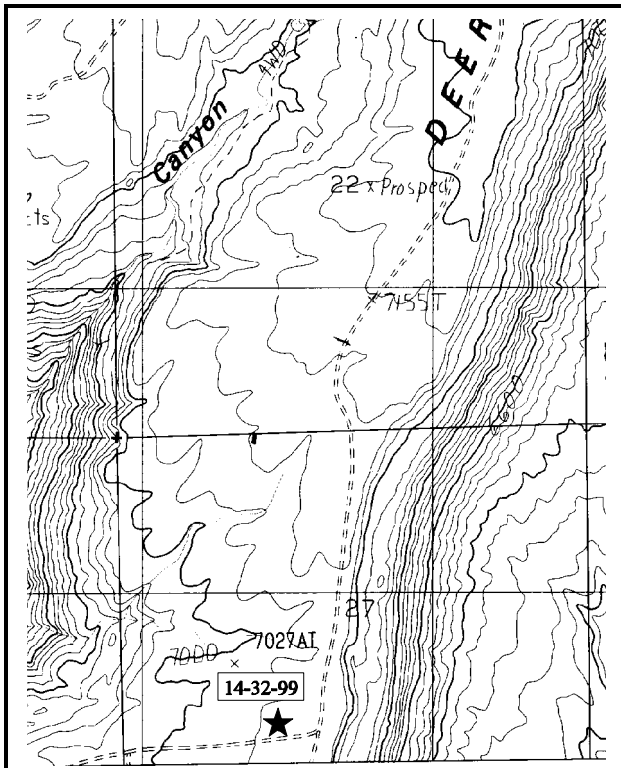
Range type: Sagebrush-Grass.

Compass bearing: frequency baseline 356°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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 enclosure 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 faint 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

UTM 4164541.475 N , 585401.503 E

## DISCUSSION

### Trend Study No. 14-32

Lower Deer Flat is a new trend study site established in 1994 to replace 14-17, Deer Flat. Since the sagebrush at the original Deer Flat site was treated and seeded, deer no longer utilize the area in the winter in large 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 new study area has a 3% slope with a southwest aspect and an elevation of about 7,200 feet. This area is administered by the BLM and grazed on the same schedule as the previous deer flat study site (14-17). 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. There are 400 cattle currently allotted to the unit. Pellet group data from 1999 estimate 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). Deer pellet groups were primarily from the previous winter ('98). Cattle are currently in the area.

Soils here are similar to the original Deer Flat study site. It 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 limit normal plant growth and development. Average soil temperature is very high 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 and forbs. 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. There is quite a bit of bare ground exposed, but erosion is minimal due to the abundant herbaceous vegetation cover and chaining debris.

The site supports a dense stand of heavily hedged Wyoming big sagebrush. It provided 92% of the browse cover in 1994 with an estimated density of 7,140 plants/acre. Utilization was mostly light but vigor was poor on 50% of the plants sampled in 1994. Percent decadence was low at just 17%, but 40% of the decadent plants sampled (500 plants/acre) were classified as dying. Density declined to 5,160 plants/acre by 1999. Use is moderate to heavy but vigor improved and percent decadence still low at 19%. The heavy use with drought, has caused low annual growth and poor seed production and many plants displayed a clubbed growth form. No seedlings were encountered in 1999, however young plants are abundant and account for 22% of the population. There are also a few heavily utilized fourwing saltbush scattered on the site.

Pinyon and juniper trees are found at a relatively low density considering the age of the chaining. Point quarter data from 1999 estimate 32 pinyon and 45 juniper trees/acre with an average diameter of 3 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.

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 now provides 88% of the grass cover and 83% of the herbaceous cover. There are several other perennial grasses present including, Indian ricegrass, bottlebrush squirreltail, and needle-and-thread grass. Annual cheatgrass is also present in low densities, but it has increased significantly in nested frequency since 1994. Forbs are rare and produce only about 1% total 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 500 of the 1,240 decadent plants/acre 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.

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. Annual 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.

TREND ASSESSMENT

soil - stable

browse - down slightly

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 14 , Study no: 32

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'94	'99	'94	'99	'94	'99
G	Agropyron cristatum	198	*291	65	89	9.43	12.62
G	Agropyron intermedium	2	-	1	-	.00	-
G	Bouteloua gracilis	-	2	-	2	-	.01
G	Bromus tectorum (a)	35	*103	15	34	.24	.81
G	Oryzopsis hymenoides	58	*23	26	9	.81	.19
G	Poa fendleriana	12	*-	6	-	.34	-
G	Sitanion hystrix	39	17	16	11	.71	.26
G	Sporobolus cryptandrus	3	-	1	-	.00	-
G	Stipa comata	94	*41	33	17	1.44	.40
Total for Annual Grasses		35	103	15	34	0.24	0.81
Total for Perennial Grasses		406	374	148	128	12.76	13.49
Total for Grasses		441	477	163	162	13.00	14.30
F	Astragalus convallarius	18	15	12	8	.67	.43
F	Crepis acuminata	3	6	1	4	.00	.02
F	Descurainia pinnata (a)	-	5	-	1	-	.00

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'94	'99	'94	'99	'94	'99
F	Erigeron spp.	9	*-	3	-	.01	-
F	Lappula occidentalis (a)	4	3	2	1	.01	.00
F	Machaeranthera spp	2	-	1	-	.00	-
F	Microsteris gracilis (a)	-	1	-	1	-	.00
F	Orthocarpus spp. (a)	15	*-	9	-	.04	-
F	Phlox longifolia	91	105	33	40	.19	.32
F	Sphaeralcea coccinea	29	18	12	7	.08	.08
Total for Annual Forbs		19	9	11	3	0.05	0.01
Total for Perennial Forbs		152	144	62	59	0.97	0.86
Total for Forbs		171	153	73	62	1.03	0.87

\* Indicates significant difference at % = 0.10

#### BROWSE TRENDS --

Herd unit 14 , Study no: 32

Type	Species	Strip Frequency		Average Cover %	
		'94	'99	'94	'99
B	Artemisia tridentata wyomingensis	87	80	12.77	11.80
B	Atriplex canescens	0	1	-	.38
B	Chrysothamnus nauseosus	0	0	-	-
B	Chrysothamnus viscidiflorus	1	3	-	.15
B	Juniperus osteosperma	0	3	1.01	1.23
B	Opuntia spp.	1	0	.00	-
B	Pinus edulis	-	-	.15	-
Total for Browse		89	87	13.94	13.57

#### CANOPY COVER --

Herd unit 14 , Study no: 32

Species	Percent Cover '99
Juniperus osteosperma	.20

#### BASIC COVER --

Herd unit 14 , Study no: 32

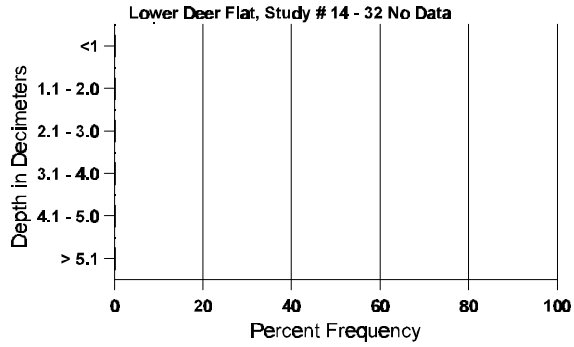
Cover Type	Nested Frequency		Average Cover %	
	'94	'99	'94	'99
Vegetation	359	369	28.21	27.89
Rock	3	-	.15	0
Litter	496	465	41.73	43.37
Cryptogams	15	34	.22	.49
Bare Ground	360	372	30.60	36.52

SOIL ANALYSIS DATA --

Herd Unit 14, Study # 32, Study Name: Lower Deer Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.4	74.2 (12.7)	7.1	46.0	29.4	24.6	1.4	4.5	51.2	0.6

### Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 14 , Study no: 32

Type	Quadrat Frequency	
	'94	'99
Rabbit	30	50
Elk	1	1
Deer	59	61
Cattle	1	4

Pellet Transect Days Use/Acre (ha) '99
N/A
1 (2)
121 (299)
40 (99)

BROWSE CHARACTERISTICS --  
Herd unit 14 , Study no: 32

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																		
S	94	53	-	-	-	-	-	-	-	-	30	-	19	4	1060			53
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	94	48	-	-	-	-	-	-	-	-	14	-	34	-	960			48
	99	19	30	7	-	-	-	1	-	-	56	-	1	-	1140			57
M	94	229	7	3	8	-	-	-	-	-	138	-	108	1	4940	37	50	247
	99	18	66	53	-	1	15	-	-	-	137	4	12	-	3060	20	28	153
D	94	56	6	-	-	-	-	-	-	-	25	-	12	25	1240			62
	99	4	6	27	-	4	7	-	-	-	36	-	6	6	960			48
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		04%			.84%			50%			-28%							
'99		41%			42%			10%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	7140	Dec:	17%			
												'99	5160		19%			
<i>Atriplex canescens</i>																		
D	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	1	-	-	-	-	-	-	1	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			100%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	0%			
												'99	20		100%			
<i>Chrysothamnus nauseosus</i>																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	142	9	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-			
												'99	0		-			
<i>Chrysothamnus viscidiflorus</i>																		
M	94	1	-	-	-	-	-	-	-	-	-	1	-	-	20	8	13	1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	18	1
D	94	1	-	-	-	-	-	-	-	-	-	-	1	20				1
	99	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			50%			+33%							
'99		00%			00%			33%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	40	Dec:	50%			
												'99	60		67%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Juniperus osteosperma																	
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	2	-	-	-	-	-	-	-	-	-	-	-	40		2	
M	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	1	-	-	-	-	-	-	-	-	-	-	-	20	-	1	
X	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-		
												'99	60		-		
Opuntia spp.																	
M	94	1	-	-	-	-	-	-	-	-	-	-	-	20	4	15	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	5	13	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'94	20	Dec:	-		
												'99	0		-		

## SUMMARY

### WILDLIFE MANAGEMENT UNIT 14 (35 & 36) - 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. The Abajo portion of the unit currently consists of 11 trend study sites, 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, all show stable or improving soil trends. Browse trends are stable to slightly improving on 3 of the sites, but down at Alkali Point and Hart's Draw. Both sites display moderate to heavy use on sagebrush, poor reproduction, and extremely high percent decadence at Alkali Point. All of these winter range sites display downward herbaceous trends except for Shingle Mill, and all showed a dramatic and significant increase in cheatgrass in their herbaceous understories. The amount of cheatgrass varies between sites from a high of 92% of the grass cover consisting of cheatgrass at Alkali Point, to a low of 33% at Hart's Point. The average for all of these sites is high however at 57% . Shingle Mill, which had an improving herbaceous trend, is higher in elevation than the other winter range sites. It has a diverse herbaceous understory which contains no cheatgrass. However, two poisonous species, lupine and weedy milkvetch, dominate the herbaceous understory by providing 42% of the total grass and forb cover. Of the sites with increasing cheatgrass, all had relatively high soil temperatures. The average temperature for the 4 sites was 66.8°F. High soil temperatures dry out the soil profile earlier in the season and give winter annuals like cheatgrass a competitive advantage against cool season grasses and forbs.

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. Soil trends for all of these sites appear to be stable. Browse trends are stable or improving on all sites except for Hart's Draw Reservoir which displays a slightly down trend. Herbaceous trends are all stable except for Brushy Basin which has a slightly down trend.

Nineteen 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, North Cottonwood 14-28, and Chippean Ridge 14-31. Of these winter range sites all displayed stable or slightly improving soil trends except for Salt Creek Mesa and Chippean Ridge which has slightly downward trends. In addition, trends were stable but condition was poor at Harmony Flat, Lower Lost Park, and North Cottonwood. Browse trends were down for 8 of the 11 sites, stable on 2 and up on only 1, Texas Flat, which is recovering from a herbicide treatment. Most of the downward trends are due to heavy use, poor reproduction, extended drought (especially summer drought), and high percent decadence on sagebrush. This is especially true for South Plain, and Ruin Park which are found in Beef Basin. Herbaceous understory trends are down on 7 of the 11 sites. Three sites, Lower Deer Flat, North Cottonwood, Harmony Flat have stable herbaceous trends, but the herbaceous understories at North Cottonwood and Harmony Flat are in poor condition. The only site to display a slightly improving herbaceous understory trend was Chippean Ridge. Of the 7 sites with a declining herbaceous trend, 4 show a dramatic and significant increase in cheatgrass, and at Lower Lost Park, also a dramatic increase in sixweeks fescue. These annual grasses provide an average of 72% of the grass cover on these four sites. Average soil temperature of these sites is high at 74°F.

Transitional ranges are sampled with 3 trend study sites, Deer Flat 14-17, Mormon Pasture Point 14-27, and Milk Ranch Point 14-30. Trends at Deer Flat are up to slightly up in all categories while Milk Ranch Point displays slightly downward trends in all categories. Mormon Pasture Point shows a downward soil trend, a slightly improving browse trend and a stable herbaceous trend.

The 5 summer range trend studies include, Kigalia Point 14-18, Wooden Shoe 14-19, Gooseberry 14-20, North Long Point 14-21, and The Wilderness 14-26. Soil trends on these sites are stable or up slightly on 3 of the 5 sites but down slightly at Kigalia Point and The Wilderness. Kigalia Points' downward trend is due to reduced protective ground cover because of a prescribed ground fire which occurred sometime during the fall of 1998. Browse trends are down or slightly down for all sites except Wooden Shoe which displays a stable trend. Browse on most of these sites is not the critical component however. The more important herbaceous



understory trends are down or slightly down at Kigalia Point, Wooden Shoe, and The Wilderness but stable at Gooseberry and North Long Point.

TREND SUMMARY

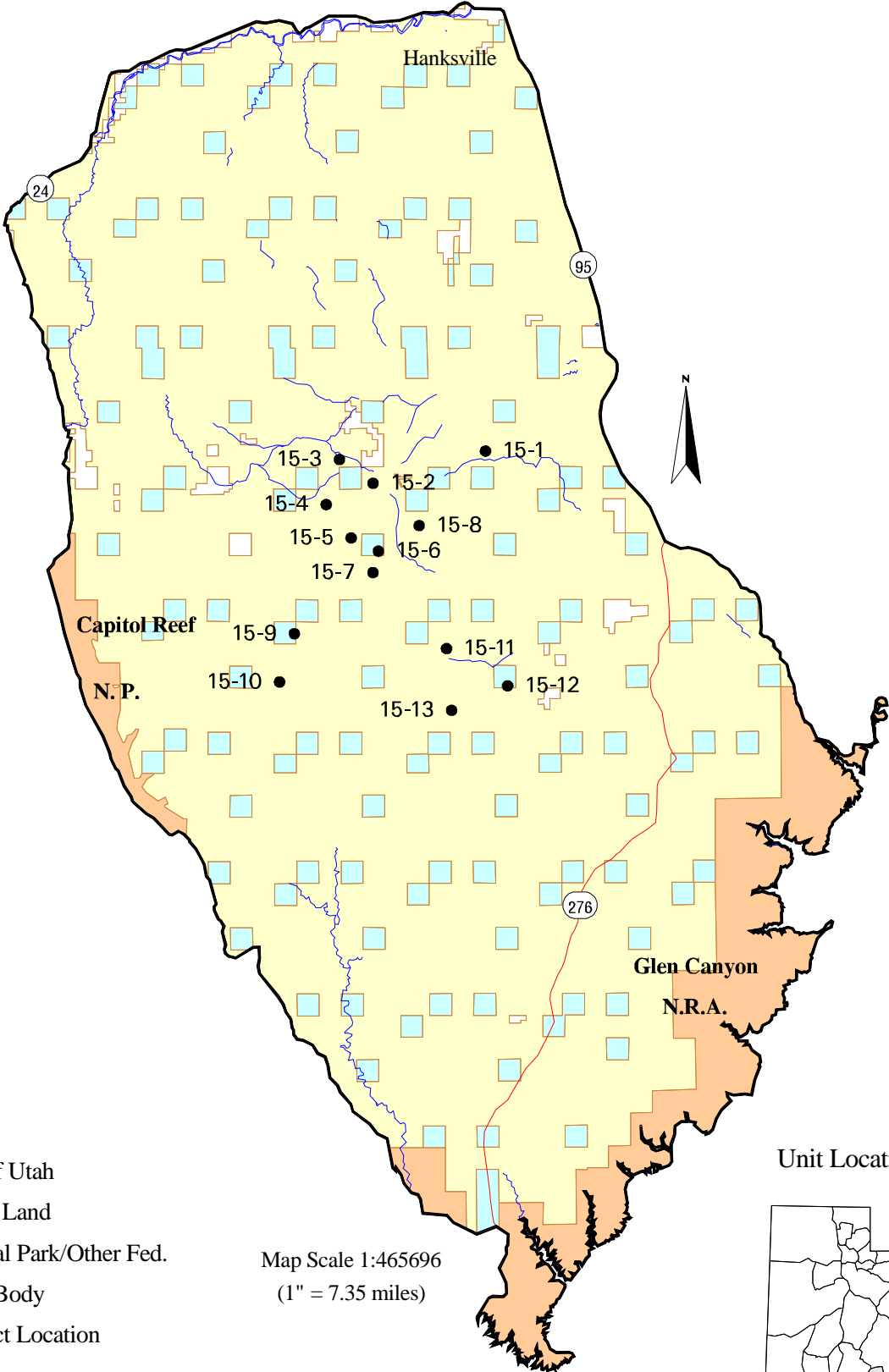
	Category	1994	1999
14-1 Alkali Point	soil	-	+
	browse	-	-
	herbaceous understory	0	-
14-2 Brushy Basin	soil	0	0
	browse	0	+
	herbaceous understory	-	-
14-3 Gold Queen Basin	soil	+	0
	browse	0	0
	herbaceous understory	+	0
14-4 Camp Jackson Reservoir	soil	0	0
	browse	0/+	0
	herbaceous understory	+	0
14-5 Jackson Ridge	soil	+	0
	browse	+	0
	herbaceous understory	+	0
14-6 Hart's Draw Reservoir	soil	+	0
	browse	-	-
	herbaceous understory	0/+	0
14-7 Shay Mountain	soil	0/+	NA
	browse	0	NA
	herbaceous understory	-	NA
14-8 Peters Point	soil	-	0
	browse	-	0
	herbaceous understory	-	0
14-9 Harts Draw	soil	-	+
	browse	-	-
	herbaceous understory	0	-
14-10 Harts Point	soil	-	0
	browse	-	+
	herbaceous understory	0	-

	Category	1994	1999
14-11 Shay Mesa	soil	-	0
	browse	0	0
	herbaceous understory	-	-
14-12 Shinglemill	soil	est	0
	browse	est	0
	herbaceous understory	est	+
Site	Category	1992	1999
14-13 Black Mesa	soil	0/+	+
	browse	-	-
	herbaceous understory	+	-
14-14 Texas Flat	soil	0	+
	browse	-	+
	herbaceous understory	+	-
14-15 Harmony Flat	soil	-	0
	browse	0	-
	herbaceous understory	0	0
14-16 Lower Lost Park	soil	0	0
	browse	0	-
	herbaceous understory	-	-
14-17 Deer Flat	soil	0	+
	browse	+	+
	herbaceous understory	+	+
14-18 Kigalia Point	soil	0	-
	browse	0	-
	herbaceous understory	0/+	-
14-19 Wooden Shoe	soil	0	0
	browse	0	0
	herbaceous understory	+	-
14-20 Gooseberry	soil	0	0
	browse	+	-
	herbaceous understory	0	0
14-21 North Long Point	soil	0	+
	browse	+	-
	herbaceous understory	-	0

	Category	1992	1999
14-22 Wild Cow Point	soil	0	0
	browse	0/+	0
	herbaceous understory	0	-
14-23 South Plain	soil	0	0
	browse	-	-
	herbaceous understory	0	-
14-24 Ruin Park	soil	0	0
	browse	-	-
	herbaceous understory	0	-
14-25 Davis Pocket	soil	0	NR
	browse	0/+	NR
	herbaceous understory	-	NR
14-26 The Wilderness	soil	0	-
	browse	+	-
	herbaceous understory	-	-
14-27 Mormon Pasture Point	soil	+	-
	browse	+	+
	herbaceous understory	-	0
14-28 North Cottonwood	soil	NR	0
	browse	NR	-
	herbaceous understory	NR	0
14-29 Salt Creek Mesa	soil	est	-
	browse	est	-
	herbaceous understory	est	-
14-30 Milk Ranch Point	soil	est	-
	browse	est	-
	herbaceous understory	est	-
14-31 Chippean Ridge	soil	est	-
	browse	est	0
	herbaceous understory	est	+
14-32 Lower Deer Flat	soil	est	0
	browse	est	-
	herbaceous understory	est	0

(0) = stable, (+) = up, (-) = down, (0/+) = stable to up, (0/-) = stable to down

# Management Unit 15

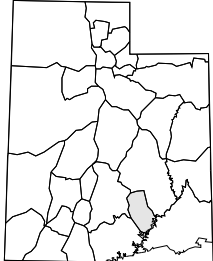


### Legend

- BLM
- State of Utah
- Private Land
- National Park/Other Fed.
- Water Body
- Transect Location
- Road
- Perennial Stream

Map Scale 1:465696  
(1" = 7.35 miles)

### 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\*

Ownership	Summer Range		Winter Range	
	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 buffalo. 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.

Buffalo 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 buffalo 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 buffalo shifted their winter range from the Burr Desert to the foothills on the west side of the Henry Mountains. The buffalo continued to use the Henry Mountains during the other seasons. Buffalo 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).

The BLM allocated 2,088 AUMs on 13 allotments (including Dry Lake which is an unallotted area for livestock, but reserved for use by buffalo) in the 1984 grazing EIS, which was 242 AUMs short of that needed to accommodate the agreed upon number of 200 yearling and older animals. A portion of the 94 AUM shortage on the Steele Butte Allotment has been offset by revegetation efforts on state land east of Cave Flat

(375 acres in 1983). The shortage in Dry Lake (102 AUMs) will be difficult to offset since this area is designated a Wilderness Study Area and may be exempt from future revegetation efforts. The Utah Division of Wildlife Resources has recently purchased enough AUM's for 285 buffalo and their calves.

The thirteen trend studies established in 1987 lie within the four livestock grazing allotments shown in Table 3. These four allotments account for 80% of the forage allocation (AUMs) for buffalo 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 buffalo and mule deer. The studies were located in areas where deer and/or buffalo "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 (Jensen, 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 and is scheduled to open again in 2000.

The buffalo herd is healthy and increasing. Between 1988 and 1993, 212 bulls and 171 cow buffalo 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 buffalo. That number remained fairly constant through 1994 when 474 buffalo 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 buffalo population is estimated at 460 animals.

TABLE 3  
FORAGE ALLOCATION, USE AND GRAZING PROGRAMS

	Allotments			
	<u>Crescent Creek</u>	<u>Nasty Flat</u>	<u>Pennell</u>	<u>Steele Butte</u>
Acres	9,703	17,341	63,254	83,443
Big Game Use (AUMs) Buffalo	65 <sup>1</sup>	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 <sup>2</sup>	877	1,081	2,780	628

<sup>1</sup>AUMs determined to be available for buffalo shown in parentheses (BLM EIS 1983)

<sup>2</sup>Acres seeded prior to 1984

Trend Study 15-1-99

Study site name: Eagle Bench .

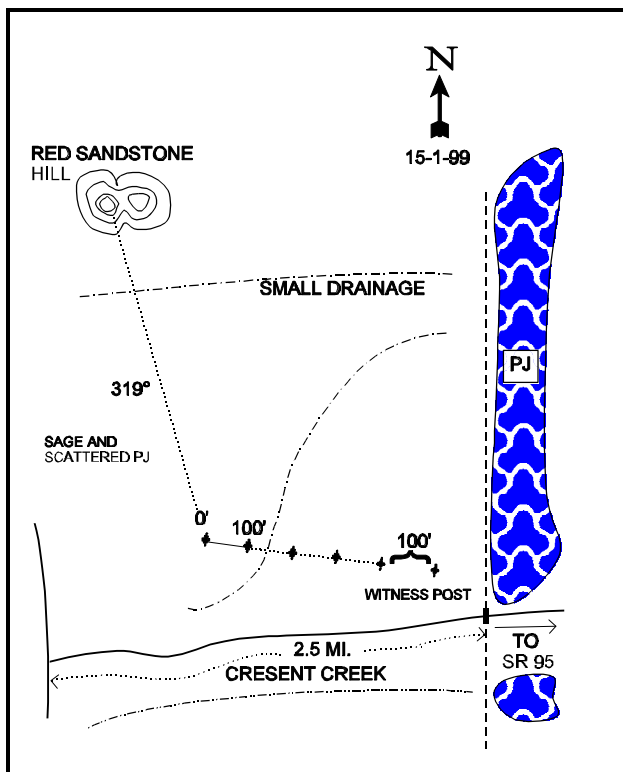
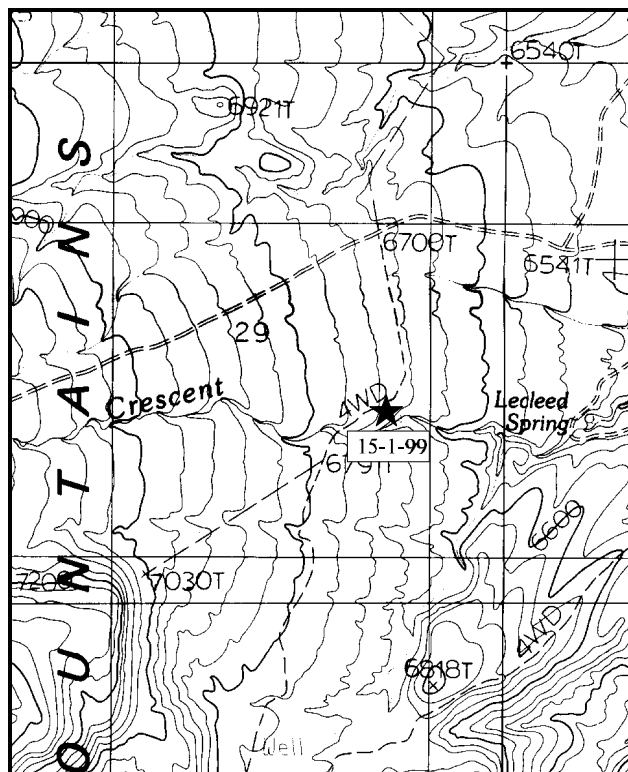
Range type: Chained, Seeded P-J .

Compass bearing: frequency baseline 95°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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: Mount Ellen

Diagrammatic Sketch

Township 31S , Range 11E , Section 29

UTM 4215029.129 N, 524673.846 E



## DISCUSSION

### Trend Study 15-1 (38-1)

The Eagle Bench study site is located in a pinyon-juniper woodland type that was chained and seeded in 1968. The site is located at an elevation of 6,640 feet that gently slopes to the northeast. Precipitation data from Hanksville shows 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 at the study is at least 12 inches. Wyoming big sagebrush is the dominant key browse species for deer in the area. Scattered pinyon and juniper are slowly becoming reestablished in the chaining, most averaging five to six feet in height. In 1999, point-center quarter data show 64 juniper trees/acre and 67 pinyon trees/acre, both with an average stem diameter of 3 inches. Approximately 33% of the junipers sampled are large trees which were knocked over during the chaining, but are still living. 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 site. Pellet group data from 1999 indicate light use with <1 deer and 9 cow days use/acre (2 ddu/ha and 22 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, and 6,400 by 1994. Currently, the sagebrush population is estimated to be 6,340 plants/acre. The majority of the sagebrush consist of mature plants (79% in 1987, 90% in 1994, and 84% in 1999). Biotic potential (proportion of seedlings to the population) remains low at only 3%, with recruitment from young plants comprising only 8% of the population. Percent decadency, although low, has slightly increased from 3% to 9% since 1994. The sagebrush population currently shows poor leader growth, but abundant seed production. Most plants have good vigor and show light to moderate hedging. Broom snakeweed is the only other numerous shrub found on the site. The population has remained at similar levels from 1987 to 1999, with 2,466 plants/acre in 1987, 1,960 plants/acre in 1994, and 2,080 plants/acre by 1999. However, the biotic potential substantially increased in 1999 with nearly a five-fold increase in the number of seedlings, coupled with a four-fold increase in the number of young plants. This may indicate an expanding population in the future. Species having low densities that were sampled in 1999 include green ephedra, Utah serviceberry, and slenderbush eriogonum.

The warm season increaser Blue grama is the dominant understory grass, followed by bottlebrush squirreltail, crested wheatgrass, and Indian ricegrass. The summer precipitation pattern and grazing program favors blue grama, the only warm season grass growing on the site. Between 1987 and 1994, nested frequencies of all perennial grasses declined significantly with the exception of Indian ricegrass which increased. In 1999, nested frequencies for all perennial grasses remained at similar levels to the 1994 reading, except for squirreltail which significantly increased. The annual cheatgrass is present at the site, but is low in frequency at the present time. Forbs have been nearly nonexistent during all readings with about a dozen species sampled in both 1994 and 1999. All species combined produce less than 2% cover. Total herbaceous cover remains low with an average of 6.1% and 5.3% in 1994 and 1999 respectively.

### 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 40%. Total vegetative cover was estimated at 24%, but only 5% 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. Recruitment however, is poor. The herbaceous understory is lacking on this site. Combined, grasses and forbs make up only 20% total ground cover. Nested frequencies of grasses declined while those of forbs increased, but this forb increase cannot compensate for the losses for the grasses for the forbs only make up 20% 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.

#### TREND ASSESSMENT

soil - stable to slightly down

browse - stable

herbaceous understory - slightly down and in poor condition

### 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 low at 9%, vigor is good, and recruitment appears adequate to maintain the population. Herbaceous understory trend is slightly up. Sum of nested frequency for perennial grasses and forbs increased, and annual species are insignificant in the community.

#### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly up

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 1

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'87	'99
G	<i>Agropyron cristatum</i>	39	34	31	22	11	13	2.40	.68
G	<i>Bouteloua gracilis</i>	<sub>b</sub> 196	<sub>a</sub> 122	<sub>a</sub> 113	73	44	43	1.53	1.87
G	<i>Bromus tectorum</i> (a)	-	<sub>a</sub> 3	<sub>b</sub> 15	-	1	6	.00	.05
G	<i>Hilaria jamesii</i>	-	5	-	-	2	-	.01	-
G	<i>Oryzopsis hymenoides</i>	19	27	24	7	13	12	.11	.31
G	<i>Sitanion hystrix</i>	<sub>b</sub> 109	<sub>a</sub> 36	<sub>b</sub> 84	52	15	41	.34	1.34
G	<i>Stipa lettermani</i>	-	3	-	-	1	-	.00	-
Total for Annual Grasses		0	3	15	0	1	6	0.00	0.05
Total for Perennial Grasses		363	227	252	154	86	109	4.40	4.21
Total for Grasses		363	230	267	154	87	115	4.41	4.26
F	<i>Arabis</i> spp.	<sub>a</sub> -	<sub>a</sub> 1	<sub>b</sub> 9	-	1	5	.00	.05
F	<i>Aster</i> spp.	<sub>a</sub> -	<sub>b</sub> 26	<sub>a</sub> -	-	10	-	.05	-
F	<i>Astragalus</i> spp.	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 14	-	-	5	-	.05
F	<i>Calochortus nuttallii</i>	-	5	-	-	2	-	.01	-
F	<i>Chaenactis douglasii</i>	-	3	-	-	1	-	.00	-
F	<i>Descurainia pinnata</i> (a)	-	-	6	-	-	3	-	.01
F	<i>Erigeron</i> spp.	-	6	-	-	2	-	.01	-
F	<i>Eriogonum</i> spp.	-	-	1	-	-	1	-	.00
F	<i>Gilia</i> spp. (a)	-	22	16	-	11	8	.05	.04
F	<i>Hymenoxys acaulis</i>	2	-	-	2	-	-	-	-
F	<i>Lesquerella kingii</i>	<sub>a</sub> -	<sub>b</sub> 8	<sub>c</sub> 41	-	3	19	.01	.22
F	<i>Phlox austromontana</i>	-	-	3	-	-	2	-	.18
F	<i>Phlox longifolia</i>	<sub>a</sub> 6	<sub>b</sub> 56	59	3	27	26	1.33	.18
F	<i>Polygonum douglasii</i> (a)	-	4	10	-	1	3	.00	.01
F	<i>Ranunculus testiculatus</i> (a)	-	-	1	-	-	1	-	.00
F	<i>Senecio multilobatus</i>	<sub>a</sub> 16	<sub>a</sub> 7	<sub>b</sub> 31	7	4	17	.02	.24
F	<i>Townsendia incana</i>	<sub>a</sub> -	<sub>b</sub> 6	<sub>b</sub> 13	-	3	6	.16	.03
F	Unknown forb-perennial	6	-	-	2	-	-	-	-
Total for Annual Forbs		0	26	33	0	12	15	0.05	0.07
Total for Perennial Forbs		30	118	171	14	53	81	1.61	0.95
Total for Forbs		30	144	204	14	65	96	1.67	1.03

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

BROWSE TRENDS --  
Herd unit 15 , Study no: 1

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Amelanchier utahensis	0	1	-	-
B	Artemisia tridentata wyomingensis	89	88	16.02	21.45
B	Ephedra viridis	0	1	-	-
B	Eriogonum microthecum	10	7	.06	.04
B	Gutierrezia sarothrae	41	36	1.09	.28
B	Juniperus osteosperma	0	3	1.25	.63
B	Mahonia fremontii	0	0	-	-
B	Opuntia spp.	1	0	.00	-
B	Pinus edulis	0	5	1.87	2.24
Total for Browse		141	141	20.32	24.65

CANOPY COVER --  
Herd unit 15 , Study no: 1

Species	Percent Cover '09
Juniperus osteosperma	1
Pinus edulis	.40

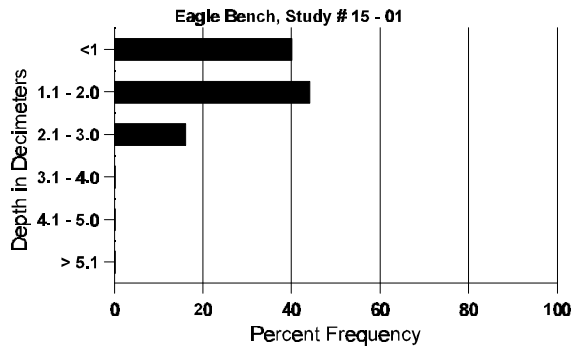
BASIC COVER --  
Herd unit 15 , Study no: 1

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	264	257	4.25	23.65	29.71
Rock	324	284	23.25	22.56	23.79
Pavement	292	299	16.25	4.56	13.64
Litter	367	325	37.50	22.97	24.80
Cryptogams	6	10	0	.03	.07
Bare Ground	305	309	18.75	20.02	21.97

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 01, Study Name: Eagle Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.4	52.4 (9.7)	6.6	51.3	28.2	20.6	2.4	14.5	96.0	0.6

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 15 , Study no: 1

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Rabbit	10	12	N/A
Deer	-	1	1 (2)
Cattle	-	2	9 (22)

## BROWSE CHARACTERISTICS --

Herd unit 15 , Study no: 1

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.		
Amelanchier utahensis																			
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'99	-	-	-	-	1	-	-	-	-	-	-	-	1	-	20	46	61	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>							
	'87	00%			00%			00%											
	'94	00%			00%			00%											
	'99	100%			00%			00%											
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-				
												'94	0		-				
												'99	20		-				

A G E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	94	10	-	-	-	-	-	2	-	-	12	-	-	-	240		12	
	99	10	-	-	1	-	-	-	-	-	11	-	-	-	220		11	
Y	87	6	12	-	-	-	-	-	-	-	18	-	-	-	1200		18	
	94	19	-	-	2	-	-	1	-	-	16	2	4	-	440		22	
	99	14	5	1	1	-	-	3	-	-	24	-	-	-	480		24	
M	87	2	75	4	-	-	-	-	-	-	81	-	-	-	5400	18 27	81	
	94	286	-	-	1	-	-	-	-	-	199	81	7	-	5740	17 26	287	
	99	143	114	8	-	-	-	-	-	-	258	7	-	-	5300	17 30	265	
D	87	-	3	1	-	-	-	-	-	-	4	-	-	-	266		4	
	94	11	-	-	-	-	-	-	-	-	7	2	-	2	220		11	
	99	16	5	4	1	-	2	-	-	-	21	-	4	3	560		28	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		87%			05%			00%			- 7%							
'94		00%			00%			04%			- 1%							
'99		39%			05%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	6866	Dec:	4%				
											'94	6400		3%				
											'99	6340		9%				
<i>Ephedra viridis</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10 8	0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6 10	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	0		-				
											'99	20		-				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total						
		1	2	3	4									
<b>Eriogonum microthecum</b>														
S	87	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	4	-	-	-	4		4
Y	87	1	1	-	-	-	-	1	-	-	-	200		3
	94	4	2	3	-	-	-	-	-	-	9		180	9
	99	-	-	2	-	-	-	-	-	-	2		40	2
M	87	1	-	-	-	-	-	-	-	-	1		66	3 3 1
	94	9	-	-	-	-	-	-	-	-	9		180	3 3 9
	99	2	5	-	7	-	-	-	-	-	14		280	3 4 14
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>			
'87		25%			00%			00%			+26%			
'94		11%			17%			00%			-11%			
'99		31%			13%			00%						
Total Plants/Acre (excluding Dead & Seedlings)										'87	266	Dec:	-	
										'94	360		-	
										'99	320		-	
<b>Gutierrezia sarothrae</b>														
S	87	1	-	-	-	-	-	-	-	1		66		1
	94	2	-	-	1	-	-	1	-	4		80		4
	99	19	-	-	-	-	-	-	-	19		380		19
Y	87	3	-	-	-	-	-	-	-	3		200		3
	94	8	-	-	-	-	-	-	-	8		160		8
	99	37	-	-	-	-	-	-	-	37		740		37
M	87	34	-	-	-	-	-	-	-	34		2266	6 4	34
	94	80	-	-	7	-	-	-	-	87		1740	5 6	87
	99	66	-	-	-	-	-	-	-	66		1320	3 3	66
D	87	-	-	-	-	-	-	-	-	-		0		0
	94	2	-	-	1	-	-	-	-	3		60		3
	99	1	-	-	-	-	-	-	-	-		20		1
X	87	-	-	-	-	-	-	-	-	-		0		0
	94	-	-	-	-	-	-	-	-	-		0		0
	99	-	-	-	-	-	-	-	-	-		60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>			
'87		00%			00%			00%			-21%			
'94		00%			00%			00%			+ 6%			
'99		00%			00%			.96%						
Total Plants/Acre (excluding Dead & Seedlings)										'87	2466	Dec:	0%	
										'94	1960		3%	
										'99	2080		1%	

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4	5	6	7	8	9				1	2	3	4
Juniperus osteosperma																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	60		-			
Mahonia fremontii																	
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	0		-			
Opuntia spp.																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	20		-			
											'99	0		-			



A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus edulis																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	3
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	100		-			

Trend Study 15-2-99

Study site name: Nasty Flat .

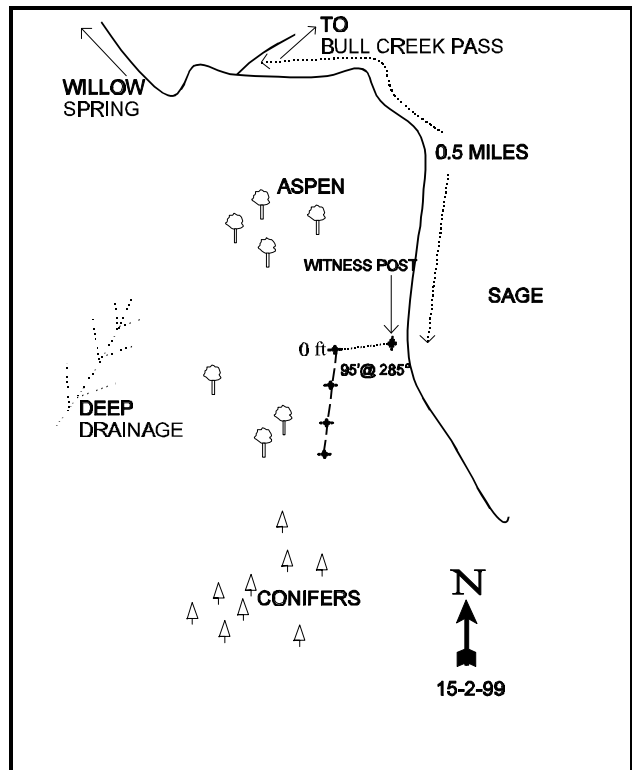
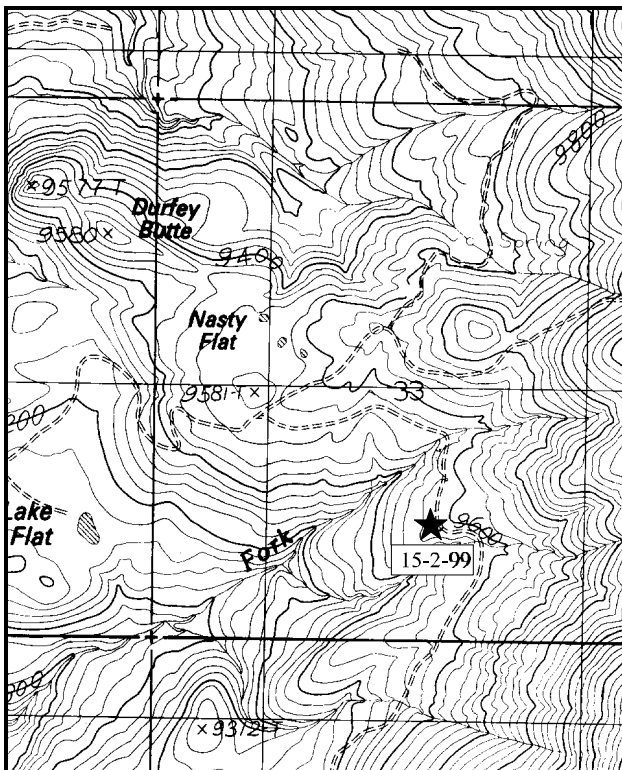
Range type: Quaking Aspen .

Compass bearing: frequency baseline 213°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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

UTM 4212681.435 N , 516489.431 E

## DISCUSSION

### Trend Study No. 15-2 (38-2)

The Nasty Flat study is located within the only aspen stand sampled in the Henry Mountains range trend monitoring effort. The aspen type is not very extensive and does not occur often in 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 indicate light animal use with 13 deer and 12 cow days use/acre (32 ddu/ha and 30 cdu/ha), however this sight was read early in the season (June 9). A few bison pats from the previous fall were sampled as well.

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 estimate 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. Currently, the majority of the population is represented by young plants (75%). Most of the aspen population sampled in 1999 shows 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%.

Mountain big sagebrush was sampled more accurately in 1999 after the baseline was relocated nearer to the edge of the aspen clone. However, this species is not considered key as this site is a summer range. The population is currently estimated at 1,460 plants/acre, and is represented by mostly mature, lightly utilized plants that are low in stature (average height/crown of 12" x 20"). 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%. Less abundant shrubs that were sampled include snowberry and Oregon grape.

The herbaceous understory is dominated by perennial species. The increasers *Stellaria jamesiana* and *Taraxacum officinale* are the most abundant forbs, far exceeding the number of more desirable species. Currently, these two species make up 73% of the forb cover, and 39% of the total herbaceous cover. Nested and quadrat frequencies for these species decreased in 1999, mostly due to the baseline being moved from beneath the aspen canopy to the edge. The key grass species are mutton bluegrass and slender wheatgrass which account for 63% of the grass cover and 30% of the total herbaceous cover. From 1994 to 1999, mutton bluegrass significantly decreased in nested frequency, while slender wheatgrass and elk sedge significantly

increased. Again, the baseline was moved in 1999 which may account for some of these changes. 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 they aren't 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

browse - stable, but unimportant on this summer range site

herbaceous understory - stable

#### 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

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'87	'99
G	Agropyron trachycaulum	b <sub>111</sub>	a <sub>88</sub>	b <sub>110</sub>	51	35	50	.41	1.14
G	Bromus inermis	b <sub>51</sub>	a <sub>4</sub>	a <sub>4</sub>	23	2	2	.03	.03
G	Carex geyeri	a <sub>4</sub>	a <sub>13</sub>	b <sub>70</sub>	3	4	29	.26	1.02
G	Festuca ovina	b <sub>5</sub>	a <sub>-</sub>	ab <sub>2</sub>	3	-	1	-	.00
G	Poa fendleriana	b <sub>259</sub>	b <sub>236</sub>	a <sub>125</sub>	92	82	51	4.14	1.50
G	Sitanion hystrix	b <sub>10</sub>	a <sub>-</sub>	b <sub>10</sub>	5	-	4	-	.02
G	Stipa lettermani	a <sub>1</sub>	b <sub>66</sub>	b <sub>49</sub>	1	25	20	1.86	.42
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		441	407	370	178	148	157	6.71	4.15
Total for Grasses		441	407	370	178	148	157	6.71	4.15
F	Achillea millefolium	-	-	3	-	-	1	-	.00
F	Agoseris glauca	-	6	3	-	2	1	.01	.00
F	Allium spp.	-	-	4	-	-	2	-	.06
F	Androsace septentrionalis (a)	-	3	7	-	1	2	.00	.01
F	Arabis drummondi	13	16	19	5	8	8	.09	.09
F	Astragalus spp.	-	69	-	-	27	-	1.47	-
F	Calochortus nuttallii	4	-	4	2	-	2	-	.01
F	Chenopodium fremontii (a)	-	5	-	-	2	-	.01	-
F	Cymopterus lemmonii	a <sub>3</sub>	a <sub>-</sub>	b <sub>4</sub>	1	-	3	-	.01
F	Descurainia pinnata (a)	4	-	-	2	-	-	-	-
F	Erigeron eatonii	a <sub>15</sub>	b <sub>27</sub>	b <sub>66</sub>	7	12	27	.09	.54
F	Erigeron spp.	4	-	-	2	-	-	-	-
F	Fritillaria atropurpurea	-	-	4	-	-	2	-	.01
F	Penstemon watsonii	41	21	39	18	11	18	.17	.34
F	Phlox longifolia	22	16	25	8	7	12	.09	.11
F	Physalis spp.	-	3	-	-	1	-	.00	-
F	Sedum lanceolatum	ab <sub>1</sub>	a <sub>-</sub>	b <sub>6</sub>	1	-	3	-	.06
F	Senecio spp.	b <sub>13</sub>	a <sub>-</sub>	a <sub>-</sub>	7	-	-	-	-
F	Stellaria jamesiana	b <sub>282</sub>	b <sub>277</sub>	a <sub>172</sub>	99	96	70	2.97	1.07
F	Taraxacum officinale	b <sub>187</sub>	ab <sub>187</sub>	a <sub>141</sub>	73	64	59	5.84	2.45
F	Unknown forb-perennial	23	-	-	10	-	-	-	-
F	Vicia spp.	3	-	-	1	-	-	-	-
F	Viola spp.	a <sub>-</sub>	b <sub>52</sub>	a <sub>-</sub>	-	23	-	1.12	-
Total for Annual Forbs		4	8	7	2	3	2	0.01	0.00
Total for Perennial Forbs		611	674	490	234	251	208	11.88	4.78
Total for Forbs		615	682	497	236	254	210	11.90	4.79

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

BROWSE TRENDS --  
Herd unit 15 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Artemisia tridentata vaseyana	12	37	.16	1.01
B	Juniperus communis	1	0	1.00	-
B	Mahonia repens	0	1	-	-
B	Pinus flexilis	0	3	.46	.56
B	Populus tremuloides	0	66	2.21	1.58
B	Pseudotsuga menziesii	0	18	.85	3.06
B	Ribes velutinum velutinum	1	0	.21	-
B	Symphoricarpos oreophilus	4	4	.30	.15
Total for Browse		18	129	5.21	6.38

CANOPY COVER --  
Herd unit 15 , Study no: 2

Species	Percent Cover '09
Pinus flexilis	2
Populus tremuloides	61
Pseudotsuga menziesii	9

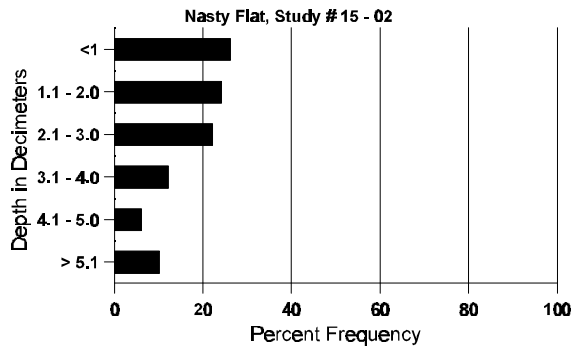
BASIC COVER --  
Herd unit 15 , Study no: 2

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	338	307	4.50	24.53	15.80
Rock	45	106	1.00	.66	6.27
Pavement	19	11	0	.03	.02
Litter	395	391	93.75	77.49	82.88
Cryptogams	-	2	0	0	.03
Bare Ground	98	52	.75	1.26	1.17

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 02, Study Name: Nasty Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.2	39.5 (17.7)	5.9	49.3	30.2	20.6	5.4	31.3	204.8	0.5

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 15 , Study no: 2

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Deer	5	5	13 (32)
Cattle	-	1	12 (30)
Buffalo	-	-	3 (7)

## BROWSE CHARACTERISTICS --

Herd unit 15 , Study no: 2

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches)		Total		
		1	2	3	4	5	6	7	8	9		1	2		Ht. Cr.	
<i>Artemisia tridentata vaseyana</i>																
S	'87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	3	-	-	-	-	-	-	-	-	-	-	60		3	
Y	'87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	7	-	-	-	-	-	-	-	-	-	-	140		7	
	'99	18	-	-	-	-	-	-	-	-	-	-	360		18	
M	'87	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	6	-	-	1	-	-	-	-	-	-	-	140	8	11	7
	'99	51	-	-	-	-	-	-	-	-	-	-	1020	12	20	51
D	'87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	1	-	-	-	-	-	-	-	-	-	-	20		1	
	'99	4	-	-	-	-	-	-	-	-	-	-	80		4	
X	'87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	-	-	-	-	-	-	-	-	-	-	-	180		9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'87		00%			00%			00%								
'94		00%			00%			07%			+79%					
'99		00%			00%			05%								
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%		
											'94	300		7%		
											'99	1460		5%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Juniperus communis</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	14	73	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	20		-			
												'99	0		-			
<i>Mahonia repens</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100	3	17	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	100		-			
<i>Pinus flexilis</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'94	0		-			
												'99	60		-			



A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<b>Populus tremuloides</b>																	
S	87	8	1	-	-	-	-	-	-	-	9	-	-	-	600		9
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	26	29	17	-	-	-	-	-	-	71	1	-	-	4800		72
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	94	-	-	-	-	-	5	8	-	106	-	-	1	2140		107
M	87	-	-	-	-	-	-	1	3	-	4	-	-	-	266	393 157	4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	7	-	-	-	-	-	-	24	-	31	-	-	-	620	- -	31
D	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	4	-	-	-	-	-	-	-	-	1	-	2	1	80		4
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	800		40
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		39%			22%			00%									
'94		00%			00%			00%									
'99		00%			00%			03%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	5132	Dec:	1%			
											'94	0		0%			
											'99	2840		3%			
<b>Pseudotsuga menziesii</b>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	22	-	-	-	-	-	-	-	-	22	-	-	-	440		22
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	-	-	-	-	-	-	-	3	-	3	-	-	-	60	- -	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	500		-			

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ribes velutinum velutinum																		
Y	'87	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	15	48	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		100%			00%			00%			-70%							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'94	20		-			
												'99	0		-			
Symphoricarpos oreophilus																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'99	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	'87	-	-	2	-	-	-	-	-	-	2	-	-	-	133	14	16	
	'94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	19	28	
	'99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	20	30	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%			-40%							
'94		00%			00%			00%			+64%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	-			
												'94	80		-			
												'99	220		-			

Trend Study 15-3-99

Study site name: Dugout .

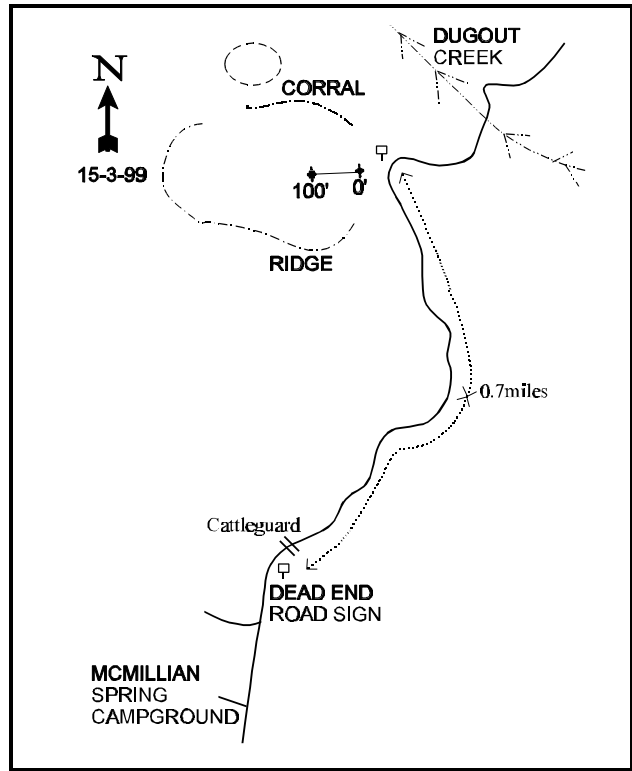
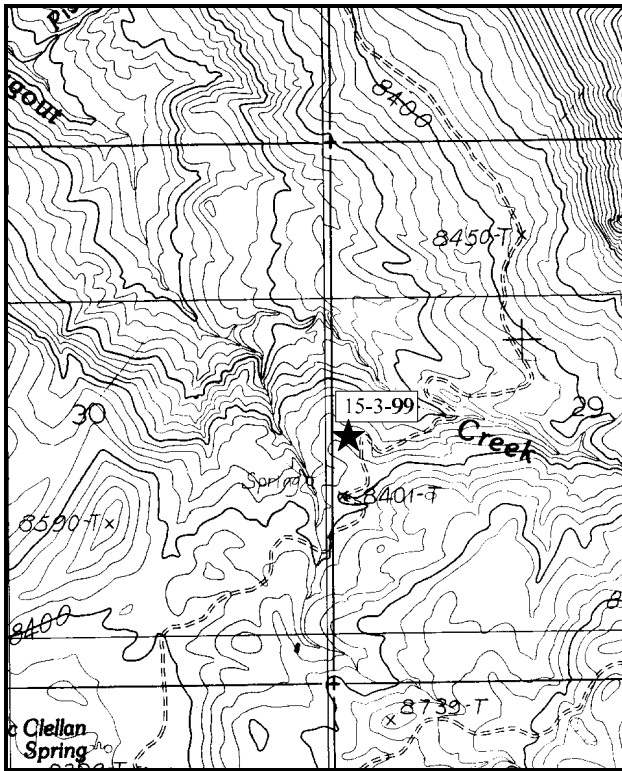
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 265°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From McMillian Spring campground, go north on the main road past the campsites and a 'Dead End Road' sign for 0.7 miles to a hairpin curve in the road at the top of a hill, just before it drops down towards Dugout Creek. The transect starts 50 feet off the left side of the road. The first stake, a short fence post, marks the 0-foot end of the frequency baseline and is tagged #7129.



Map Name: Mount Ellen

Diagrammatic Sketch

Township 31S , Range 10E , Section 30

UTM 4214411.096 N, 514041.535 E

## DISCUSSION

### Trend Study No. 15-3 (38-3)

The Dugout study is located in a mountain brush range type with scattered pinyon and juniper. Black sagebrush and oakbrush dominate the site which is in a key area for mule deer. The site is located on a west aspect at an elevation of 8,300 feet. It has a variable slope ranging from 2-13%. Mean annual precipitation is at least 15 inches. Water is available for livestock and wildlife within a half mile of the study site which lies within the Nasty Flat Cattle Allotment. Pellet group data from 1999 indicate light use by wildlife and livestock with an estimated 15 deer and 6 cow days use/acre (37 ddu/ha and 15 cdu/ha).

The soils appear moderately deep with an estimated effective rooting depth of over 17 inches, although a restrictive layer must be present to support such a dense stand of black sagebrush. Rocks are prevalent on the soil surface and throughout the upper portion of the profile. The soil is a light brown, clay loam with a neutral pH (7.3). The fairly high clay content is evident by the amount of crusting in exposed areas, as well as cracks beginning to form during drying periods. Phosphorus levels (7.8 ppm) in the soil are slightly lower than the minimum of 10 ppm, thought necessary for normal plant development. There is some evidence of minimal surface water movement and soil pedestaling, however erosion is not severe on study area. Vegetative and litter cover, provided mainly by the shrub component, seems to be adequate to keep erosion at minimal levels. Organic matter buildup is high under the oakbrush, but low elsewhere. Some of the steep slopes surrounding the site show heavier erosion.

Black sagebrush and serviceberry are the key browse species in the area. Black sagebrush is the most abundant browse on the site with an estimated density of 4,999 plants/acre in 1987, 4,840 in 1994, and 5,020 by 1999. Utilization was mostly light in 1987 and 1994, with nearly one-third of the population showing moderate use by 1999. Percent decadency of black sagebrush has varied between years. Decadency increased from 29% in 1987 to 43% by 1994, then decreased to 33% in 1999. The proportion of decadent plants classified as dying also decreased between 1994 and 1999. Recruitment is good for this species with an estimated 800 young plants/acre (16% of the population) being sampled in 1999. The number of dead plants sampled was high in 1999 (1700 plants/acre), although dead plants were not sampled in previous years so comparisons should not be made. The extended drought is most likely causing population thinning and die-off of black sagebrush. Currently, mature sagebrush plants have abundant seed from the previous year. Serviceberry consists of mostly mature plants that have been moderately browsed. There was a large increase in the proportion of plants receiving heavier use between 1994 and 1999. However, vigor is good on the majority of the plants sampled and percent decadency is low, characterizing a healthy population.

Other browse sampled are true mountain mahogany and Gambel oak. Mountain mahogany is an important species, but because of its low density at this site it isn't considered a key species. The majority of the plants over all sampling years have displayed moderate to heavy use because of low numbers. During the 1987 reading, 67% of the shrubs encountered displayed heavy hedging, while 33% showed poor vigor. In 1994, 45% of the mahogany were heavily hedged while those displaying poor vigor decreased from 33% to 9%. In 1999, 80% of plants sampled displayed moderate or heavy hedging, with 10% showing poor vigor. Gambel oak was quite abundant in 1987, but was mistakenly not counted in the shrub strips during the 1994 reading. In 1999, the density of oak was estimated at 2,500 stems/acre with most of these being classified as mature. Use is mostly light and vigor good. Pinyon pine is estimated at 176 trees/acre by point quarter data taken in 1999. Average stem diameter is 5 inches. Point quarter data also estimates Utah juniper and ponderosa pine at 21 and 22 trees/acre respectively. Average stem diameter for juniper is less than 3 inches with ponderosa just over 3 inches. Canopy cover of pinyon was estimated at 23% in 1999.

Grasses and forbs are fairly diverse on the site, but none are particularly abundant. Six grass and thirty-one forb species were sampled in 1999 totaling 22% of the total vegetative cover. Nearly all of the herbaceous understory is perennial species. Mutton bluegrass is the most abundant grass on the site, followed by

squirreltail and Indian ricegrass. All species with the exception of mutton bluegrass provide less than 1% cover individually. No noticeable utilization was observed on any of the herbaceous species in 1999.

#### APPARENT TREND ASSESSMENT

In 1987, litter cover (58%) contributed substantially to total ground cover (88%). The low estimate for bare soil in 1987 of 12% is even lower in 1994 at only 7%. This would indicate that the site is well buffered from the erosive forces of wind and water.

#### 1994 TREND ASSESSMENT

The soil trend appears stable with a decline in percent bare ground. Black sagebrush have shown an increase in percent decadency from 29% in 1987 to 43% by 1994. Utilization is light however, and age class analysis would indicate a stable population. The browse trend appears to be fairly stable at this time, but the rate of decadency should be monitored closely. The herbaceous understory follows the same trend as many sites on this unit. Sum of nested frequencies of grasses declined while those of forbs increased, but on this site the forbs make up 75% of the herbaceous cover. Nested frequencies of grasses and forbs combined have remained stable.

#### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

#### 1999 TREND ASSESSMENT

Trend for soil is stable. Although percent bare ground increased, protective ground cover provided by litter and vegetation, especially herbaceous species also increased. Trend for the key browse is stable. Black sagebrush density is stable, vigor good on most mature plants, decadency has decreased, and the proportion of decadent plants classified as dying has decreased. Recruitment from young plants is also good. Serviceberry, although showing moderate use, has good vigor, low decadency, and good recruitment from young plants. Herbaceous understory trend is stable. The understory is comprised almost solely of perennial species. Perennial sum of nested frequency for both grasses and forbs has increased since 1994.

#### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous - stable

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	a-	b12	a-	-	4	-	.12	-
G	Agropyron intermedium	4	-	-	1	-	-	-	-
G	Agropyron smithii	b20	a-	a-	10	-	-	-	-
G	Bouteloua gracilis	5	4	10	2	2	4	.03	.12
G	Bromus tectorum (a)	-	-	1	-	-	1	-	.00
G	Carex spp.	1	3	-	1	2	-	.01	-
G	Festuca spp.	b29	a-	a-	11	-	-	-	-
G	Oryzopsis hymenoides	31	47	29	13	20	13	.51	.36
G	Poa fendleriana	54	63	94	27	24	38	1.24	1.77
G	Sitanion hystrix	b55	a19	ab36	26	10	16	.19	.22
G	Stipa lettermani	18	16	11	10	7	4	.06	.04
Total for Annual Grasses		0	0	1	0	0	1	0	0.00
Total for Perennial Grasses		217	164	180	101	69	75	2.17	2.52
Total for Grasses		217	164	181	101	69	76	2.17	2.53
F	Agoseris glauca	a-	b9	ab1	-	3	1	.01	.00
F	Allium spp.	ab4	a-	b8	2	-	3	-	.30
F	Antennaria parvifolia	2	1	6	1	1	3	.03	.44
F	Androsace septentrionalis (a)	-	a-	b10	-	-	5	-	.02
F	Astragalus henrimontanensis	b10	a-	c18	4	-	12	-	.45
F	Astragalus tenellus	a8	a3	b27	4	2	16	.06	.30
F	Aster spp.	b47	b49	a4	17	20	2	1.95	.01
F	Castilleja chromosa	12	18	16	7	7	9	.14	.09
F	Castilleja linariaefolia	6	3	3	3	1	1	.00	.01
F	Calochortus nuttallii	b6	a-	c20	3	-	7	-	.08
F	Cirsium calcareum	-	-	1	-	-	1	-	.15
F	Comandra pallida	ab18	a10	b23	6	4	9	.09	.78
F	Crepis intermedia	ab13	a4	b23	5	2	9	.01	.39
F	Cymopterus purpureus	ab56	b56	a42	27	31	22	.52	.39
F	Eriogonum alatum	-	-	5	-	-	4	-	.04
F	Eriogonum pumilus	a23	b72	a67	12	32	30	.90	.55
F	Eriogonum racemosum	a-	a-	b5	-	-	3	-	.01
F	Grindelia squarrosa	-	1	-	-	1	-	.00	-
F	Hymenoxys acaulis	37	40	46	17	16	17	.59	.77
F	Hymenoxys richardsonii	a-	ab1	b8	-	1	4	.00	.07
F	Lesquerella wardii	b42	a17	ab34	21	9	17	.23	.30
F	Lupinus sericeus	19	21	15	9	11	8	.30	.09
F	Machaeranthera grindelioides	b8	a-	b15	3	-	5	-	.19
F	Penstemon spp.	26	8	8	11	5	5	.02	.02

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	<i>Petradoria pumila</i>	<sub>a</sub> 1	<sub>a</sub> 4	<sub>b</sub> 12	1	2	9	.06	.09
F	<i>Penstemon watsonii</i>	<sub>ab</sub> 14	<sub>b</sub> 27	<sub>a</sub> 9	8	14	5	.81	.24
F	<i>Physaria acutifolia</i>	<sub>a</sub> -	<sub>b</sub> 9	-	-	4	-	.02	-
F	<i>Phlox longifolia</i>	10	16	13	4	6	6	.08	.06
F	<i>Polygonum douglasii</i> (a)	-	<sub>b</sub> 23	<sub>a</sub> -	-	9	-	.07	-
F	<i>Potentilla gracilis</i>	<sub>a</sub> 6	<sub>a</sub> 4	<sub>b</sub> 18	2	3	8	.01	.24
F	<i>Senecio multilobatus</i>	-	-	3	-	-	1	-	.00
F	<i>Tragopogon dubius</i>	-	-	3	-	-	1	-	.00
F	Unknown forb-perennial	3	2	-	1	2	-	.01	-
F	<i>Viguiera multiflora</i>	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 24	-	-	14	-	.71
F	<i>Zigadenus paniculatus</i>	<sub>a</sub> -	<sub>c</sub> 28	<sub>b</sub> 6	-	11	3	.08	.01
Total for Annual Forbs		0	23	10	0	9	5	0.07	0.02
Total for Perennial Forbs		371	403	483	168	188	235	5.98	6.88
Total for Forbs		371	426	493	168	197	240	6.05	6.91

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

#### BROWSE TRENDS --

Herd unit 15 , Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	<i>Amelanchier utahensis</i>	23	25	4.15	4.57
B	<i>Artemisia nova</i>	79	82	8.59	6.06
B	<i>Artemisia tridentata vaseyana</i>	1	0	-	-
B	<i>Cercocarpus montanus</i>	10	10	1.79	2.08
B	<i>Chrysothamnus depressus</i>	5	6	.06	.18
B	<i>Chrysothamnus nauseosus</i>	0	0	-	-
B	<i>Chrysothamnus viscidiflorus</i>	1	0	-	-
B	<i>Eriogonum corymbosum</i>	0	0	-	-
B	<i>Eriogonum microthecum</i>	1	0	-	-
B	<i>Gutierrezia sarothrae</i>	3	0	.06	-
B	<i>Juniperus osteosperma</i>	0	2	.15	.76
B	<i>Pinus edulis</i>	0	13	5.52	11.11
B	<i>Pinus ponderosa</i>	-	-	.21	-
B	<i>Quercus gambelii</i>	0	32	4.49	7.80
B	<i>Symphoricarpos oreophilus</i>	11	2	.54	.03
Total for Browse		134	172	25.60	32.61

CANOPY COVER --  
Herd unit 15 , Study no: 3

Species	Percent Cover 09
Pinus edulis	23

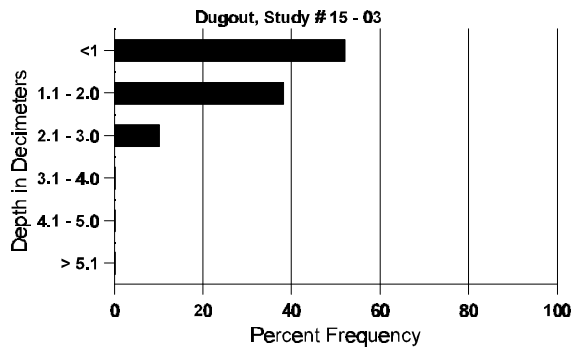
BASIC COVER --  
Herd unit 15 , Study no: 3

Cover Type	Nested Frequency		Average Cover %		
	04	09	'87	'94	'99
Vegetation	282	286	3.75	32.83	36.99
Rock	245	229	13.50	14.13	14.43
Pavement	175	203	13.00	3.39	5.85
Litter	381	374	58.00	43.79	52.28
Cryptogams	9	51	.25	.88	.85
Bare Ground	183	190	11.50	7.15	14.32

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 03, Study Name: Dugout

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
17.3	49.0 (18.1)	7.3	32.0	29.4	38.6	2.3	7.8	115.2	0.8

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 15 , Study no: 3

Type	Quadrat Frequency	
	04	09
Rabbit	3	22
Deer	8	9
Cattle	-	-

Pellet Transect Days Use/Acre (ha) 09
N/A
15 (37)
6 (15)



BROWSE CHARACTERISTICS --  
Herd unit 15 , Study no: 3

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Amelanchier utahensis</b>																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	94	1	-	-	-	-	-	1	-	-	2	-	-	-	40		2	
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
Y	87	3	4	-	-	-	-	-	-	-	7	-	-	-	466		7	
	94	1	-	-	3	-	-	-	-	-	4	-	-	-	80		4	
	99	2	6	-	-	-	-	2	-	-	10	-	-	-	200		10	
M	87	-	3	1	-	-	-	-	-	-	4	-	-	-	266	46 18	4	
	94	16	2	-	3	-	-	-	-	-	19	1	1	-	420	40 37	21	
	99	3	9	1	3	1	-	-	-	-	17	-	-	-	340	47 39	17	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		64%			09%			00%			-29%							
'94		08%			00%			04%			+ 7%							
'99		61%			04%			04%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	732	Dec:	0%				
											'94	520		4%				
											'99	560		4%				
<b>Artemisia nova</b>																		
S	87	27	-	-	-	-	-	-	-	-	27	-	-	-	1800		27	
	94	65	-	8	-	-	-	19	-	-	92	-	-	-	1840		92	
	99	23	-	-	-	-	-	-	-	-	23	-	-	-	460		23	
Y	87	20	-	-	-	-	-	-	-	-	19	1	-	-	1333		20	
	94	12	-	-	2	-	-	9	-	-	23	-	-	-	460		23	
	99	29	4	-	7	-	-	-	-	-	40	-	-	-	800		40	
M	87	24	7	2	-	-	-	-	-	-	33	-	-	-	2200	14 15	33	
	94	82	8	12	12	-	-	1	-	-	105	8	-	2	2300	12 19	115	
	99	57	48	6	16	-	-	2	-	-	129	-	-	-	2580	11 17	129	
D	87	10	10	2	-	-	-	-	-	-	18	-	2	2	1466		22	
	94	66	20	2	13	-	-	3	-	-	76	2	1	25	2080		104	
	99	41	27	-	6	-	-	8	-	-	59	-	8	15	1640		82	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1700		85	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		23%			05%			05%			- 3%							
'94		12%			06%			12%			+ 4%							
'99		31%			02%			09%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	4999	Dec:	29%				
											'94	4840		43%				
											'99	5020		33%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total									
		1	2	3	4		1	2										
Artemisia tridentata vaseyana																		
M	87	1	-	-	-	-	-	-	1	-	-	66	15	23	1			
	94	1	-	-	-	-	-	-	1	-	-	20	28	55	1			
	99	-	-	-	-	-	-	-	-	-	-	0	-	-	0			
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-70%							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	66	Dec:	-					
										'94	20		-					
										'99	0		-					
Cercocarpus montanus																		
Y	87	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	99	1	2	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	-	1	1	-	-	-	-	-	-	2	-	-	-	133	24	34	2
	94	1	1	5	-	-	-	2	-	-	9	-	-	-	180	27	38	9
	99	-	2	4	-	-	-	-	-	-	6	-	-	-	120	26	31	6
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	1	-	-	-	-	-	-	-	-	1	20			1
	99	-	-	-	-	-	-	1	-	-	-	-	-	1	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		33%			67%			33%			+10%							
'94		09%			45%			09%			- 9%							
'99		40%			40%			10%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	199	Dec:	0%					
										'94	220		9%					
										'99	200		10%					

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Chrysothamnus depressus</b>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	8	3	-	-	-	-	-	-	-	11	-	-	-	733	3	7	11
	94	4	-	2	-	-	-	-	-	-	6	-	-	-	120	3	7	6
	99	4	-	-	-	1	-	-	-	-	5	-	-	-	100	6	9	5
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	2	-	-	-	-	-	-	-	-	2	-	40		2	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		25%			00%			00%			-82%							
'94		00%			29%			00%			+ 0%							
'99		14%			29%			29%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	799	Dec:	0%			
												'94	140		0%			
												'99	140		29%			
<b>Chrysothamnus nauseosus</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	19	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	0		-			
<b>Chrysothamnus viscidiflorus</b>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20	18	16	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	20		-			
												'99	0		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		5	6		7	8	9	1	2	3	4	
<i>Eriogonum corymbosum</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	12	24	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'87	00%			00%			00%									
	'94	00%			00%			00%									
	'99	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	0		-			
<i>Eriogonum microthecum</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'87	00%			00%			00%									
	'94	00%			00%			00%									
	'99	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	40		-			
											'99	0		-			
<i>Gutierrezia sarothrae</i>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	3	-	-	-	-	-	-	-	3	-	-	-	60	8	10	3
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'87	00%			00%			00%									
	'94	00%			00%			00%									
	'99	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	60		-			
											'99	0		-			
<i>Juniperus osteosperma</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	2	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'87	00%			00%			00%									
	'94	00%			00%			00%									
	'99	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	40		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	1	-	-	8	-	-	11	-	-	-	220		11	
Y	87	2	-	-	-	-	-	-	-	-	1	-	-	1	133		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	6	-	-	2	-	-	-	-	-	8	-	-	-	160		8	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	3	-	-	1	-	-	1	-	-	5	-	-	-	100	-	5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			50%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	-			
												'94	0		-			
												'99	260		-			
Quercus gambelii																		
S	87	19	-	-	-	-	-	-	-	-	19	-	-	-	1266		19	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	-	-	-	3	-	-	6	-	-	-	120		6	
Y	87	58	5	-	-	-	-	-	-	-	63	-	-	-	4200		63	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	5	-	-	20	-	-	3	-	-	28	-	-	-	560		28	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	79	2	-	15	-	-	-	-	-	95	-	-	1	1920	36	96	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		08%			00%			00%										
'94		00%			00%			00%										
'99		02%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	4200	Dec:	0%			
												'94	0		0%			
												'99	2500		1%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Symphoricarpos oreophilus																		
Y	'87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	'94	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	'99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	'87	3	3	-	-	-	-	-	-	-	6	-	-	-	400	17	23	6
	'94	3	-	-	6	-	-	1	-	-	10	-	-	-	200	12	22	10
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13	27	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		33%			00%			00%			-53%							
'94		00%			00%			00%			-64%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	600	Dec:	-			
												'94	280		-			
												'99	100		-			

Trend Study 15-4-99

Study site name: South Creek Chaining .

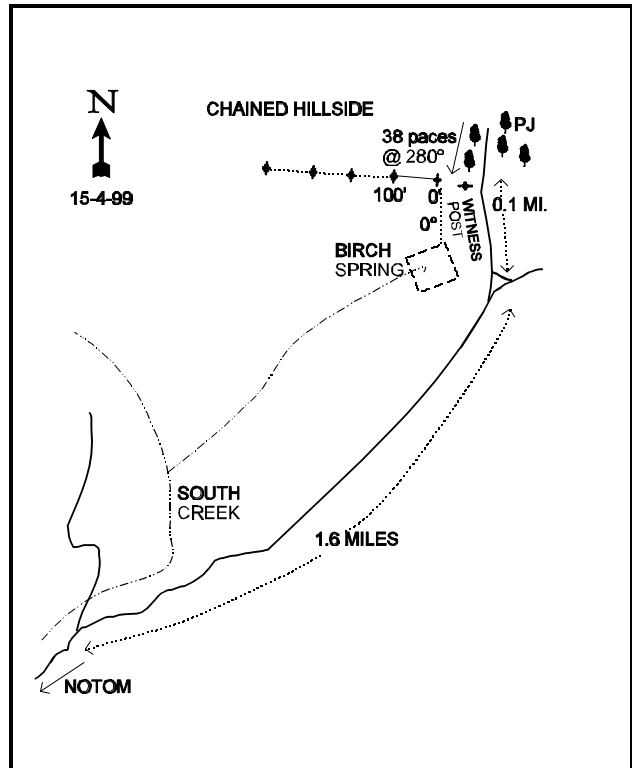
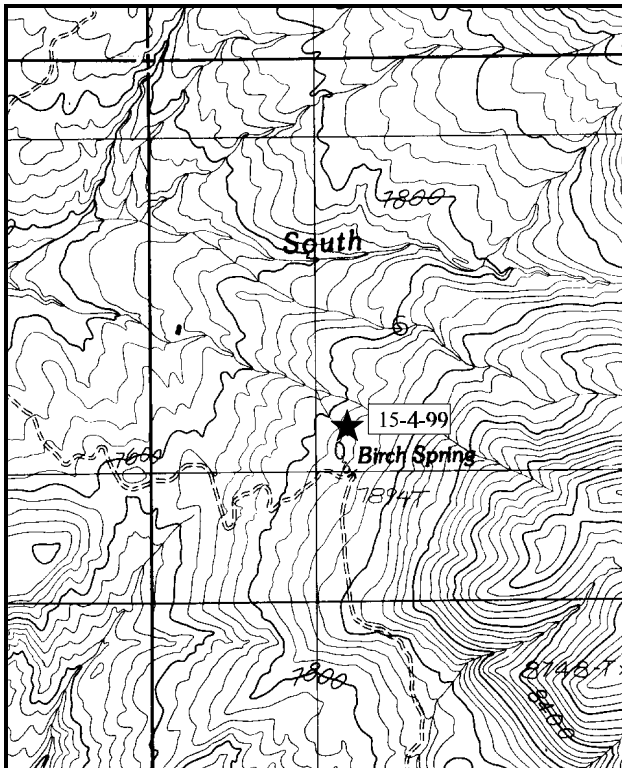
Range type: Chained, Seeded P-J .

Compass bearing: frequency baseline 275°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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

UTM 4211131.359 N , 513082.932 E

## DISCUSSION

### Trend Study No. 15-4 (38-4)

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. Mean annual precipitation is probably between 12 and 14 inches, based on the existing plant community occupying the site. 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 within a key area for buffalo and mule deer. Pellet group data also indicates a high amount of rabbit use. 1999 pellet group data estimate a moderate level of use on the site with 13 deer and 39 cow days use/acre (32 ddu/ha and 96 cdu/ha). Also, 7 buffalo days use/acre (16 bdu/ha) were estimated at the site. 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. A lone doe was seen on June 3 when the site was read.

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 gentler 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 rubber rabbitbrush are the most abundant browse species on the site. Sagebrush is the key browse at this site. The population has rapidly increased with an estimated 2,740 plants/acre in 1999, up from 160 plants/acre in 1994. Much of this increase comes from the explosion of young plants in the population (1,060 in 1999 compared to 60 in 1994) which greatly increased due to the high number of seedlings that were sampled in 1994 (6,120 seedlings/acre). Currently, an additional 4,560 seedlings/acre were estimated which could result in the further increases of sagebrush if a high proportion of these can persist on the site. Mature sagebrush plants also greatly increased from 100 per acre in 1994 to 1,680 in 1999. The population appears healthy with most plants showing light use and good vigor, with no decadent plants sampled. Rubber rabbitbrush follows closely the pattern of sagebrush. A high number of seedlings sampled in 1994 resulted in an increased number of young plants in 1999, from 760 plants/acre in 1994 to 1,860 plants/acre in 1999. The mature age class also doubled between 1994 and 1999. Decadency is low, vigor good, with 25% of the population showing moderate use. This population looks to be expanding in the future, and may be a cause for concern. Both sagebrush and rabbitbrush had numerous insect galls on the stems in 1999.

Utah serviceberry, snowberry, and true mountain mahogany are also at the site, however none are very abundant with only a single plant of each species being sampled in 1999. 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 low abundance.

Crested wheatgrass and alfalfa provide the bulk of the forage found in the chaining. These provide early spring green-up and fall regrowth for wildlife use. Both species had received heavy utilization prior to the time this trend study was established in June of 1987. During the 1994 reading, utilization appeared light. Utilization on crested wheatgrass was not uniform in 1999, with some areas showing little or no use while others showed heavy use. Alfalfa makes up 69% of the forb cover, or 11% of the total vegetative cover at the site. It showed moderate utilization in 1999. This species is decreasing in frequency however, which is most



likely the result of the extended drought. Currently, crested wheatgrass provides 93% of the grass cover, 73% of the herbaceous cover, or 53% 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 show light hedging. On the down side, 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

browse - slightly down because of the significant increase in green rabbitbrush density

herbaceous understory - stable

#### 1999 TREND ASSESSMENT

Trend for soil is slightly down. Percent cover of bare ground, rock and pavement all increased, while protective ground cover provided by vegetation and litter decreased. 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. Trend for herbaceous understory is stable. Sum of nested frequency for perennial species 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 - slightly down

browse - slightly down, the increase in mountain big sagebrush being offset by the increase in rubber rabbitbrush

herbaceous understory - stable

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	293	294	294	95	92	92	22.07	20.97
G	Agropyron smithii	<sub>ab</sub> 5	<sub>a</sub> -	<sub>b</sub> 13	2	-	6	-	.77
G	Bromus tectorum (a)	-	<sub>a</sub> 24	<sub>b</sub> 57	-	9	22	.26	.63
G	Poa fendleriana	3	1	2	1	1	1	.00	.15
G	Sitanion hystrix	<sub>b</sub> 42	<sub>a</sub> 4	<sub>a</sub> -	23	2	-	.01	-
Total for Annual Grasses		0	24	57	0	9	22	0.26	0.62
Total for Perennial Grasses		343	299	309	121	95	99	22.08	21.89
Total for Grasses		343	323	366	121	104	121	22.35	22.52
F	Arabis spp.	-	-	2	-	-	1	-	.00
F	Artemisia ludoviciana	3	1	6	1	1	2	.00	.06
F	Astragalus henrimontanensis	7	5	6	4	3	4	.01	.04
F	Casella bursa-pastoris	-	-	3	-	-	1	-	.00
F	Chenopodium album (a)	-	3	-	-	2	-	.01	-
F	Chaenactis douglasii	-	-	2	-	-	1	-	.00
F	Chorispora tenella (a)	-	-	3	-	-	1	-	.38
F	Cirsium vulgare	<sub>b</sub> 9	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	Cryptantha spp.	-	2	-	-	1	-	.00	-
F	Descurainia pinnata (a)	-	<sub>b</sub> 33	<sub>a</sub> 9	-	15	3	.10	.04
F	Erigeron spp.	-	-	1	-	-	1	-	.03
F	Hymenoxys acaulis	-	3	2	-	1	1	.00	.00
F	Lappula occidentalis (a)	-	<sub>a</sub> -	<sub>b</sub> 64	-	-	31	-	.38
F	Lesquerella kingii	<sub>a</sub> 18	<sub>b</sub> 43	<sub>ab</sub> 42	10	23	21	.29	.25
F	Leucopoa kingii	-	13	-	-	5	-	.07	-
F	Lomatium spp.	<sub>a</sub> -	<sub>b</sub> 16	-	-	6	-	.43	-
F	Machaeranthera canescens	1	-	6	1	-	2	-	.18
F	Medicago sativa	<sub>b</sub> 110	<sub>a</sub> 73	<sub>a</sub> 71	47	32	31	6.50	4.38
F	Phlox longifolia	<sub>a</sub> -	<sub>b</sub> 13	<sub>a</sub> -	-	6	-	.03	-
F	Polygonum douglasii (a)	-	57	41	-	27	18	.51	.11
F	Sisymbrium altissimum (a)	-	-	2	-	-	1	-	.00
F	Sphaeralcea coccinea	<sub>b</sub> 35	<sub>ab</sub> 20	<sub>a</sub> 17	20	12	8	.14	.11
F	Taraxacum officinale	<sub>b</sub> 27	<sub>a</sub> 3	<sub>b</sub> 21	11	1	12	.00	.38
F	Unknown forb-perennial	6	-	-	2	-	-	-	-
Total for Annual Forbs		0	93	119	0	44	54	0.62	0.92
Total for Perennial Forbs		216	192	179	99	91	85	7.50	5.46
Total for Forbs		216	285	298	99	135	139	8.12	6.38

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

BROWSE TRENDS --  
Herd unit 15 , Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Amelanchier utahensis	2	1	-	-
B	Artemisia tridentata vaseyana	7	33	1.30	3.87
B	Cercocarpus montanus	0	1	-	-
B	Chrysothamnus nauseosus graveolens	37	44	1.46	5.48
B	Juniperus osteosperma	0	0	.85	.15
B	Pinus edulis	0	3	1.74	.85
B	Ribes cereum cereum	0	0	.00	-
B	Rosa woodsii	0	0	-	-
B	Symphoricarpos oreophilus	2	2	-	.18
Total for Browse		48	84	5.36	10.55

CANOPY COVER --  
Herd unit 15 , Study no: 4

Species	Percent Cover '09
Juniperus osteosperma	1
Pinus edulis	1

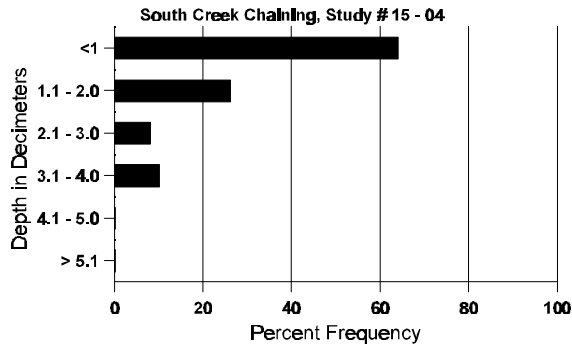
BASIC COVER --  
Herd unit 15 , Study no: 4

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	327	331	7.25	39.24	38.48
Rock	296	279	12.25	13.10	18.34
Pavement	262	228	9.75	3.17	6.53
Litter	377	354	49.75	22.01	28.75
Cryptogams	4	7	0	.03	.04
Bare Ground	279	279	21.00	10.62	18.14

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 04, Study Name: South Creek Chaining

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.4	49.2 (14.1)	6.9	45.6	27.8	26.6	3.7	19.7	156.8	0.7

# Stoniness Index



## PELLET GROUP DATA -- Herd unit 15 , Study no: 4

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'04	'09	
Rabbit	31	39	N/A
Deer	6	4	13 (32)
Cattle	-	22	39 (96)
Buffalo	12	-	7 (17)

## BROWSE CHARACTERISTICS -- Herd unit 15 , Study no: 4

AGE	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	5	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	'87	-	-	2	-	-	-	-	-	-	-	-	-	-	66			2
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	1	-	-	1	-	-	-	-	-	-	-	40	34	55	2
	'99	-	-	-	-	-	1	-	-	-	-	-	-	-	20	17	30	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'87		00%			100%			00%				-39%						
'94		00%			100%			00%				-50%						
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'94	40		-			
												'99	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Artemisia tridentata vaseyana</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	58	-	-	-	-	-	248	-	-	306	-	-	-	6120		306	
	99	228	-	-	-	-	-	-	-	-	228	-	-	-	4560		228	
Y	87	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	99	51	2	-	-	-	-	-	-	-	46	7	-	-	1060		53	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100	16	28	
	99	74	10	-	-	-	-	-	-	-	82	2	-	-	1680	14	22	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%			+79%							
'94		00%			00%			00%			+94%							
'99		09%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'94	160		-			
												'99	2740		-			
<b>Cercocarpus montanus</b>																		
M	87	-	-	2	-	-	-	-	-	-	2	-	-	-	66	8	12	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	22	
	99	-	-	-	-	-	1	-	-	-	1	-	-	-	20	9	27	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%										
'94		00%			00%			00%										
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'94	0		-			
												'99	20		-			



A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
<b>Ribes cereum cereum</b>													
S	87	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	1	-	-	-	-	1	-	1	
	99	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	0	-	0	
	99	-	-	-	-	-	-	-	-	0	68 68	0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		00%		00%		00%							
'94		00%		00%		00%							
'99		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-
										'94	0		-
										'99	0		-
<b>Rosa woodsii</b>													
M	87	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	0	13 9	0	
	99	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		00%		00%		00%							
'94		00%		00%		00%							
'99		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-
										'94	0		-
										'99	0		-
<b>Symphoricarpos oreophilus</b>													
S	87	-	1	-	-	-	-	-	-	1	-	1	
	94	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	3	-	-	-	-	-	3	-	3	
	94	2	-	-	-	-	-	-	-	2	-	2	
	99	-	-	-	1	-	-	-	-	1	-	1	
M	87	-	-	2	-	-	-	-	-	2	13 24	2	
	94	-	-	-	-	-	-	-	-	0	18 33	0	
	99	1	-	-	-	-	-	-	-	1	13 21	1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		00%		100%		00%		-76%					
'94		00%		00%		00%		+ 0%					
'99		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	166	Dec:	-
										'94	40		-
										'99	40		-

Trend Study 15-5-99

Study site name: Bates Knob .

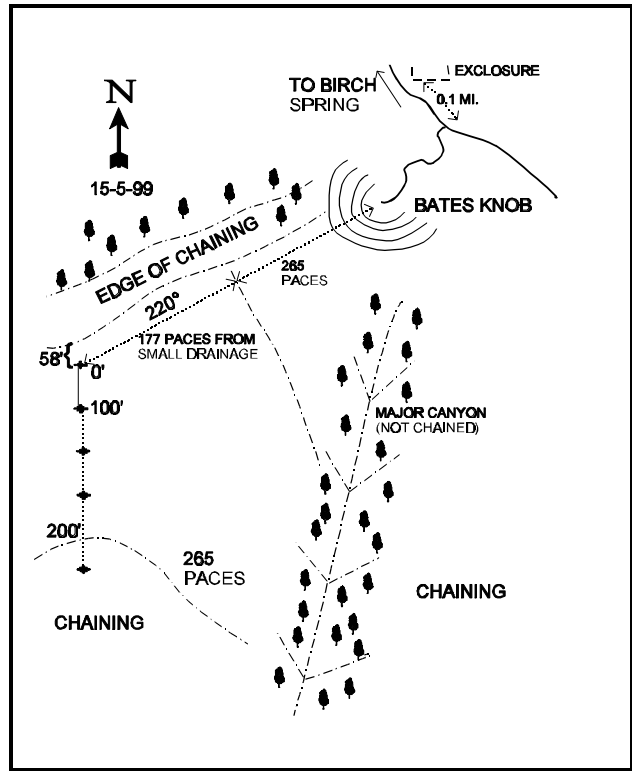
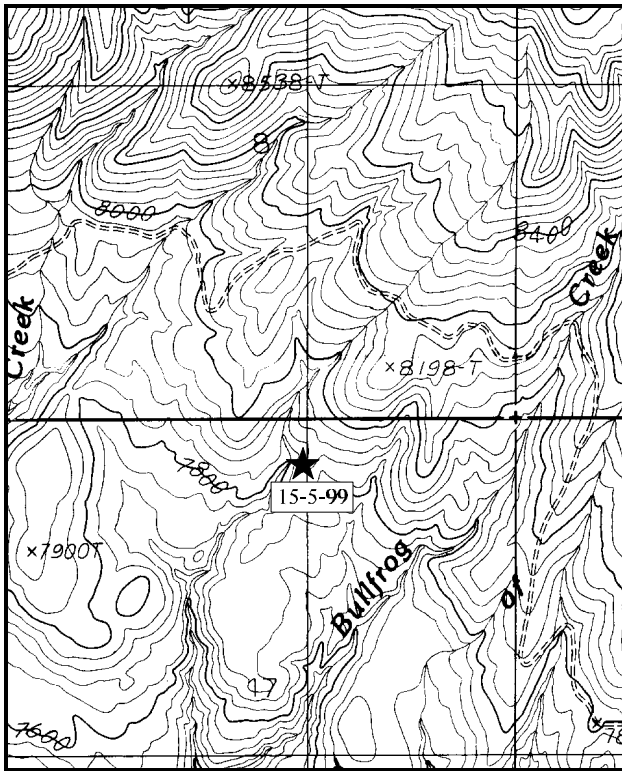
Range type: Chained, Seeded P-J .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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 0.25 miles to a cattleguard. Continue another 1 mile to a cattleguard in an electric fence. From the electric fence, go 1.35 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 yards bearing 220°. 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

UTM 4208706.038 N , 514896.227 E



## DISCUSSION

### Trend Study No. 15-5 (38-5)

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. Precipitation would be expected to average 12-14 inches per year. 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 a key use area for buffalo. Seventy-five head of buffalo were observed near the site while data were being collected in July of 1987. Numerous buffalo 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 probably not be aware of buffalo using the chaining. Pellet group quadrat frequency for 1994 and 1999 showed a high quadrat frequency for rabbit pellet groups on this site. Pellet group data taken in 1999 show moderate to heavy use by grazing animals with 38 cow days use/acre (94 cdu/ha) being noted. Buffalo use was estimated at 26 buffalo days use/acre (64 bdu/ha). Deer use is light with nearly 3 days use/acre (7 ddu/ha) being estimated.

The soils at the site are a light colored, sandy clay loam of granitic origin. The reactivity of the soil is neutral (7.1 pH). The soil profile is rocky throughout, but not as much on the surface. The estimated effective rooting depth is 15 inches. There is an organic layer present near the surface, but it is not common to the entire site. Cattle and buffalo use is causing trails and dust bowls to form which could be a source of soil loss in the future. There is an acceptable amount of bare soil present (19% in 1999), as evidence of erosion is minimal at the present time. Downed trees left by the chaining are also piled in depressions and appear to limit erosion and to protect plants beneath them from over utilization. Organic matter is built up in some places due mostly to the chaining debris.

This site has few preferred shrubs. Rubber rabbitbrush density, estimated at 366 plants/acre in 1987, increased dramatically in 1994 to 6,100 plants/acre. In 1999, rubber rabbitbrush was split into two subspecies, green rubber rabbitbrush (*Chrysothamnus nauseosus graveolens*) a less palatable form, and white-stemmed rubber rabbitbrush (*Chrysothamnus nauseosus hololeucus*) a palatable subspecies utilized by wildlife. These two subspecies were easily separated in 1999 based on growth form and degree of hedging. Currently, the green rubber rabbitbrush population is mostly mature plants with an estimated density of 1,560 plants/acre. This subspecies has a large growth form, and shows little or no use. Recruitment for this species is slowing with 12% of the population consisting of young plants, and no seedlings being sampled in 1999. White-stemmed rubber rabbitbrush has an estimated population of 4,300 plants/acre with 73% of these being mature. This subspecies has a lower growth form and has received a lot of use. Sixty-two percent of the plants sampled in 1999 showed moderate use. Recruitment is good with 25% of the population classified as young. In 1994, biotic and reproductive potentials of rabbitbrush were very high (371%) indicating a dynamically increasing population. However, very few seedlings of either subspecies were sampled in 1999, a result of the extended drought limiting the number that actually became established. The number of young plants of both subspecies summed together is lower than the 1994 estimates. It appears that rabbitbrush at the site is becoming more stable.

Mountain big sagebrush has continued to increase since 1987. The population was estimated at 66 plants/acre in 1987, increasing to 1,780 in 1994, and 4,740 plants/acre by 1999. The number of seedlings between 1994 and 1999 declined from 4,480 plants/acre to 220. However, recruitment is high with the number of young in the population nearly doubling from 1,180 to 2,260 plants/acre between 1994 and 1999. Decadency has remained low over all years as has the number of dead in the population. The amount of use on sagebrush is increasing as 42% of the population shows moderate use in 1999. All plants showed only light use in 1994. The age class structure of sagebrush along with few decadent or dead plants and good recruitment indicates a continued increase of this species in the future. Pinyon and juniper trees are not abundant in this area with an estimated 16 pinyon and 20 juniper trees/acre from point quarter data in 1999.

Crested wheatgrass and a rhizomatous alfalfa are the 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 with the continuing drought. Currently, both species are at similar levels as the 1994 reading, with sum of nested frequency slightly increasing for both. Both species were heavily utilized when the site was read in June 1999. The annual cheatgrass brome increased significantly in sum of nested frequency value between 1994 and 1999, but is still low in abundance. It currently provides 15% of the grass cover and 7% of the total vegetative cover on the site. This species appears to be expanding and is cause for concern should it continue to increase. Other forbs at the site are diverse, but most are infrequent. Many annual species are present in the understory, although 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 on the site since the last reading. This increase however, is at the expense of the desirable herbaceous species crested wheatgrass and alfalfa. Currently, the most numerous browse on the site is an unpalatable subspecies of 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

browse - down due to increase in unpalatable shrubs

herbaceous understory - down

#### 1999 TREND ASSESSMENT

Trend for soils is 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 buffalo. 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 mostly good vigor. Another palatable shrub, white-stemmed rubber rabbitbrush appears stable to slightly increasing with 1,060 young plants/acre and very few decadent plants. Vigor is good and utilization mostly moderate. The less palatable green rubber rabbitbrush has three times fewer plants in the population than white-stemmed, and appears to be stable with few young or seedlings sampled. Overall trend for browse is slightly up. The herbaceous understory shows a stable trend, although the species composition is limited. Crested wheatgrass and alfalfa, the key species, 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

browse - up slightly

herbaceous understory - stable

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	<sub>b</sub> 300	<sub>a</sub> 253	<sub>a</sub> 269	98	90	88	10.38	11.92
G	Agropyron intermedium	3	-	-	1	-	-	-	-
G	Bouteloua gracilis	-	1	2	-	1	1	.00	.03
G	Bromus tectorum (a)	-	<sub>a</sub> 41	<sub>b</sub> 112	-	16	45	.71	2.20
G	Oryzopsis hymenoides	1	-	-	1	-	-	-	-
G	Sitanion hystrix	<sub>b</sub> 24	<sub>a</sub> 8	<sub>a</sub> 5	13	4	3	.04	.04
G	Sporobolus cryptandrus	1	1	2	1	1	1	.00	.00
Total for Annual Grasses		0	41	112	0	16	45	0.71	2.20
Total for Perennial Grasses		329	263	278	114	96	93	10.44	12.00
Total for Grasses		329	304	390	114	112	138	11.15	14.20
F	Arabis spp.	-	3	4	-	1	2	.00	.01
F	Artemisia ludoviciana	<sub>b</sub> 38	<sub>a</sub> 2	<sub>a</sub> -	17	1	-	.03	-
F	Aster spp.	-	1	-	-	1	-	.00	-
F	Astragalus spp.	<sub>a</sub> -	<sub>b</sub> 5	<sub>ab</sub> 2	-	3	1	.04	.00
F	Astragalus utahensis	-	4	1	-	2	1	.01	.00
F	Chenopodium album (a)	-	<sub>b</sub> 10	<sub>a</sub> -	-	4	-	.02	-
F	Chaenactis douglasii	3	1	3	2	1	2	.00	.01
F	Cymopterus purpureus	-	2	-	-	1	-	.00	-
F	Descurainia pinnata (a)	-	<sub>b</sub> 47	<sub>a</sub> 24	-	17	9	.25	.07
F	Eriogonum alatum	<sub>b</sub> 26	<sub>a</sub> -	<sub>a</sub> -	11	-	-	-	-
F	Gayophytum ramosissimum (a)	-	<sub>b</sub> 18	<sub>a</sub> 1	-	7	1	.03	.00
F	Hymenoxys acaulis	<sub>b</sub> 9	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	Lappula occidentalis (a)	-	<sub>b</sub> 88	<sub>a</sub> 15	-	33	6	.77	.03
F	Lesquerella kingii	21	26	43	9	12	21	.09	.30
F	Machaeranthera canescens	4	8	2	3	3	2	.01	.01
F	Medicago sativa	<sub>b</sub> 109	<sub>a</sub> 30	<sub>a</sub> 49	45	16	19	2.13	1.48
F	Penstemon spp.	-	-	3	-	-	1	-	.00
F	Petradoria pumila	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 6	-	-	4	-	.09
F	Phlox longifolia	-	2	5	-	1	2	.03	.01
F	Polygonum douglasii (a)	-	<sub>b</sub> 49	<sub>a</sub> 1	-	21	1	.25	.00
F	Senecio multilobatus	-	3	-	-	2	-	.03	-
F	Sisymbrium altissimum (a)	-	21	7	-	9	4	.24	.04
F	Tragopogon dubius	1	1	-	1	1	-	.00	-
F	Unknown forb-perennial	9	-	-	4	-	-	-	-
Total for Annual Forbs		0	233	48	0	91	21	1.57	0.15
Total for Perennial Forbs		220	88	118	95	45	55	2.41	1.93
Total for Forbs		220	321	166	95	136	76	3.99	2.09

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

BROWSE TRENDS --  
Herd unit 15 , Study no: 5

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Artemisia frigida	6	5	-	.06
B	Artemisia tridentata vaseyana	20	34	1.77	3.59
B	Chrysothamnus nauseosus graveolens	73	43	5.67	4.42
B	Chrysothamnus nauseosus hololeucus	0	60	-	3.35
B	Chrysothamnus viscidiflorus	3	1	.17	-
B	Gutierrezia sarothrae	13	29	.00	.64
B	Juniperus osteosperma	0	1	-	.38
B	Pinus edulis	0	4	1.79	1.79
Total for Browse		115	177	9.42	14.25

CANOPY COVER --  
Herd unit 15 , Study no: 5

Species	Percent Cover '09
Pinus edulis	1

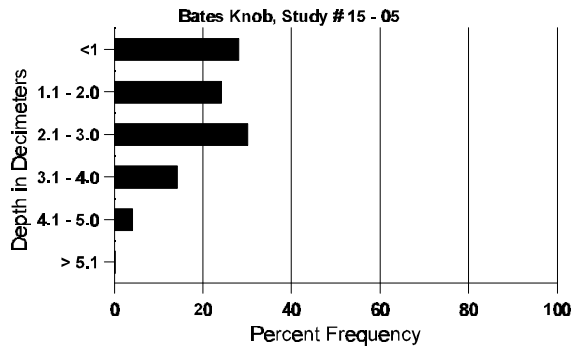
BASIC COVER --  
Herd unit 15 , Study no: 5

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	304	320	6.00	25.36	28.06
Rock	238	170	5.25	5.65	7.41
Pavement	181	179	5.50	.68	1.61
Litter	385	360	57.50	39.38	47.73
Cryptogams	-	6	0	0	.21
Bare Ground	268	262	25.75	18.68	19.11

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 05, Study Name: Bates Knob

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.0	50.4 (15.4)	7.1	46.0	25.4	28.6	2.8	16.9	121.6	0.7

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 15 , Study no: 5

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'94	'99	
Rabbit	14	20	N/A
Deer	3	8	3 (7)
Buffalo	14	10	26 (64)
Cattle	-	-	38 (94)

## BROWSE CHARACTERISTICS --

Herd unit 15 , Study no: 5

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4												
<i>Artemisia frigida</i>																	
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'99	13	-	-	-	-	-	-	-	13	-	-	-	260		13	
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	4	-	-	-	-	-	-	-	4	-	-	-	80		4	
	'99	33	-	-	-	-	-	-	-	33	-	-	-	660		33	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	33	-	-	-	-	-	-	-	33	-	-	-	660	5	9	33
	'99	9	-	-	-	-	-	-	-	9	-	-	-	180	2	3	9
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'99	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'87		00%		00%		00%											
'94		00%		00%		00%		+14%									
'99		00%		00%		02%											
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	0%				
										'94	740		0%				
										'99	860		2%				

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	224	-	-	-	-	-	-	-	-	-	-	-	4480			224
	99	11	-	-	-	-	-	-	-	-	-	-	-	220			11
Y	87	1	-	-	-	-	-	-	-	-	-	-	-	33			1
	94	55	-	-	2	-	-	2	-	-	-	-	-	1180			59
	99	91	22	-	-	-	-	-	-	-	-	-	-	2260			113
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	30	-	-	-	-	-	-	-	-	-	-	-	600	14	20	30
	99	40	72	5	2	-	-	-	-	-	-	-	-	2380	9	15	119
D	87	-	1	-	-	-	-	-	-	-	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	5	-	-	-	-	-	-	-	-	-	-	100			5
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		50%			00%			50%			+96%						
'94		00%			00%			00%			+62%						
'99		42%			02%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	50%		
												'94	1780		0%		
												'99	4740		2%		
<i>Chrysothamnus nauseosus graveolens</i>																	
S	87	8	1	-	-	-	-	-	-	-	-	-	-	300			9
	94	1011	3	-	2	-	-	-	-	-	-	-	-	20320			1016
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	5	1	-	-	-	-	-	-	-	-	-	-	200			6
	94	146	6	-	1	-	-	7	-	-	-	-	-	3200			160
	99	8	-	-	1	-	-	-	-	-	-	-	-	180			9
M	87	5	-	-	-	-	-	-	-	-	-	-	-	166	26	37	5
	94	83	39	1	-	-	-	-	-	-	-	-	-	2460	22	28	123
	99	58	4	-	-	-	-	-	-	-	-	-	-	1240	36	40	62
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	19	2	-	1	-	-	-	-	-	-	-	-	440			22
	99	7	-	-	-	-	-	-	-	-	-	-	-	140			7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		09%			00%			00%			+94%						
'94		15%			.32%			07%			-74%						
'99		05%			00%			01%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	366	Dec:	0%		
												'94	6100		7%		
												'99	1560		9%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus nauseosus hololeucus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	24	20	9	-	-	-	-	-	-	53	-	-	-	1060		53	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	99	16	113	27	-	-	-	-	-	-	156	-	-	-	3120	16	17	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	1	1	-	-	-	-	-	-	5	-	-	1	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		62%			17%			.46%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%				
											'94	0		0%				
											'99	4300		3%				
Chrysothamnus viscidiflorus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	22	-	-	-	-	-	-	-	-	22	-	-	-	440		22	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	5	6	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%			-75%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	80		-				
											'99	20		-				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total										
		1	2	3	4		1	2											
<i>Gutierrezia sarothrae</i>																			
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	1	-	-	-	-	-	-	-	1	-	-	-	20		1			
	99	4	-	-	-	-	-	-	-	4	-	-	-	80		4			
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	9	-	-	-	-	-	-	-	9	-	-	-	180		9			
	99	9	-	-	-	-	-	-	-	9	-	-	-	180		9			
M	87	6	-	-	-	-	-	-	-	6	-	-	-	200	8	5	6		
	94	9	2	-	-	-	-	-	-	11	-	-	-	220	20	31	11		
	99	69	-	-	-	-	-	-	-	69	-	-	-	1380	7	9	69		
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	99	3	-	-	-	-	-	-	-	1	-	-	2	60		3			
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	99	-	-	-	-	-	-	-	-	-	-	-	-	40		2			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'87		00%		00%		00%		+50%											
'94		10%		00%		00%		+75%											
'99		00%		00%		02%													
Total Plants/Acre (excluding Dead & Seedlings)										'87	200	Dec:	0%						
										'94	400		0%						
										'99	1620		4%						
<i>Juniperus osteosperma</i>																			
Y	87	1	-	-	-	-	-	-	-	1	-	-	-	33		1			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	99	1	-	-	-	-	-	-	-	1	-	-	-	20		1			
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	99	-	-	-	-	-	-	-	-	-	-	-	-	20		1			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'87		00%		00%		00%													
'94		00%		00%		00%													
'99		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'87	33	Dec:	-						
										'94	0		-						
										'99	20		-						



A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus edulis																	
Y	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	4
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-		
												'94	0		-		
												'99	80		-		

Trend Study 15-6-99

Study site name: Box Springs Chaining .

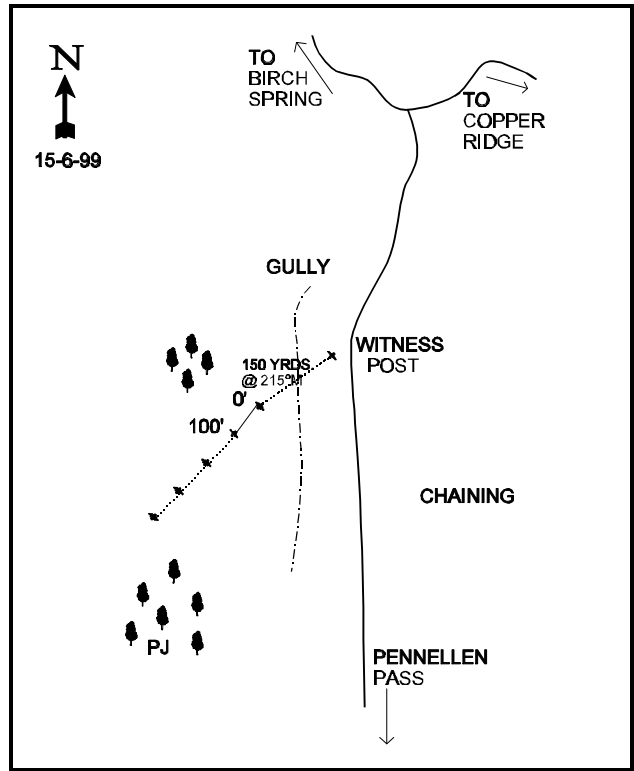
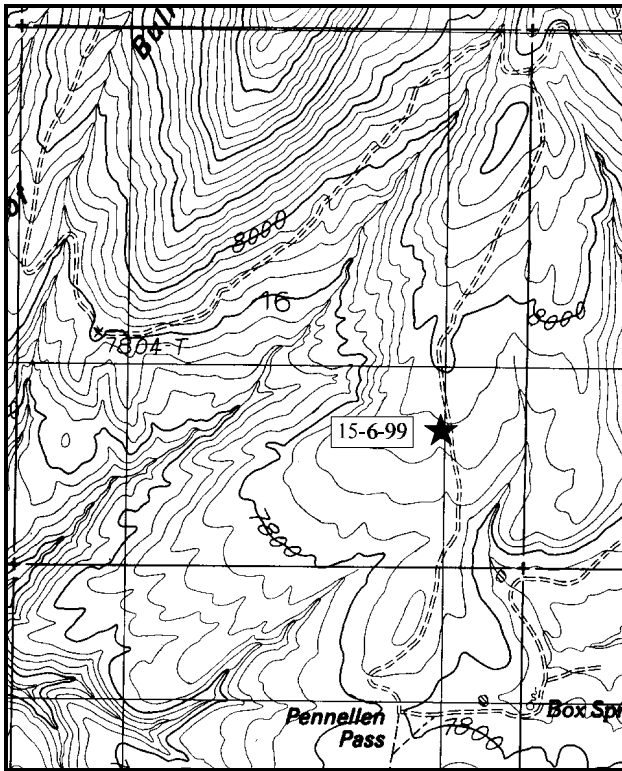
Range type: Chained, Seeded P-J .

Compass bearing: frequency baseline 204°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Birch Spring (T32S, R10E, Sec. 6), proceed southwest 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

UTM 4207744.556 N , 516878.631 E

## DISCUSSION

### Trend Study No. 15-6 (38-6)

The Box Springs Chaining study monitors range trend on a parcel of state land that was chained and seeded in 1984. Prior to the chaining, the site supported a dense stand of tall, mature pinyon with much fewer numbers of juniper. The elevation at the site is 7,900 feet which slopes gently to the south. The estimated mean annual precipitation is between 12 and 14 inches. Water is available for livestock and wildlife at Box Springs which is located about one-fourth mile southeast of the site. 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 bisects the chaining and is about one-fourth mile from the study site. Human use is expected to be light, with the exception of deer and buffalo hunts, and occasional use made by sightseers and livestock permittees. Pellet group data collected in 1999 indicate 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 at least from last fall, while the deer and buffalo are mostly from the spring and winter. This site was read on the 3<sup>rd</sup> of June.

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 which accounted for approximately 86% of the ground cover in 1987, 89% in 1994 and 91% by 1999. There is a slight decrease in relative cover of bare ground in 1999 coupled with an increase in pavement. There is evidence of light erosion with surface soil movement and minor pedestaling being noted around bunch grasses. However, protective ground cover from vegetation and litter is still high in relation to bare ground, thus minimizing erosion.

Young 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 better estimate with a much larger sample size. The densities for pinyon and juniper were on average estimated at respectively 78 and 45 trees/acre in 1994 and 1999. Basal diameter of pinyon was estimated at 3.5 inches in 1999, with juniper being just over three inches. Thirty-nine percent of the juniper and 10% of the pinyon sampled in 1999 were knockdown trees from the chaining. Pinyon and juniper currently provide 66% of the browse cover at this site.

Broom snakeweed is the most abundant shrub on the site with an estimated density of 800 plants/acre in 1994, decreasing to 620 plants/acre in 1999. This species appears to be stable with an evenly distributed age class. Bitterbrush planted by seed dribblers during the chaining was estimated at 266 seedlings/acre in 1987. By 1994, there was an estimated 120 bitterbrush plants/acre. Utilization was light and vigor good. By 1999, bitterbrush density is estimated at 100 plants/acre. There is no recruitment for bitterbrush with no seedling or young plants being sampled in 1999. Currently, 80% of the plants sampled show heavy use. These plants have received continual heavy use due to the low density and preference by wildlife resulting in a decumbent growth form. Mountain big sagebrush is also present on the site, but infrequent.

Intermediate wheatgrass and Fairway crested wheatgrass are the predominant seeded grasses. In 1999, both species remain at similar nested frequency and cover levels to those in 1994. Utilization was light on these species when the site was read in June 1999. Other seeded grasses include: smooth brome, sheep fescue, orchard grass, and Great Basin wildrye. Orchard grass and basin wildrye are infrequent, while sheep fescue and smooth brome slightly increased in nested frequency in 1999. Alfalfa was the most abundant forb in 1987 with a quadrat frequency of 31%. This alfalfa, a rhizomatous variety, was expected to increase on this site. However, with the continuing drought conditions which have occurred since the late 1980's and the resulting heavy use of the chainings by livestock and buffalo, alfalfa has declined significantly. It was

sampled in only one quadrat in both 1994 and 1999. Another seeded forb, small burnet, was also fairly common during the 1987 reading, but has declined significantly from a quadrat frequency of 14% to only 3% in 1994, and 1% in 1999.

#### 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 when it is 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 browse is stable. The herbaceous understory is still 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

browse - stable, but unimportant for this site

herbaceous understory - stable to slightly declining; up for grasses, but down for seeded forbs

#### 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 the browse total cover only make 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 and crested wheatgrass have remain 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

browse- stable

herbaceous understory-stable

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	<i>Agropyron cristatum</i>	167	187	186	68	75	74	6.28	6.65
G	<i>Agropyron intermedium</i>	227	216	198	84	76	68	7.56	6.84
G	<i>Bromus inermis</i>	78	94	97	35	35	39	2.31	2.99
G	<i>Dactylis glomerata</i>	<sub>b</sub> 39	<sub>a</sub> 21	<sub>a</sub> 10	19	10	4	1.59	.07
G	<i>Elymus cinereus</i>	<sub>a</sub> -	<sub>ab</sub> 5	<sub>b</sub> 6	-	2	3	.18	.33
G	<i>Festuca ovina</i>	<sub>a</sub> 62	<sub>b</sub> 101	<sub>c</sub> 139	31	42	58	5.35	6.50
G	<i>Sitanion hystrix</i>	1	-	2	1	-	1	-	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		574	624	638	238	240	247	23.30	23.39
Total for Grasses		574	624	638	238	240	247	23.30	23.39
F	<i>Arabis</i> spp.	6	7	4	2	3	2	.01	.01
F	<i>Astagalus cicer</i>	1	7	6	1	3	3	.04	.12
F	<i>Aster</i> spp.	-	3	-	-	1	-	.00	-
F	<i>Chaenactis douglasii</i>	<sub>a</sub> -	<sub>b</sub> 6	<sub>ab</sub> 3	-	4	2	.04	.06
F	<i>Descurainia pinnata</i> (a)	-	-	3	-	-	1	-	.00
F	<i>Hymenoxys acaulis</i>	-	1	1	-	1	1	.00	.00
F	<i>Ipomopsis aggregata</i>	-	-	3	-	-	1	-	.00
F	<i>Lappula occidentalis</i> (a)	-	2	-	-	1	-	.00	-
F	<i>Lesquerella kingii</i>	<sub>ab</sub> 19	<sub>a</sub> 8	<sub>b</sub> 36	10	3	17	.01	.16
F	<i>Machaeranthera canescens</i>	-	3	3	-	1	1	.03	.03
F	<i>Medicago sativa</i>	<sub>b</sub> 66	<sub>a</sub> 1	<sub>a</sub> 1	31	1	1	.03	.00
F	<i>Onobrychis viciaefolia</i>	<sub>a</sub> -	<sub>b</sub> 5	<sub>b</sub> -	-	4	-	.09	-
F	<i>Penstemon palmeri</i>	1	-	-	1	-	-	-	-
F	<i>Polygonum douglasii</i> (a)	-	2	-	-	1	-	.00	-
F	<i>Sanguisorba minor</i>	<sub>b</sub> 32	<sub>a</sub> 3	<sub>a</sub> 1	14	3	1	.19	.00
Total for Annual Forbs		0	4	3	0	2	1	0.00	0.00
Total for Perennial Forbs		125	44	58	59	24	29	0.47	0.40
Total for Forbs		125	48	61	59	26	30	0.48	0.40

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

BROWSE TRENDS --  
Herd unit 15 , Study no: 6

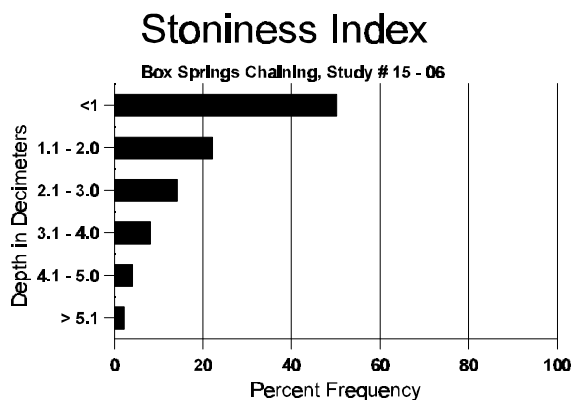
Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Artemisia tridentata vaseyana	4	2	.18	1.28
B	Chrysothamnus nauseosus graveolens	0	0	-	-
B	Echinocereus spp.	0	1	-	.00
B	Gutierrezia sarothrae	7	7	.18	.06
B	Juniperus osteosperma	0	4	3.15	2.34
B	Pinus edulis	0	4	.06	1.32
B	Purshia tridentata	6	5	.15	.56
Total for Browse		17	23	3.73	5.58

BASIC COVER --  
Herd unit 15 , Study no: 6

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	322	329	11.25	26.25	32.29
Rock	199	169	1.50	5.50	5.53
Pavement	189	206	.50	1.02	6.64
Litter	393	380	73.25	50.34	59.68
Cryptogams	-	6	0	0	.03
Bare Ground	227	219	13.50	11.39	10.23

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 06, Study Name: Box Springs Chaining

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	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 --  
Herd unit 15 , Study no: 6

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Rabbit	6	34	N/A
Deer	1	12	5 (12)
Cattle	-	6	38 (94)
Buffalo	7	4	15 (37)

BROWSE CHARACTERISTICS --  
Herd unit 15 , Study no: 6

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
<i>Artemisia tridentata vaseyana</i>																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	4	-	-	-	-	-	-	-	-	-	-	-	-	80	18	20	4
	'99	1	1	-	-	-	-	-	-	-	-	-	-	-	40	25	33	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'87			'94			'99			-50%							
		00%			00%			00%										
		00%			00%			00%										
		50%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	80		-			
												'99	40		-			
<i>Chrysothamnus nauseosus graveolens</i>																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	40	18	0
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'87			'94			'99										
		00%			00%			00%										
		00%			00%			00%										
		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	0		-			
<i>Echinocereus spp.</i>																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'87			'94			'99										
		00%			00%			00%										
		00%			00%			00%										
		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	20		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total		
		1	2	3	4					
<i>Gutierrezia sarothrae</i>										
S	87	-	-	-	-	-	-	0	0	
	94	1	-	-	-	-	-	20	1	
	99	6	-	-	-	-	-	120	6	
Y	87	-	-	-	-	-	-	0	0	
	94	16	-	-	-	-	-	320	16	
	99	9	-	-	-	-	-	180	9	
M	87	3	-	-	-	-	-	100	10 6	3
	94	24	-	-	-	-	-	480	7 8	24
	99	16	-	-	-	-	-	320	4 5	16
D	87	-	-	-	-	-	-	0	0	
	94	-	-	-	-	-	-	0	0	
	99	6	-	-	-	-	-	120	6	
X	87	-	-	-	-	-	-	0	0	
	94	-	-	-	-	-	-	0	0	
	99	-	-	-	-	-	-	20	1	
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>					
'87		00%	00%	00%	+88%					
'94		00%	00%	00%	-23%					
'99		00%	00%	19%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	100	Dec:	0%	
						'94	800		0%	
						'99	620		19%	
<i>Juniperus osteosperma</i>										
S	87	1	-	-	-	-	-	33	1	
	94	-	-	-	-	-	-	0	0	
	99	-	-	-	-	-	-	0	0	
Y	87	2	-	-	-	-	-	66	2	
	94	-	-	-	-	-	-	0	0	
	99	3	-	-	-	-	-	60	3	
M	87	-	-	-	-	-	-	0	0	
	94	-	-	-	-	-	-	0	0	
	99	1	-	-	-	-	-	20	1	
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>					
'87		00%	00%	00%						
'94		00%	00%	00%						
'99		00%	00%	00%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	66	Dec:	-	
						'94	0		-	
						'99	80		-	



A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Pinus edulis																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	87	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	169	79	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	233	Dec:	-				
											'94	0		-				
											'99	80		-				
Purshia tridentata																		
S	87	8	-	-	-	-	-	-	-	-	8	-	-	-	266		8	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	4	-	-	-	-	-	-	-	4	-	-	-	80	4	9	4
	99	1	-	-	-	-	2	-	-	2	5	-	-	-	100	4	17	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		67%			00%			00%			-17%							
'99		00%			80%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	120		-				
											'99	100		-				

Trend Study 15-7-99

Study site name: Airplane Spring .

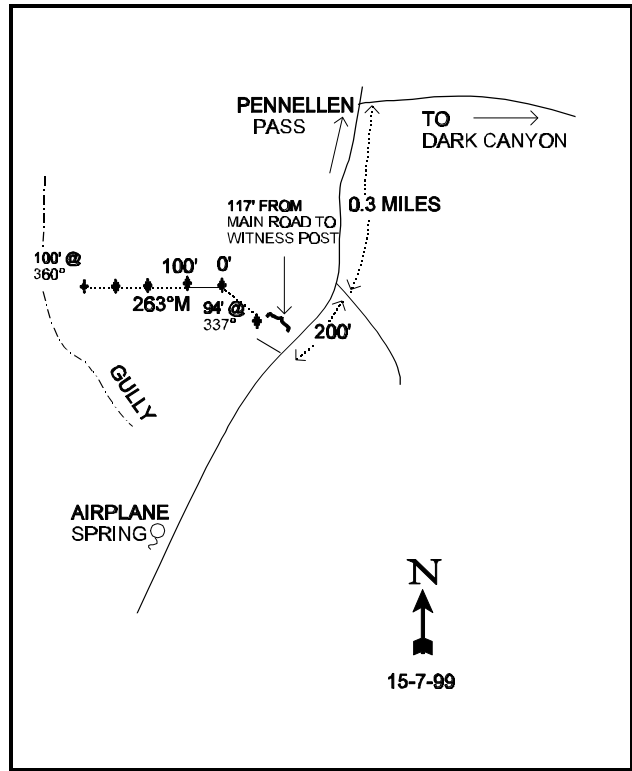
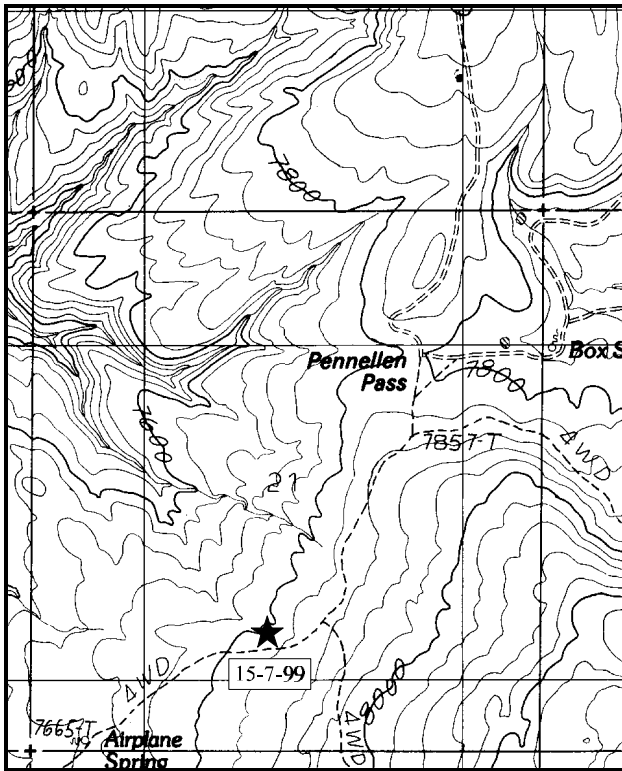
Range type: Chained, Seeded P-J .

Compass bearing: frequency baseline 263°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Birch Spring (T32S, R10E, Sec. 6), travel southwest 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 road. The first baseline stake is 94 feet northwest 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

UTM 4206189.450 N , 516486.643 E

## DISCUSSION

### Trend Study No. 15-7(38-7)

The Airplane Springs study site is located within the Airplane Springs 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. Precipitation is similar to that received at the Box Spring chaining (#15-6), which is an extension of the Airplane Springs chaining. This project was completed during the mid-1960's with some of the surviving trees now up to 10 feet in height. 1999 point quarter estimates the density of pinyon at 80 trees/acre with an average basal diameter of nearly 4 inches. Juniper density is estimated at 60 trees/acre with a basal diameter of nearly 4 inches. Both species combined have a canopy cover of 8% in 1999.

This portion of the chaining is in the Pennell Allotment and is a key area for buffalo and deer. The nearest water source is Airplane Spring which is one-half mile 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. During the 1994 reading, pellet group data indicated a high proportion of rabbit pellet groups compared to that of deer. Rabbit pellets were also high in 1999 with 84% of the 50 circular plots (100ft<sup>2</sup>) with pellet groups. Use from wildlife is currently low with 4 deer days use/acre (10 ddu/ha) estimated in 1999, and only 1 buffalo days use/acre (2 bdu/ha). Livestock use is moderate with an estimated 20 cow days use/acre (49 cdu/ha) in 1999.

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. Currently, erosion is minimal 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 slopes uphill 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 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. However, 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. The cover and browse provided by the adjacent mountain brush type coupled with the herbaceous forage and browse of the chained area contribute to making 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, and 5,100 by 1999. Some of the increase may be the result of the larger sample size taken in 1994. However, the change from 1994 to 1999 was from large increases in percent young and mature plants. Biotic potential (107%) is also very high with the number of seedlings sampled in 1999 increasing to 5,440 plants/acre, up from 3,400 plants in 1994. Due to the present age class distribution, this species appears to continue expanding. Use remains light and vigor is good for the majority of the population with abundant seed heads present from last year.

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. Mahogany plants are knee to waist high due to the heavy use received in the past. Serviceberry plants are large statured with some being 6 to 8 feet in height. 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. Bitterbrush is present, but only one plant was sampled in both 1994 and 1999.

The most abundant grasses on the site are seeded species. Crested wheatgrass nested frequency decreased between 1987 and 1994, but increased again in 1999. It currently provides 95% of the grass cover and 48% of the total vegetative cover on the site. Intermediate wheatgrass continues to decrease since 1987 with a nested

frequency value of 28 and a quadrat frequency of only 12. This would be expected with continuing drought. Both species were only lightly utilized in 1999. Native grasses have practically disappeared from the understory with a sum of nested frequency for all species together of only 21 in 1999. Forbs in the understory are diverse, but infrequent providing only 4% of the vegetative cover in 1999. The key species, alfalfa, was numerous in 1987, but like at other sites, this species has declined significantly during the 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.

#### 1994 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1987. The abundant herbaceous vegetative cover, combined with the gently slope 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 of perennial grasses and forbs have declined by 31% indicating a downward trend.

##### TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - down

#### 1999 TREND ASSESSMENT

Soils 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 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

browse- up

herbaceous understory- stable

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	<i>Agropyron cristatum</i>	<sub>b</sub> 306	<sub>a</sub> 234	<sub>ab</sub> 264	94	76	84	11.67	19.07
G	<i>Agropyron intermedium</i>	<sub>c</sub> 122	<sub>b</sub> 58	<sub>a</sub> 28	46	24	12	1.04	.64
G	<i>Bouteloua gracilis</i>	1	5	-	1	2	-	.01	-
G	<i>Bromus tectorum</i> (a)	-	6	-	-	2	-	.01	-
G	<i>Festuca ovina</i>	<sub>a</sub> 2	<sub>a</sub> -	<sub>b</sub> 8	2	-	5	-	.24
G	<i>Oryzopsis hymenoides</i>	-	-	2	-	-	2	-	.03
G	<i>Poa fendleriana</i>	<sub>a</sub> -	<sub>c</sub> 19	<sub>b</sub> 10	-	10	4	.15	.10
G	<i>Sitanion hystrix</i>	<sub>c</sub> 73	<sub>b</sub> 28	<sub>a</sub> 1	37	11	1	.15	.01
Total for Annual Grasses		0	6	0	0	2	0	0.00	0
Total for Perennial Grasses		504	344	313	180	123	108	13.03	20.11
Total for Grasses		504	350	313	180	125	108	13.05	20.11
F	<i>Arabis</i> spp.	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 11	-	-	4	-	.02
F	<i>Aster</i> spp.	-	4	-	-	2	-	.01	-
F	<i>Astragalus</i> spp.	3	-	2	1	-	1	-	.03
F	<i>Castilleja</i> spp.	-	-	4	-	-	2	-	.03
F	<i>Cymopterus</i> spp.	-	3	-	-	2	-	.01	-
F	<i>Erigeron eatonii</i>	27	29	15	12	13	8	.29	.09
F	<i>Eriogonum umbellatum</i>	-	3	2	-	1	1	.03	.03
F	<i>Gayophytum ramosissimum</i> (a)	-	<sub>b</sub> 12	<sub>a</sub> -	-	5	-	.02	-
F	<i>Hedysarum boreale</i>	-	2	-	-	1	-	.03	-
F	<i>Hymenoxys acaulis</i>	14	8	10	8	4	6	.02	.05
F	<i>Hymenoxys richardsonii</i>	-	-	6	-	-	2	-	.01
F	<i>Lappula occidentalis</i> (a)	-	<sub>b</sub> 19	<sub>a</sub> 5	-	10	4	.05	.02
F	<i>Lesquerella kingii</i>	<sub>a</sub> 2	<sub>a</sub> 4	<sub>b</sub> 19	1	2	8	.01	.06
F	<i>Medicago sativa</i>	<sub>b</sub> 49	<sub>a</sub> 9	<sub>a</sub> 19	19	5	8	.90	.96
F	<i>Orthocarpus</i> spp. (a)	3	-	-	3	-	-	-	-
F	<i>Penstemon</i> spp.	<sub>a</sub> -	<sub>b</sub> 9	<sub>a</sub> 1	-	3	1	.01	.00
F	<i>Phlox longifolia</i>	<sub>a</sub> -	<sub>b</sub> 10	<sub>b</sub> 9	-	4	6	.02	.05
F	<i>Polygonum douglasii</i> (a)	-	7	1	-	2	1	.01	.00
F	<i>Schoenocrambe linifolia</i>	<sub>b</sub> 15	<sub>a</sub> 3	<sub>a</sub> -	7	1	-	.00	-
F	<i>Sphaeralcea coccinea</i>	3	7	7	2	4	4	.33	.07
F	<i>Tragopogon dubius</i>	<sub>b</sub> 3	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
Total for Annual Forbs		3	38	6	3	17	5	0.08	0.02
Total for Perennial Forbs		117	91	105	54	42	51	1.68	1.44
Total for Forbs		120	129	111	57	59	56	1.77	1.46

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

BROWSE TRENDS --  
Herd unit 15 , Study no: 7

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Amelanchier utahensis	9	6	1.11	1.01
B	Artemisia nova	41	54	3.51	6.68
B	Artemisia tridentata vaseyana	3	0	.38	-
B	Cercocarpus montanus	9	11	1.62	1.25
B	Chrysothamnus depressus	4	10	.15	.03
B	Chrysothamnus nauseosus graveolens	2	3	.00	.00
B	Chrysothamnus viscidiflorus	4	5	.03	.00
B	Eriogonum microthecum	0	0	-	-
B	Gutierrezia sarothrae	14	12	.38	.21
B	Juniperus osteosperma	0	5	1.25	2.00
B	Opuntia spp.	2	1	.00	-
B	Pinus edulis	0	6	4.11	6.48
B	Purshia tridentata	1	1	.15	.00
B	Quercus gambelii	0	1	-	-
B	Ribes spp.	0	1	-	.03
B	Sclerocactus	0	1	-	.03
B	Symphoricarpos oreophilus	2	2	.16	.03
Total for Browse		91	119	12.90	17.80

CANOPY COVER --  
Herd unit 15 , Study no: 7

Species	Percent Cover '09
Amelanchier utahensis	.20
Cercocarpus montanus	.40
Juniperus osteosperma	1
Pinus edulis	7

BASIC COVER --  
Herd unit 15 , Study no: 7

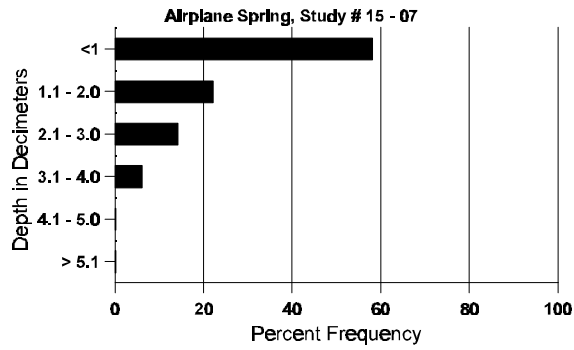
Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	306	304	6.50	28.12	37.69
Rock	305	288	19.50	22.58	28.07
Pavement	273	248	4.25	2.94	9.41
Litter	380	358	57.50	33.31	28.98
Cryptogams	21	18	.50	.18	.25
Bare Ground	290	248	11.75	11.27	12.93

SOIL ANALYSIS DATA --

Herd Unit 15, Study # 07, Study Name: Airplane Spring

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	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

### Stoniness Index



PELLET GROUP DATA --

Herd unit 15 , Study no: 7

Type	Quadrat Frequency	
	04	09
Rabbit	18	61
Deer	8	12
Cattle	-	5
Buffalo	-	1

Pellet Transect Days Use/Acre (ha)
09
N/A
4 (10)
20 (49)
1 (2)

BROWSE CHARACTERISTICS --  
Herd unit 15 , Study no: 7

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Amelanchier utahensis</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	4	-	-	-	-	-	-	4	-	-	-	133	33	22	4
	94	5	3	-	-	-	1	-	-	-	9	-	-	-	180	46	58	9
	99	6	3	-	-	-	1	-	-	-	10	-	-	-	200	57	56	10
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%			+25%							
'94		27%			09%			09%			+ 0%							
'99		36%			09%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	166	Dec:	0%				
											'94	220		9%				
											'99	220		0%				
<b>Artemisia nova</b>																		
S	87	121	-	-	-	-	-	-	-	-	121	-	-	-	4033		121	
	94	170	-	-	-	-	-	-	-	-	169	-	1	-	3400		170	
	99	272	-	-	-	-	-	-	-	-	272	-	-	-	5440		272	
Y	87	30	1	1	-	-	-	-	-	-	32	-	-	-	1066		32	
	94	35	-	-	-	-	-	-	-	-	33	-	2	-	700		35	
	99	85	3	1	-	-	-	-	-	-	89	-	-	-	1780		89	
M	87	14	3	-	-	-	-	-	-	-	17	-	-	-	566	14	21	17
	94	113	-	-	6	-	-	-	-	-	94	-	25	-	2380	11	17	119
	99	100	24	16	-	-	-	-	-	-	140	-	-	-	2800	11	22	140
D	87	1	-	-	-	-	-	-	-	-	-	-	-	1	33		1	
	94	21	-	-	1	-	-	-	-	-	17	-	2	3	440		22	
	99	9	4	4	2	6	1	-	-	-	25	-	-	1	520		26	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		08%			02%			02%			+53%							
'94		00%			00%			18%			+31%							
'99		15%			09%			.39%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1665	Dec:	2%				
											'94	3520		13%				
											'99	5100		10%				



A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																		
S	87	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	94	14	-	-	1	-	-	-	-	-	15	-	-	-	300		15	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	17	13	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	16	26	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	33	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-55%							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	133	Dec:	-				
											'94	60		-				
											'99	0		-				
<i>Cercocarpus montanus</i>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	87	-	1	1	-	-	-	-	-	-	2	-	-	-	66	21	30	
	94	2	2	3	1	-	1	-	-	-	9	-	-	-	180	31	28	
	99	4	1	3	-	-	4	-	-	-	12	-	-	-	240	42	38	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	1	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		50%			50%			00%			+63%							
'94		22%			44%			00%			+47%							
'99		06%			47%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	0%				
											'94	180		0%				
											'99	340		6%				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus depressus																		
S	87	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	11	-	-	-	-	-	-	-	11	-	-	-	366		11	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	4	10	
	94	4	-	-	1	-	-	-	-	-	5	-	-	-	100	6	14	
	99	2	5	1	-	-	2	-	-	-	10	-	-	-	200	3	6	
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	3	-	-	1	-	-	-	3	-	-	1	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		85%			00%			00%			-77%							
'94		00%			00%			00%			+64%							
'99		36%			50%			07%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	432	Dec:	8%				
											'94	100		0%				
											'99	280		29%				
Chrysothamnus nauseosus graveolens																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	-	1	1	-	-	-	-	-	-	1	-	1	-	40	20	28	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	26	30	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		50%			50%			50%			+33%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	40		-				
											'99	60		-				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	7	-	-	-	-	-	-	-	-	7	-	-	-	140	3	6	7
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	9	12	4
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%			-22%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%				
											'94	180		22%				
											'99	140		14%				
Eriogonum microthecum																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	13	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	0		-				
											'99	0		-				

A Y G R E		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	99	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
Y	87	25	-	-	-	-	-	-	-	-	25	-	-	-	833		25	
	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
	99	24	-	-	-	-	-	-	-	-	24	-	-	-	480		24	
M	87	17	-	-	-	-	-	-	-	-	17	-	-	-	566	10	8	17
	94	20	-	-	-	-	-	-	-	-	20	-	-	-	400	6	7	20
	99	24	-	-	-	-	-	-	-	-	24	-	-	-	480	6	8	24
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	3	-	-	-	-	-	-	-	-	-	-	-	3	60		3	
	99	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-53%							
'94		00%			00%			09%			+34%							
'99		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1399	Dec:	0%			
												'94	660		9%			
												'99	1000		4%			
<i>Juniperus osteosperma</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	-	1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	100	Dec:	-			
												'94	0		-			
												'99	100		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	0	1	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%			-50%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	40		-			
												'99	20		-			
Pinus edulis																		
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140	-	7	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	100	Dec:	-			
												'94	0		-			
												'99	160		-			
Purshia tridentata																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	24	
	99	-	-	-	-	-	1	-	-	-	1	-	-	-	20	74	76	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			100%			00%			+ 0%							
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'94	20		100%			
												'99	20		0%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Quercus gambelii</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	18	22	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%				
											'94	0		0%				
											'99	160		13%				
<b>Ribes spp.</b>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	60	96	
	99	-	-	-	-	-	-	-	1	-	1	-	-	-	20	64	67	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	0		-				
											'99	20		-				
<b>Sclerocactus</b>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	0		-				
											'99	20		-				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total		
		1	2	3	4		1	2			
Symphoricarpos oreophilus											
S	87	2	-	-	-	-	-	-	2	-	2
	94	2	-	-	-	-	-	-	2	-	2
	99	-	-	-	-	-	-	-	0	-	0
Y	87	5	3	1	-	-	-	-	9	-	9
	94	1	-	-	-	-	-	-	1	-	1
	99	1	-	-	-	-	-	-	1	-	1
M	87	-	1	6	-	-	-	-	7	-	7
	94	-	1	-	-	-	-	-	1	-	1
	99	1	-	-	-	-	-	-	1	-	1
D	87	-	-	1	-	-	-	-	1	-	1
	94	-	-	-	-	-	-	-	0	-	0
	99	-	-	-	-	-	-	-	0	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		24%		47%		00%		-93%			
'94		50%		00%		00%		+ 0%			
'99		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	566	Dec:	6%		
						'94	40		0%		
						'99	40		0%		

Trend Study 15-8-99

Study site name: Garden Basin .

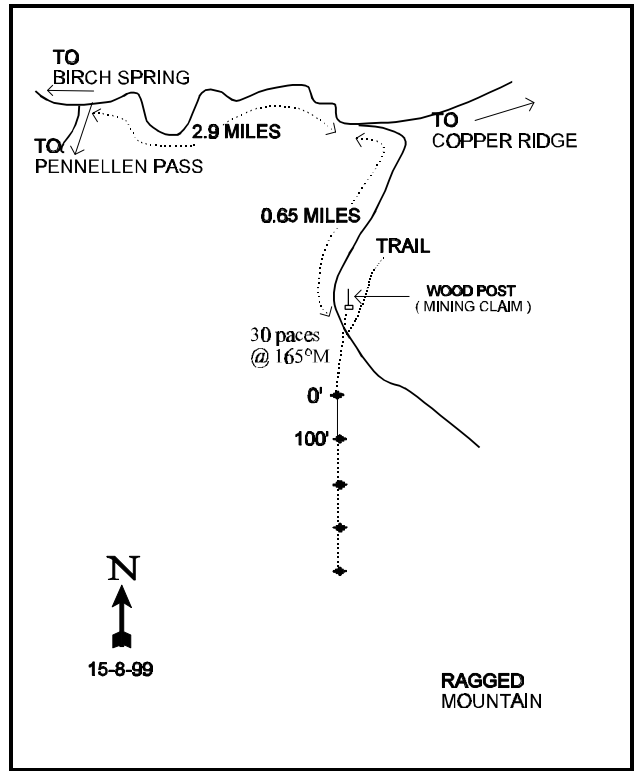
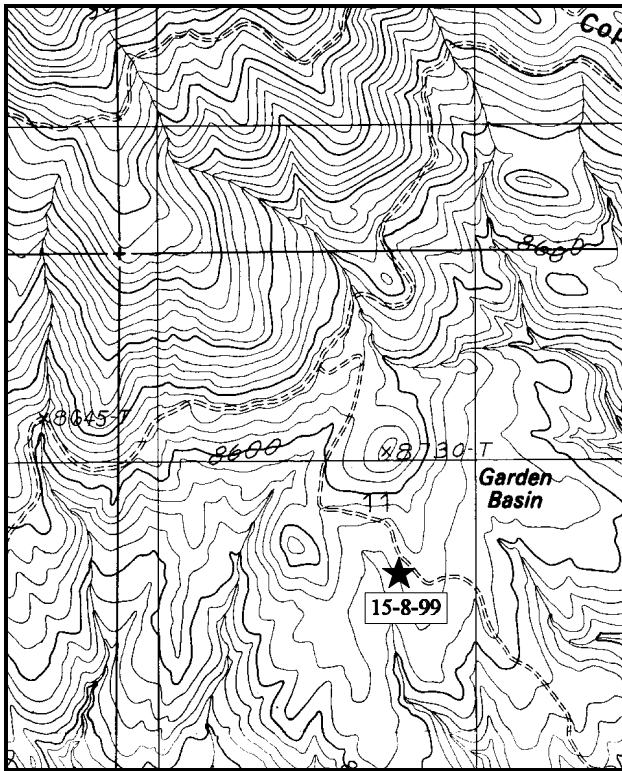
Range type: Pinyon-Juniper .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

This transect can be reached from Birch Spring by driving southwest 5.1 miles to a major intersection. Bear left and continue 2.9 miles to a road on the right. Turn and go down this road south toward Ragged Mountain for 0.65 miles to a white PVC mining claim post on the left side of the road. The 0-foot baseline stake is 30 paces away at a bearing of 165°M, and is marked by browse tag #7133.



Map Name: Mount Ellen

Diagrammatic Sketch

Township 32S , Range 10E , Section 11

UTM 4209602.004 N , 519849.173 E



## DISCUSSION

### Trend Study No. 15-8(38-8)

The Garden Basin area has been proposed for habitat improvement by the BLM and is included as a project in the Henry Mountain Coordinated Resource Management Plan. This site should be discontinued unless it is treated. The site is expected to be a key area for both deer and buffalo following conversion to a grass-forb type with a variety of shrub species. The site is located on a southeast facing, pinyon-juniper slope (3%) at an elevation of 8,500 feet. The study area lies between Mt. Ellen and Ragged Mountain near the upper elevational limits of the pinyon-juniper woodland. Point quarter data taken in 1999 estimates 147 pinyon and 25 juniper trees/acre. Average basal diameter for pinyon is about 11 inches while juniper is 8 inches. Line intercept data from 1999 estimated canopy of pinyon-juniper at 34%. Precipitation is expected to be about 14 inches per year. Water is not available locally, but Box Springs is about two miles to the southwest. Wildlife use is light with an estimated 1 deer day use/acre (3 ddu/ha). Livestock do not use the site.

Soils are a reddish-grey, clay loam with a neutral pH (7.1). The parent material is granite. The soil is moderately shallow with an estimated effective rooting depth of just under 10 inches. The profile is very rocky with all of the penetrometer readings used to determine the stoniness index lying in the upper 3 decimeters. The surface horizon is generally low in organic matter except for areas beneath tree canopies. Erosion potential is moderate on this site due to the absence of herbaceous cover, but the gentle slope keeps erosion at a minimum. Although there is erosion pavement present, there are no active gullies in the area. Nutrients in the soil are low with 7 ppm phosphorus and 41 ppm potassium. These values are below the minimum of 10 ppm and 70 ppm thought necessary for normal plant development.

The key browse species that could be released by a chaining treatment are antelope bitterbrush, serviceberry, and black sagebrush. None of these species are currently abundant. Black sagebrush is the most numerous with a population of approximately 460 stunted plants/acre in both 1994 and 1999. This species is more abundant in the interspaces between pinyon-juniper trees. Percent decadency declined from 52% to 39% between 1994 and 1999. However, the number of plants displaying poor vigor increased from 17% to 26%. Two-thirds of the decadent plants sampled are dying. Thirty-five percent of the plants showed moderate use with another 17% demonstrated heavy use in 1999. However, the hedged appearance of black sagebrush is probably more a reflection of the poor site potential and competition from mature pinyon and juniper trees than use from wildlife. The serviceberry population is composed of mature plants that have been moderately or heavily utilized. Currently, density is estimated at 100 plants/acre. Bitterbrush density is currently estimated at 340 plants/acre, up slightly from 1994. Most show moderate use (47%) with another 35% expressing heavy use. True mountain mahogany has an estimated density of 160 plants/acre, made up mostly of mature plants that have been moderately utilized over the years. One-fourth of the plants classified with poor vigor.

There are no herbaceous species that could be considered to be key for this area at the present time. Grasses and forbs combined to produce <1% cover in 1994, and only 3% in 1999. The very low numbers of understory species and cover will continue, unless mechanical intervention and seeding is employed to control the dominant overstory of pinyon and juniper trees. The site potential is steadily going down through time as the soils are continually being lost from runoff without protective herbaceous cover. This is the only site that is low in both phosphorous and potassium.

### 1994 TREND ASSESSMENT

Basic ground cover characteristics are similar to those of 1987, but percent bare ground has increased while rock and pavement cover combined, have declined. Indicating some overland flow of soils covering the rock. There are no active gullies on the site, but sheet erosion is occurring with the lower rock and pavement values.

Trend for soil is stable to slightly down and in poor condition. Browse on the site are not particularly abundant and all have poor biotic or reproductive potentials. Black sagebrush and antelope bitterbrush increased in density since 1987, but this increase is likely the result of the larger sample size taken in 1994. Until the pinyon and juniper are treated, these shrubs will remain static or slowly declining in number and vigor. Trend for browse is slightly down at this time due to increasing decadency rates of the key browse species. The herbaceous understory is insignificant on this site and of little importance. All grasses and forbs combined produce <1% cover. Sum nested frequencies for perennial grasses and forbs have remained stable since 1987.

TREND ASSESSMENT

soil - stable to slightly declining and in poor condition due to the lack of an herbaceous cover

browse - slightly down

herbaceous understory - stable, but nearly nonexistent

1999 TREND ASSESSMENT

Trend for soil is stable, but remains in poor condition due to the lack of an herbaceous understory. Erosion is minimal only because of the gentle slope. Browse trend is down. Black sagebrush shows high decadency (39%) with two-thirds of these are dying. Plants displaying poor vigor is high (26%), and recruitment and biotic potential are low. Serviceberry is in very low densities and has no recruitment. Bitterbrush remains at stable densities, but has received heavy use in the past and has no recruitment. Trend for the herbaceous understory is stable, but severely lacking.

TREND ASSESSMENT

soil- stable, but in poor condition

browse- down

herbaceous understory- stable, but severely lacking

HERBACEOUS TRENDS --

Herd unit 15 , Study no: 8

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Bromus tectorum (a)	-	1	-	-	1	-	.00	-
G	Festuca ovina	<sub>b</sub> 7	<sub>a</sub> -	<sub>a</sub> -	4	-	-	-	-
G	Oryzopsis hymenoides	4	3	7	3	1	3	.03	.06
G	Poa spp.	2	2	-	2	2	-	.01	-
G	Poa fendleriana	-	2	2	-	2	2	.01	.01
G	Sitanion hystrix	<sub>b</sub> 22	<sub>a</sub> -	<sub>a</sub> 6	12	-	2	-	.01
Total for Annual Grasses		0	1	0	0	1	0	0.00	0
Total for Perennial Grasses		35	7	15	21	5	7	0.05	0.08
Total for Grasses		35	8	15	21	6	7	0.05	0.08
F	Allium spp.	<sub>b</sub> 14	<sub>b</sub> 13	<sub>a</sub> -	7	6	-	.05	-
F	Androsace septentrionalis (a)	-	-	1	-	-	1	-	.00
F	Arabis spp.	-	2	1	-	1	1	.00	.00
F	Astragalus spp.	<sub>ab</sub> 3	<sub>b</sub> 7	<sub>a</sub> -	1	3	-	.01	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	04	09
F	Chaenactis douglasii	<sub>b</sub> 26	<sub>ab</sub> 15	<sub>a</sub> 9	15	8	5	.04	.05
F	Eriogonum alatum	<sub>a</sub> -	<sub>ab</sub> 4	<sub>b</sub> 8	-	2	6	.03	.08
F	Gayophytum ramosissimum (a)	-	<sub>b</sub> 46	<sub>a</sub> -	-	19	-	.09	-
F	Hymenoxys acaulis	-	2	3	-	1	1	.00	.03
F	Ipomopsis aggregata	3	-	1	2	-	1	-	.00
F	Lappula occidentalis (a)	-	2	-	-	2	-	.01	-
F	Lesquerella kingii	19	19	9	11	10	7	.05	.03
F	Lomatium spp.	<sub>a</sub> -	<sub>b</sub> 21	<sub>b</sub> 11	-	11	5	.05	.02
F	Polygonum douglasii (a)	-	<sub>b</sub> 127	<sub>a</sub> 43	-	54	19	.27	.09
F	Unknown forb-perennial	3	-	-	2	-	-	-	-
F	Zigadenus paniculatus	<sub>a</sub> 2	<sub>b</sub> 16	<sub>b</sub> 27	1	7	15	.04	.17
Total for Annual Forbs		0	175	44	0	75	20	0.37	0.10
Total for Perennial Forbs		70	99	69	39	49	41	0.30	0.40
Total for Forbs		70	274	113	39	124	61	0.68	0.50

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

#### BROWSE TRENDS --

Herd unit 15 , Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		04	09	04	09
B	Amelanchier utahensis	4	5	1.00	.84
B	Artemisia nova	16	17	.99	.36
B	Artemisia tridentata vaseyana	0	0	-	-
B	Cercocarpus montanus	4	5	.76	1.00
B	Gutierrezia sarothrae	0	0	-	-
B	Juniperus osteosperma	0	4	.63	.45
B	Opuntia spp.	0	0	-	-
B	Pinus edulis	0	9	13.81	16.75
B	Purshia tridentata	9	12	1.45	1.23
B	Symphoricarpos oreophilus	2	1	.03	.03
Total for Browse		35	53	18.68	20.68

#### CANOPY COVER --

Herd unit 15 , Study no: 8

Species	Percent Cover 09
Pinus edulis	34

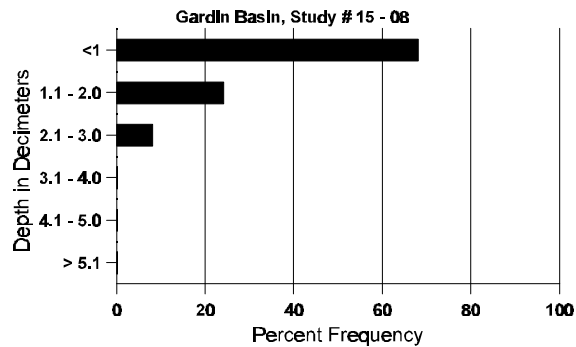
BASIC COVER --  
Herd unit 15 , Study no: 8

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	193	118	1.00	19.64	25.64
Rock	279	222	20.25	19.14	21.79
Pavement	241	235	15.50	3.79	13.54
Litter	386	348	55.00	46.25	47.06
Cryptogams	7	13	0	.07	.09
Bare Ground	244	213	8.25	13.21	12.76

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 08, Study Name: Garden Basin

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.9	45.4 (10.9)	7.1	45.3	26.2	28.6	3.4	7.1	41.6	0.9

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 15 , Study no: 8

Type	Quadrat Frequency	
	'04	'09
Rabbit	21	25
Deer	2	3
Buffalo	-	-

Pellet Transect Days Use/Acre (ha)
'09
N/A
1 (2)
1 (2)

BROWSE CHARACTERISTICS --

Herd unit 15 , Study no: 8

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	4	2	-	-	-	-	-	-	-	6	-	-	-	200		6	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	33	79	98	
	94	2	-	-	1	-	-	-	-	-	2	1	-	-	60	53	64	
	99	-	1	-	-	1	-	1	-	2	5	-	-	-	100	49	54	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		43%			00%			00%			-66%							
'94		00%			00%			00%			+20%							
'99		40%			40%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	233	Dec:	0%				
											'94	80		25%				
											'99	100		0%				
Artemisia nova																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	87	-	1	-	-	-	-	-	-	-	-	-	1	-	33		1	
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	7	-	-	1	-	-	-	-	-	8	-	-	-	160	9	17	
	99	1	8	2	1	-	-	-	-	-	12	-	-	-	240	10	21	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	12	-	-	-	-	-	-	-	-	8	-	-	4	240		12	
	99	7	-	2	-	-	-	-	-	-	3	-	-	6	180		9	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		100%			00%			100%			+93%							
'94		00%			00%			17%			+ 0%							
'99		35%			17%			26%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	33	Dec:	0%				
											'94	460		52%				
											'99	460		39%				

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	9	19	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	23	26	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	0		-		
												'99	0		-		
<i>Cercocarpus montanus</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	4	-	-	-	-	-	-	-	-	-	-	-	80	29	35	4
	99	-	6	-	-	-	-	-	-	-	-	-	-	120	32	36	6
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	1	-	-	-	-	-	-	-	-	20			1
	99	2	-	-	-	-	-	-	-	-	-	2	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%			+38%						
'99		75%			00%			25%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%		
												'94	100		20%		
												'99	160		25%		
<i>Gutierrezia sarothrae</i>																	
S	87	1	-	-	-	-	-	-	-	-	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	5	-	-	-	-	-	-	-	-	-	-	-	166			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	4	4	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	166	Dec:	-		
												'94	0		-		
												'99	0		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Juniperus osteosperma</b>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	-	-	-	-	-	-	-	1	-	1	-	-	-	33	177	79	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'94	0		-			
												'99	80		-			
<b>Opuntia spp.</b>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	22	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	0		-			
<b>Pinus edulis</b>																		
S	87	49	-	-	-	-	-	-	-	-	49	-	-	-	1633		49	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	1	-	-	1	-	-	1	-	-	1	40		2	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	-	-	-	-	-	3	-	-	7	-	-	-	140		7	
M	87	1	1	-	-	-	-	3	-	-	5	-	-	-	166	126	87	5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	2	-	-	4	-	-	-	80	-	-	4
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		17%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	199	Dec:	-			
												'94	0		-			
												'99	220		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	6	-	2	2	4	-	-	-	-	14	-	-	-	280	11	43	
	99	2	8	-	-	-	6	-	-	-	16	-	-	-	320	12	42	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	1	-	-	-	-	2	-	-	-	40		2	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+90%							
'94		31%			13%			00%			+ 6%							
'99		47%			35%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	0%			
												'94	320		13%			
												'99	340		6%			
Symphoricarpos oreophilus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	14	60	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	17	54	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%			+ 0%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	40		-			
												'99	40		-			



Trend Study 15-9-99

Study site name: Cave Flat Chaining .

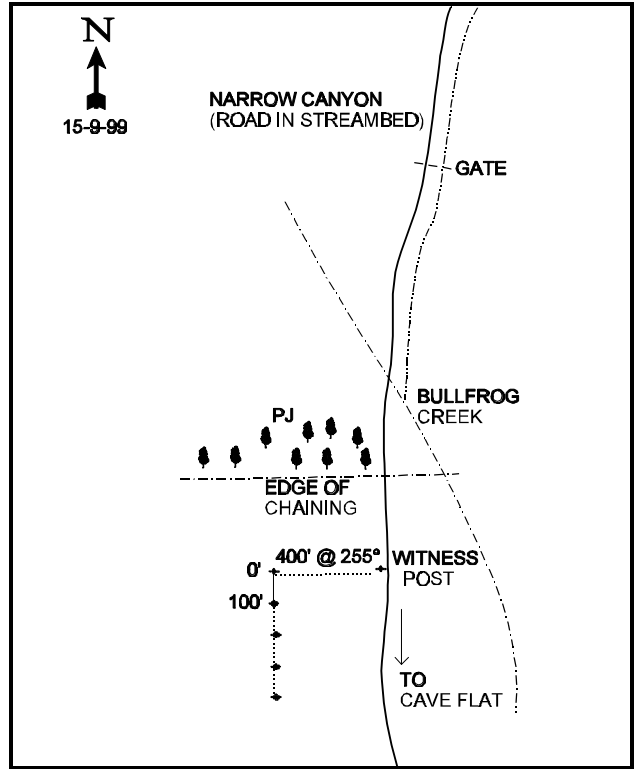
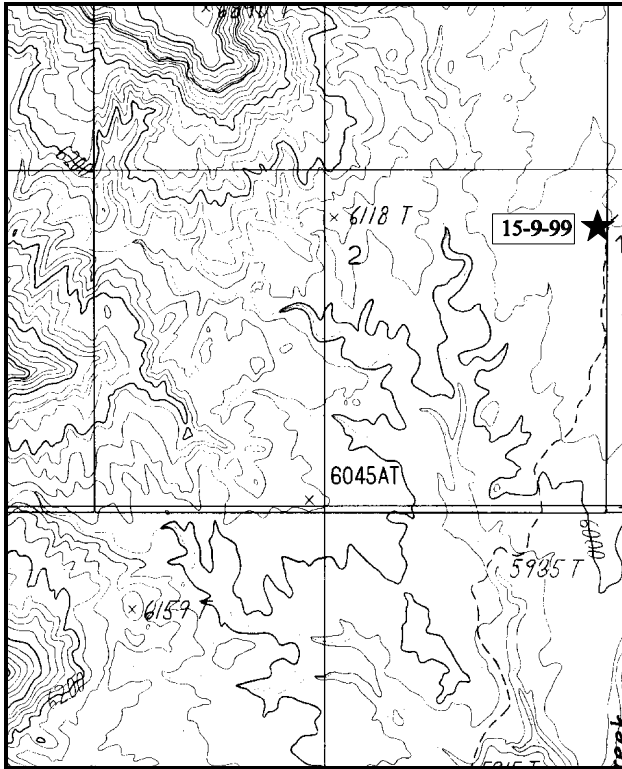
Range type: Chained, Seeded P-J .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Pennellen Pass (T32S, R10E, Sec. 21) drive south for 0.4 miles to an intersection. Stay right towards Airplane Spring and go 3.5 miles to an intersection. Turn left, travel along Bullfrog Creek for 1.35 miles to a gate. Continue past the gate and up out of the creek, going 1.75 miles to a witness post on the right side of the road in the chaining. The transect starts 400 feet west (bearing of 255°M) of the witness post.



Map Name: Cave Flat

Diagrammatic Sketch

Township 33S , Range 9E , Section 2

UTM 4201736.395 N, 510761.607 E

## DISCUSSION

### Trend Study No. 15-9(38-3)

The Cave Flat study is located east of Cave Flat in a pinyon-juniper chaining project that was done on state land by the Division of Wildlife Resources in the fall of 1983. The slope varies from 5-10% on a south-southwest aspect at an elevation of 6,100 ft. This approaches the lower limit of the pinyon-juniper woodland on the west side of the Henry Mountains. Numerous small gullies traverse the chained area. Soil disturbance was higher than normal because of the light sandy loam soil. The site averages less than 12 inches of moisture per year which would make it difficult to successfully treat the site with its associated high amount of sand in the soil. The low level of precipitation and the fact that the seed can easily be planted too deep in the loose sandy soil would also contribute to the low establishment of seeded species.

The area is a key transition area for buffalo as they move off the mountain and out onto Cave Flat and Swap Mesa for the winter. The major reason for chaining this area was to delay buffalo use of the higher elevation seedings by providing additional succulent forage at a lower elevation site. The chaining is within the Steele Butte Allotment and excessive use has been made of the chaining by livestock and buffalo prior to the 1987 reading. Livestock were to be kept off the Cave Flat area beginning in 1988. Pellet transect data from 1999 indicate a moderate level of buffalo use with 47 buffalo days use/acre (116 bdu/ha). Use by livestock is light with 5 cow days use/acre being estimated (12 cdu/ha). Use by deer is currently minimal as no pellet groups were sampled in the 1999 transect counts.

The soil is a sandy loam with numerous rocks on the surface and in the soil profile. A considerable amount of petrified wood is mixed in with the rocks. The soil is loose and easily transported by wind. The soil is slightly alkaline with a pH of 7.7 and has an estimated effective rooting depth of 15 inches. Phosphorus levels (5.8 ppm) are below the minimum of 10 ppm thought necessary for normal plant development. Percent bare ground was quite high since 1987 as on average it is about 40%. Bare ground cover was up again to 43% in 1999. Vegetation and litter both decreased in nested frequency and cover in 1999. Several small gullies are present throughout the site, but due to the gentle terrain, herbaceous and litter cover, and characteristics of the sandy soil, erosion isn't currently a serious problem.

Browse species are not abundant, although a variety of species do occur on the site. Unfortunately, broom snakeweed is the most abundant shrub with an estimated density of 2,666 plants/acre in 1987, and 7,180 in 1994. The population flourished in the years leading up to 1999 with an estimated 21,540 plants/acre. This species has a high biotic potential and recruitment level with an estimated 2,480 seedlings/acre and 5,900 young plants/acre in 1999. The high proportion of seedlings and young in past years have resulted in nearly a 4-fold increase in the number of mature plants at the site. Slenderbush eriogonum is present but represented by small statured plants. Point quarter data estimates 10 surviving pinyon and 16 juniper trees/acre. The average basal diameter of pinyon is just over 2 inches while that of juniper is nearly 5 inches. Thirty percent of the juniper trees are knockdowns from the chaining treatment that are still surviving.

A variety of seeded and native grasses grow on the site. The key perennial grass species are intermediate wheatgrass and crested wheatgrass. Both species increased in quadrat and nested frequency in 1999. Squirreltail, Indian ricegrass, and sand dropseed also exist on the site. However, they are infrequent and decreasing in frequency. Annual grasses, cheatgrass and sixweeks fescue, are also present. Cheatgrass alone accounts for 43% of the total vegetative cover or 60% of the herbaceous cover in 1999. This species is slightly increasing as shown by the increase in nested frequency since 1994, and is found in thick patches throughout the site. Individual cheatgrass plants are short (3 to 6 inches). Sixweeks fescue was sampled in 11 quadrats in 1994, but was not sampled in 1999. However, this species is often difficult to see as it grows under other herbaceous plants in the understory and may still be present. In 1999, cover values for perennial grasses were about half of that in 1994 even with the slight increase in sum of nested frequency. This is a result of the extended drought and dry conditions of the Cave Flat area producing plants that are decreasing in

size. Ten species of forbs were sampled in both 1994 and 1999, but total forb cover is low at less than 2% in 1999 with nested frequency of all forbs decreasing substantially in 1999. The seeded Yellow sweetclover was the most abundant perennial forb encountered in 1987 with a quadrat frequency of 27%. The short lived forb was not seen during the 1994 or 1999 readings. Alfalfa was also seeded and was encountered during both readings, but had a quadrat frequency of only 1% in 1987 and 1994, and was not sampled in 1999. Russian thistle once was the dominate forb at the site, but has since nearly disappeared.

#### 1994 TREND ASSESSMENT

Protective ground cover increased from 57% in 1987 to 66% in 1994. The proportion of bare ground seems high, but due to the gentle terrain and the abundance of herbaceous ground cover, erosion is not currently a problem. Trend for soil is slightly improved. The browse component is not an important aspect on this chaining. The trend for the shrubs which do occur on the site is down primarily due to a significant increase in the density and dynamic biotic and reproductive potentials of the invader broom snakeweed. The dominant grass on the chaining is cheatgrass brome which covers 9% of the ground surface and accounts for 39% of all vegetative cover. Since annual grasses and forbs were not recorded with the old method used in 1987, no comparisons can be made between readings for these species. Seeded grasses, crested and intermediate wheatgrass, have increased in nested frequency since the last reading and perennial grasses as a whole appear to be on the increase. Forbs are not very abundant and the composition is poor. The only seeded forb present is alfalfa with a quadrat frequency of only 1%. Annual forbs dominate and make up 80% of the forb cover. The only annual forb counted in 1987 was Russian thistle. It has nearly doubled in nested frequency since then (76 to 122). Trend for herbaceous understory is stable due to an increase in the sum of nested frequencies for perennial grasses and a decline in perennial forb nested frequencies.

#### TREND ASSESSMENT

soil - slightly improved, but poor condition

browse - down and dominated by broom snakeweed

herbaceous understory - stable

#### 1999 TREND ASSESSMENT

Trend for soil is stable, but in poor condition. The ratio of bare soil to protective cover is almost the same as 1994 even though bare ground cover increased from 34% to 43% between sampling dates, while vegetation and litter cover both decreased. However, this decrease can be attributed to the extended drought causing plants to be stunted and producing less of a litter build-up. Erosion is still minimal. Browse trend is down as broom snakeweed dominates the site. Recruitment and biotic potential remain high and the population density has tripled over the last 5 years. Herbaceous understory trend is stable, but depleted. Sum of nested frequency for perennial grasses increased while perennial forbs slightly decreased. Cheatgrass is increasing in frequency and is now the most abundant herbaceous species.

#### TREND ASSESSMENT

soil- stable, but in poor condition

browse- down

herbaceous understory- stable, but depleted

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 9

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	<i>Agropyron cristatum</i>	38	32	43	15	13	22	2.09	.73
G	<i>Agropyron intermedium</i>	<sub>a</sub> 21	<sub>b</sub> 127	<sub>c</sub> 175	8	45	65	4.76	3.35
G	<i>Aristida purpurea</i>	<sub>b</sub> 12	<sub>a</sub> -	<sub>b</sub> 3	5	-	3	-	.04
G	<i>Bouteloua gracilis</i>	-	-	1	-	-	1	-	.00
G	<i>Bromus tectorum</i> (a)	-	234	273	-	76	87	8.77	9.21
G	<i>Elymus junceus</i>	-	7	3	-	2	1	.42	.00
G	<i>Oryzopsis hymenoides</i>	<sub>b</sub> 25	<sub>ab</sub> 16	<sub>a</sub> 12	14	7	4	.13	.15
G	<i>Sitanion hystrix</i>	31	40	9	15	14	6	1.25	.22
G	<i>Sporobolus cryptandrus</i>	7	8	6	5	5	4	.16	.04
G	<i>Vulpia octoflora</i> (a)	-	<sub>b</sub> 34	<sub>a</sub> -	-	11	-	1.10	-
Total for Annual Grasses		0	268	273	0	87	87	9.87	9.21
Total for Perennial Grasses		134	230	252	62	86	106	8.84	4.56
Total for Grasses		134	498	525	62	173	193	18.72	13.77
F	<i>Astragalus mollissimus</i>	<sub>b</sub> 19	<sub>a</sub> 6	<sub>ab</sub> 16	12	3	10	.04	.15
F	<i>Chaenactis douglasii</i>	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 10	-	-	5	-	.07
F	<i>Cryptantha humilis</i>	<sub>a</sub> 4	<sub>b</sub> 33	<sub>ab</sub> 17	3	14	6	.60	.51
F	<i>Descurainia pinnata</i> (a)	-	25	27	-	12	13	.35	.47
F	<i>Erodium cicutarium</i> (a)	-	-	4	-	-	2	-	.03
F	<i>Eriogonum</i> spp.	4	-	-	2	-	-	-	-
F	<i>Holosteum umbellatum</i> (a)	-	4	-	-	2	-	.01	-
F	<i>Lappula occidentalis</i> (a)	-	1	7	-	1	3	.00	.18
F	<i>Lactuca serriola</i>	<sub>b</sub> 7	<sub>a</sub> -	<sub>a</sub> -	3	-	-	-	-
F	<i>Melilotus officinalis</i>	<sub>b</sub> 60	<sub>a</sub> -	<sub>a</sub> -	27	-	-	-	-
F	<i>Medicago sativa</i>	2	4	-	1	1	-	.00	-
F	<i>Penstemon</i> spp.	<sub>a</sub> 4	<sub>b</sub> 22	<sub>ab</sub> 13	2	11	7	.22	.28
F	<i>Plantago patagonica</i> (a)	-	-	3	-	-	2	-	.01
F	<i>Psilostrophe sparsiflora</i>	2	-	-	2	-	-	-	-
F	<i>Salsola iberica</i> (a)	<sub>b</sub> 76	<sub>b</sub> 122	<sub>a</sub> 2	36	41	1	1.83	.00
F	<i>Streptanthus cordatus</i>	-	3	-	-	1	-	.00	-
F	<i>Townsendia incana</i>	<sub>a</sub> -	<sub>ab</sub> 1	<sub>b</sub> 10	-	1	3	.00	.04
Total for Annual Forbs		76	152	43	36	56	21	2.20	0.70
Total for Perennial Forbs		102	69	66	52	31	31	0.89	1.06
Total for Forbs		178	221	109	88	87	52	3.10	1.77

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

BROWSE TRENDS --  
Herd unit 15 , Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Chrysothamnus nauseosus graveolens	3	7	-	.15
B	Chrysothamnus viscidiflorus	0	1	-	-
B	Ephedra viridis	1	0	-	-
B	Eriogonum microthecum	20	18	.11	.10
B	Gutierrezia sarothrae	70	93	1.62	5.50
B	Juniperus osteosperma	0	0	-	.00
B	Opuntia spp.	1	0	.03	-
B	Pinus edulis	0	1	.15	-
B	Shepherdia rotundifolia	0	0	-	-
Total for Browse		95	120	1.91	5.77

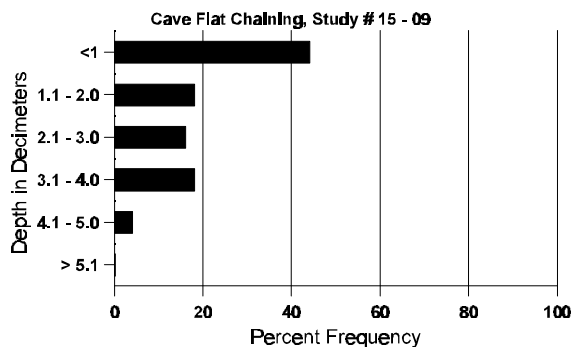
BASIC COVER --  
Herd unit 15 , Study no: 9

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	356	339	2.50	23.29	21.92
Rock	156	92	3.75	4.23	4.46
Pavement	148	123	3.00	.99	1.56
Litter	383	355	47.50	31.52	29.63
Cryptogams	4	17	0	.01	.27
Bare Ground	334	327	43.25	30.29	43.31

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 09, Study Name: Cave Flat Chaining

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.1	61.2 (17.1)	7.7	65.3	18.2	16.6	1.2	5.8	128.0	0.6

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 15 , Study no: 9

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'84	'89	
Rabbit	12	29	N/A
Deer	1	1	0
Cattle	-	13	5 (12)
Buffalo	-	11	47 (116)

BROWSE CHARACTERISTICS --  
Herd unit 15 , Study no: 9

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<b>Chrysothamnus nauseosus graveolens</b>																		
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
Y	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	-	-	1
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	'99	4	-	1	-	-	-	-	-	-	5	-	-	-	100	-	-	5
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	27	0
	'99	2	2	-	1	-	-	-	-	-	5	-	-	-	100	23	28	5
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	1	-	-	-	-	-	-	-	-	-	-	-	1	20	-	-	1
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
<b>% Plants Showing</b>		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+45%							
'94		00%			00%			33%			+70%							
'99		20%			10%			00%										
<b>Total Plants/Acre (excluding Dead &amp; Seedlings)</b>												'87	33	Dec:	0%			
												'94	60		33%			
												'99	200		0%			
<b>Chrysothamnus viscidiflorus</b>																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'99	-	1	-	-	-	-	-	-	-	1	-	-	-	20	3	6	1
<b>% Plants Showing</b>		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		100%			00%			00%										
<b>Total Plants/Acre (excluding Dead &amp; Seedlings)</b>												'87	0	Dec:	-			
												'94	0		-			
												'99	20		-			

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ephedra viridis																		
M	'87	-	1	1	-	-	-	-	-	-	2	-	-	-	66	15	16	2
	'94	-	-	2	-	-	-	-	-	-	2	-	-	-	40	11	23	2
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20	36	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'87			50%			50%			00%			-39%				
		'94			00%			100%			00%							
		'99			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-				
											'94	40		-				
											'99	0		-				
Eriogonum microthecum																		
S	'87	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	'94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	'99	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
Y	'87	7	-	-	-	-	-	-	-	-	7	-	-	-	233			7
	'94	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
	'99	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
M	'87	35	-	-	-	-	-	-	-	-	35	-	-	-	1166	7	6	35
	'94	24	6	-	-	-	-	-	-	-	30	-	-	-	600	4	7	30
	'99	17	6	-	-	-	-	-	-	-	23	-	-	-	460	3	4	23
D	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	'94	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
	'99	1	1	5	-	-	-	-	-	-	6	-	-	1	140			7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'87			00%			00%			00%			-46%				
		'94			15%			00%			03%			+ 9%				
		'99			16%			12%			02%							
Total Plants/Acre (excluding Dead & Seedlings)											'87	1432	Dec:	2%				
											'94	780		5%				
											'99	860		16%				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																		
S	87	155	-	-	-	-	-	-	-	-	155	-	-	-	5166		155	
	94	71	1	-	1	-	-	1	-	-	74	-	-	-	1480		74	
	99	124	-	-	-	-	-	-	-	-	124	-	-	-	2480		124	
Y	87	37	-	-	-	-	-	-	-	-	37	-	-	-	1233		37	
	94	154	-	-	-	-	-	-	-	-	154	-	-	-	3080		154	
	99	294	-	-	1	-	-	-	-	-	295	-	-	-	5900		295	
M	87	43	-	-	-	-	-	-	-	-	43	-	-	-	1433	13 16	43	
	94	196	-	-	1	-	-	-	-	-	194	-	3	-	3940	46 39	197	
	99	742	20	-	1	-	-	-	-	-	762	-	-	-	15260	7 9	763	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	8	-	-	-	-	-	-	-	-	3	-	-	5	160		8	
	99	16	2	-	1	-	-	-	-	-	11	-	-	8	380		19	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	520		26	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+63%							
'94		00%			00%			02%			+67%							
'99		02%			00%			.74%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	2666	Dec:	0%			
												'94	7180		2%			
												'99	21540		2%			
<i>Juniperus osteosperma</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	98 47	1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'94	0		-			
												'99	0		-			



A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	4	4	1
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	14	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	11	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-39%							
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'94	20		-			
												'99	0		-			
Pinus edulis																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'94	0		-			
												'99	20		-			
Shepherdia rotundifolia																		
Y	87	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	48	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	35	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'94	0		-			
												'99	0		-			

Trend Study 15-10-99

Study site name: Cave Flat .

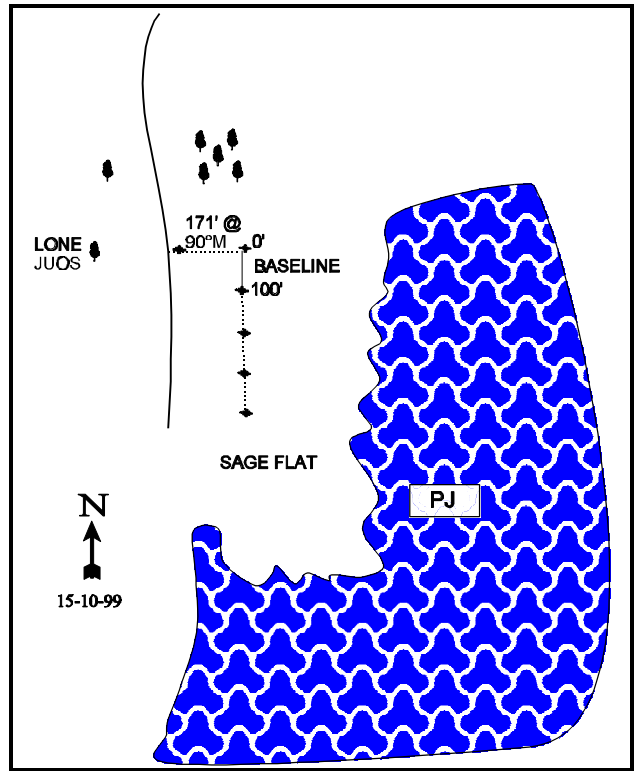
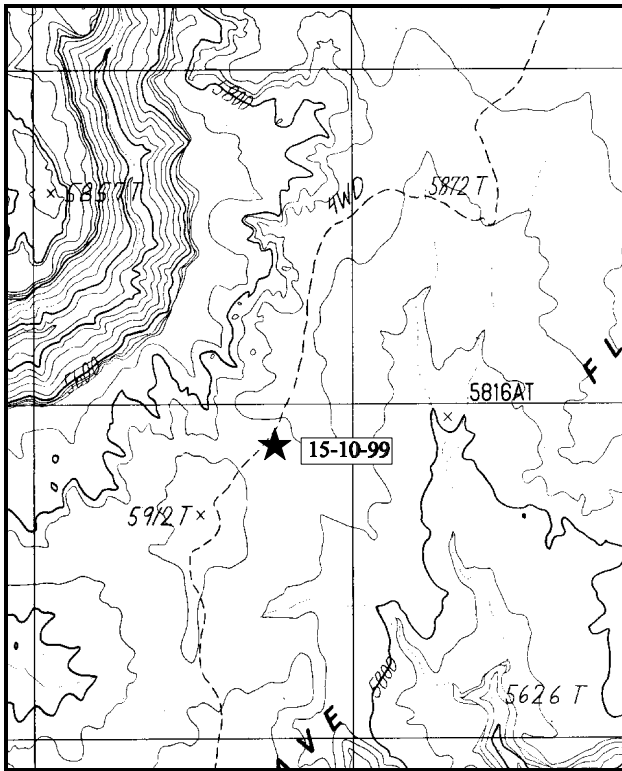
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 195°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Cave Flat Chaining (transect 15-9), continue south along Bullfrog Creek for 2.15 miles to a faint fork. Stay right. Go 0.7 miles to another faint intersection and stay right. Continue 0.15 miles into the large sage flat to the witness post on the left side of the road (a 2-foot tall piece of angle iron). The 0-foot baseline stake, a 2-foot tall fencepost, tagged #7126, is 171 feet bearing 90°M from the witness post. The transect runs southwest from there.



Map Name: Cave Flat

Diagrammatic Sketch

Township 33S , Range 9E , Section unsurveyed

UTM 4198225.664 N , 509689.547 E

## DISCUSSION

### Trend Study No. 15-10 (38-10)

The Cave Flat study is located in a Wyoming big sagebrush flat which is surrounded by a low elevation pinyon-juniper woodland (5,800 ft). This is considered a key wintering area for buffalo and deer. The terrain overall is fairly level, gradually sloping (0-3%) to the southwest. However, the immediate area where the site is established gently slopes to the northeast. The average annual precipitation for this area is estimated at 10 inches. A road runs through the middle of the flat, but it is rarely traveled. The area is inaccessible by vehicle when Bullfrog Creek washes out the road at the turn to Bullfrog. The region does have coal deposits, but as of yet, there has not been any mining activity in this remote area. Current use of the area by wildlife and livestock is light. Pellet group data from 1999 estimates 4 deer and 8 cow days use/acre (10 ddu/ha and 20 cdu/ha). Buffalo use was estimated at 28 days use/acre (69 bdu/ha) in the 1999 transect counts.

Soils at the site are a reddish, sandy loam with a neutral pH (7.2). There is a distinct hardpan, and the estimated stoniness index of the profile is more a reflection of the hardpan than actual rock. The soils are moderately deep with an estimated effective rooting depth of nearly 15 inches. Relative cover from bare ground is high (56% in 1994, 50% in 1999), with vegetation and litter cover providing the other half of the ground cover. The soil surface is loose with some rill erosion present. Slight pedestaling around shrubs was noted in 1999, however erosion remains at minimal levels due to the gentle slope. The soil is low in organic matter in the interspaces of the shrubs. Litter accumulation is beneath individual shrubs.

Wyoming big sagebrush is the key browse species. It's density was high in 1987 with an estimated 7,065 plants per acre. With the much larger sample taken in 1994 and 1999, estimated sagebrush density was 3,940 plants/acre and 4,680 plants/acre respectively. Since percent decadency was low (16%) in 1987, the change in density would be more the result of a more representative sample and not an actual major decline in density. Thirty-eight percent of the sagebrush sampled in 1987 were heavily hedged and 75% displayed poor vigor. By 1994, no shrubs displayed heavy use and only 16% were in poor vigor. Data from 1999 indicate 10% of the plants displaying heavy use and 5% are poor in vigor. In 1994, 47% of the decadent plants were classified as dying, this number decreasing to 41% in 1999. Percent decadency has decreased substantially from 30% in 1994 to 9% in 1999. Biotic potential is low, but recruitment from young plants should be adequate to replace the proportion of the population that is dying out. Of concern is the large amount of broom snakeweed. This species represents the most numerous shrub with an estimated density of 6,740 plants/acre in 1994, increasing to 10,000 plants/acre in 1999. Age class analysis indicates a mostly mature population with moderate recruitment (16% young plants).

Herbaceous understory plants account for 47% of the total vegetative cover in 1999, an increase from 35% in 1994. Warm season grasses consisting primarily of blue grama and galleta are the key species. Blue grama significantly increased in nested frequency between 1994 and 1999, while galleta slightly decreased during this same time period. Cheatgrass, an annual, significantly increased in nested frequency in 1999 while providing the most herbaceous cover of any other single species. Forbs are insignificant with woolly plantain providing 99% of the forb cover and significantly increasing in nested frequency in 1999.

### 1994 TREND ASSESSMENT

Protective ground cover on the site is minimal, but has improved since 1987. Percent bare ground is still high at 56% relative cover with nested frequency values for vegetation (326) and litter (369) indicating well dispersed soil protection. This, along with the gentle terrain, prohibits erosion from being a major problem on this site. Trend for soil is slightly up, but still in poor condition. The browse trend is stable with a healthy population of Wyoming big sagebrush which has a relatively higher decadency rate (30%), but is less heavily hedged with a high biotic potential (34%). On the down side, broom snakeweed is the most abundant shrub on the site and age class analysis indicates an expanding population with a biotic potential of 32%. Even with

it's high density, broom snakeweed only makes up 19% of the total browse cover. The herbaceous understory is dominated by warm season grasses, with perennial forbs severely lacking on the site. Sum nested frequencies of perennial grasses and forbs combined have slightly declined.

TREND ASSESSMENT

soil - slightly improved, but still poor condition

browse - stable, but with broom snakeweed still increasing

herbaceous understory - slightly declining for perennial species, lacking forbs

1999 TREND ASSESSMENT

Trend for soil is stable. Although bare ground remains at a high level, protective cover from vegetation and litter increased since 1994. The gentle slope and herbaceous cover minimize erosion. Sagebrush trend is up with decreased decadency, light to moderate utilization on most plants, improved vigor, and adequate recruitment to replace dying individuals. One negative aspect for browse trend is the increase in broom snakeweed. The population appears to be stabilizing with biotic potential going from 32% in 1994, to currently where it is at only 1%. The population is mostly mature plants at this time (83%). Trend for browse is slightly up overall. Trend for herbaceous understory is slightly down due a decrease in sum of nested frequency for perennial species and an increase in sum of nested frequency for annual species. Cheatgrass is expanding over the site and is a cause for concern. Forbs are insignificant and severely lacking in diversity.

TREND ASSESSMENT

soil- stable, but poor condition

browse- slightly up

herbaceous understory- slightly down with annuals providing almost 60% of the cover

HERBACEOUS TRENDS --

Herd unit 15 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	-	2	-	-	1	-	.00	-
G	Aristida purpurea	-	5	-	-	2	-	.03	-
G	Bouteloua gracilis	<sub>b</sub> 160	<sub>a</sub> 89	<sub>ab</sub> 116	52	32	44	4.40	3.55
G	Bromus tectorum (a)	-	<sub>a</sub> 158	<sub>b</sub> 264	-	62	83	.43	4.57
G	Hilaria jamesii	107	100	88	41	38	32	2.53	2.23
G	Oryzopsis hymenoides	14	13	13	9	7	5	.23	.08
G	Sitanion hystrix	14	22	35	10	11	17	.13	.25
G	Sporobolus cryptandrus	<sub>a</sub> -	<sub>b</sub> 27	<sub>a</sub> 3	-	13	2	.28	.01
G	Vulpia octoflora (a)	-	<sub>b</sub> 206	<sub>a</sub> 163	-	77	63	.38	1.26
Total for Annual Grasses		0	364	427	0	139	146	0.81	5.84
Total for Perennial Grasses		295	258	255	112	104	100	7.63	6.13
Total for Grasses		295	622	682	112	243	246	8.45	11.97
F	Astragalus spp.	-	5	2	-	2	2	.01	.01
F	Erodium cicutarium (a)	-	<sub>b</sub> 6	<sub>a</sub> -	-	4	-	.02	-
F	Fritillaria atropurpurea	-	3	-	-	1	-	.00	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	Lygodesmia spp.	-	8	-	-	4	-	.02	-
F	Plantago patagonica (a)	<sub>a</sub> 84	<sub>b</sub> 147	<sub>c</sub> 212	32	52	70	.75	2.04
F	Sphaeralcea coccinea	<sub>ab</sub> 10	<sub>b</sub> 11	<sub>a</sub> 1	5	7	1	.03	.00
Total for Annual Forbs		84	153	212	32	56	70	0.77	2.04
Total for Perennial Forbs		10	27	3	5	14	3	0.07	0.01
Total for Forbs		94	180	215	37	70	73	0.84	2.06

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

#### BROWSE TRENDS --

Herd unit 15 , Study no: 10

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Artemisia tridentata wyomingensis	78	78	12.73	12.86
B	Atriplex canescens	0	1	-	-
B	Atriplex confertifolia	2	0	-	-
B	Chrysothamnus nauseosus	0	0	-	-
B	Chrysothamnus viscidiflorus	0	1	-	-
B	Coleogyne ramosissima	0	4	-	-
B	Eriogonum microthecum	3	0	3.23	1.61
B	Gutierrezia sarothrae	79	78	-	-
B	Juniperus osteosperma	0	1	.03	.18
B	Opuntia spp.	13	25	1.08	1.14
Total for Browse		175	188	17.07	15.80

#### BASIC COVER --

Herd unit 15 , Study no: 10

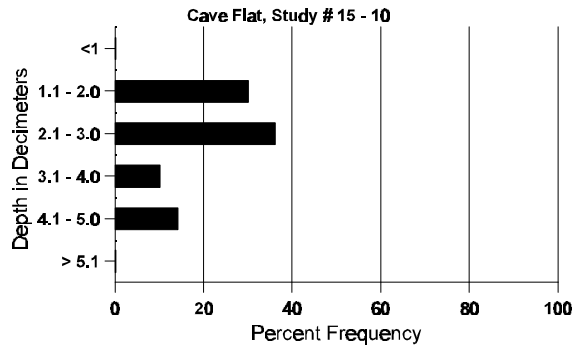
Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	326	353	4.00	24.37	24.81
Rock	35	3	0	.06	.00
Pavement	65	71	0	.14	.28
Litter	369	348	29.50	15.71	23.39
Cryptogams	8	4	0	.38	.04
Bare Ground	370	354	66.50	51.41	48.55

SOIL ANALYSIS DATA --

Herd Unit 15, Study # 10, Study Name: Cave Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.6	62.8 (15.5)	7.2	63.3	18.2	18.6	0.9	9.2	105.6	0.4

### Stoniness Index



PELLET GROUP DATA --

Herd unit 15 , Study no: 10

Type	Quadrat Frequency	
	04	09
Rabbit	24	36
Deer	6	18
Cattle	-	4
Buffalo	3	5

Pellet Transect Days Use/Acre (ha)
09
N/A
4 (10)
8 (20)
28 (69)

BROWSE CHARACTERISTICS --

Herd unit 15 , Study no: 10

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4			
<i>Artemisia tridentata wyomingensis</i>								
S	87	-	-	-	-	-	-	-
	94	66	-	-	-	-	-	-
	99	4	-	-	-	-	-	-
Y	87	18	11	20	-	-	-	-
	94	33	-	-	-	-	-	-
	99	26	12	5	-	2	-	-
M	87	5	19	16	-	-	-	-
	94	102	2	-	-	-	-	-
	99	110	48	8	1	-	-	-
D	87	5	8	4	-	-	-	-
	94	56	4	-	-	-	-	-
	99	7	5	9	-	-	1	-
X	87	-	-	-	-	-	-	-
	94	-	-	-	-	-	-	-
	99	-	-	-	-	-	-	-
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
'87		36%	38%	75%	-44%			
'94		03%	00%	16%	+16%			
'99		29%	10%	05%				
Total Plants/Acre (excluding Dead & Seedlings)					'87	7065	Dec:	16%
					'94	3940		30%
					'99	4680		9%
<i>Atriplex canescens</i>								
M	87	-	-	-	-	-	-	-
	94	-	-	-	-	-	-	-
	99	-	-	-	-	-	-	-
D	87	-	-	-	-	-	-	-
	94	-	-	-	-	-	-	-
	99	-	-	-	-	1	-	-
X	87	-	-	-	-	-	-	-
	94	-	-	-	-	-	-	-
	99	-	-	-	-	-	-	-
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
'87		00%	00%	00%				
'94		00%	00%	00%				
'99		00%	100%	00%				
Total Plants/Acre (excluding Dead & Seedlings)					'87	0	Dec:	0%
					'94	0		0%
					'99	20		100%

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Atriplex confertifolia</b>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	1	-	-	-	2	-	-	-	40	11	15	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			50%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	40		-			
												'99	0		-			
<b>Chrysothamnus nauseosus</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	0		-			
<b>Chrysothamnus viscidiflorus</b>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	7	0
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	1	-	-	-	-	-	-	-	-	1	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'94	0		0%			
												'99	20		100%			



A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total									
		1	2	3	4												
<b>Coleogyne ramosissima</b>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	1	-	-	-	-	-	4	-	-	-	80		4	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	19	29	0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			25%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-				
										'94	0		-				
										'99	80		-				
<b>Eriogonum microthecum</b>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-				
										'94	60		-				
										'99	0		-				

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Gutierrezia sarothrae</i>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	94	-	-	14	-	-	-	-	-	108	-	-	-	2160		108
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6
Y	87	11	-	-	-	-	-	-	-	-	10	-	1	-	733		11
	94	45	-	-	-	-	-	-	-	-	45	-	-	-	900		45
	99	78	-	-	1	-	-	-	-	-	79	-	-	-	1580		79
M	87	48	-	-	-	-	-	-	-	-	47	-	1	-	3200	8 8	48
	94	280	-	-	4	-	-	-	-	-	283	-	1	-	5680	8 11	284
	99	414	-	-	-	-	-	-	-	-	414	-	-	-	8280	5 7	414
D	87	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6
	94	8	-	-	-	-	-	-	-	-	3	1	-	4	160		8
	99	6	-	-	1	-	-	-	-	-	2	-	1	4	140		7
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	600		30
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			03%			+36%						
'94		00%			00%			01%			+33%						
'99		00%			00%			01%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	4333	Dec:	9%			
											'94	6740		2%			
											'99	10000		1%			
<i>Juniperus osteosperma</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	20		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Opuntia spp.																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	1	-	-	2	-	-	-	40		2
	99	6	-	-	2	-	-	-	-	-	7	-	1	-	160		8
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133	6 10	2
	94	9	-	-	-	-	-	-	-	-	6	1	2	-	180	6 34	9
	99	19	1	-	1	-	-	-	-	-	18	-	3	-	420	5 25	21
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2
	99	9	-	-	-	-	-	-	-	-	3	-	6	-	180		9
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+49%						
'94		00%			00%			23%			+66%						
'99		03%			00%			26%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	0%		
												'94	260		15%		
												'99	760		24%		

Trend Study 15-11-99

Study site name: Above Coyote Bench .

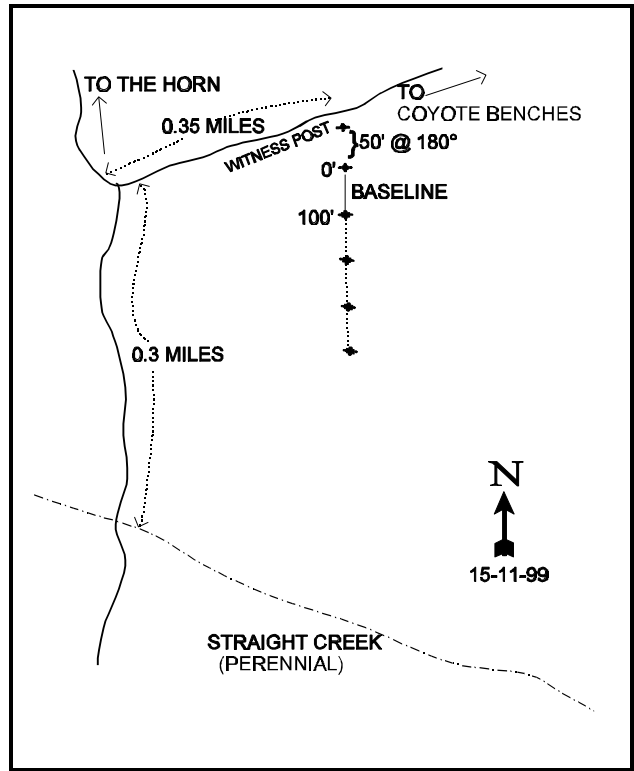
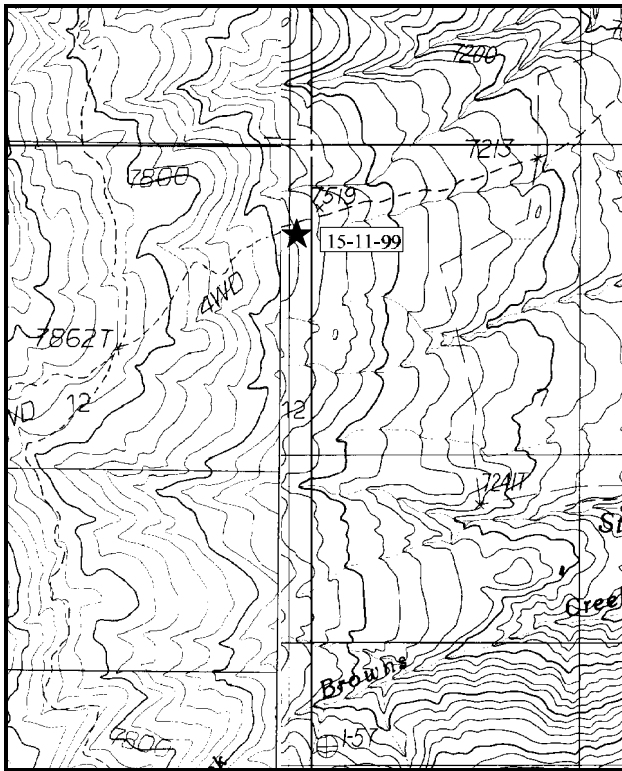
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Pennellen Pass, go east around The Horn towards Dark Canyon. It is 3.5 miles from Pennellen Pass to a cattleguard at Dark Canyon. Continue 1.85 miles to Willow Spring. Continue on the main road 3.3 miles to Straight Creek Junction. Turn left and go 0.35 miles down towards Coyote Bench. A witness post on the right side of the road marks the study location. This green fence post has a browse tag #7130 attached. The 0-foot baseline stake is 50 feet south.



Map Name: Mount Pennell

Diagrammatic Sketch

Township 33S , Range 10E , Section 12

UTM 4200656.196 N, 521836.285 E

## DISCUSSION

### Trend Study No. 15-11 (38-11)

The "Above" Coyote Bench study is located about two miles east of Mt. Pennell on the upper reaches of Coyote Bench at an elevation of 7,560 feet. The slope is 8% with an aspect toward the northeast. Pinyon are scattered throughout the slope with the predominant range type being mountain brush. The area is considered a key summer and fall use area for mule deer. It is within the Pennell Cattle Allotment, yet there is very little use by cattle and buffalo. Pellet transect data from 1999 show light use by deer and livestock with 8 deer and 7 cow days use/acre (20 ddu/ha and 17 cdu/ha) being estimated. A few rabbit pellets were also counted. Water is available most of the year in Straight Creek, less than one mile from the site. Human use of this area would be expected to be minimal during the summer with few buffalo in the area. Much more use would be expected during the fall deer hunt. An unimproved dirt road runs the length of Coyote Bench.

The soil is a coarse-textured, sandy clay loam with an abundance of various sized rock on the surface and throughout the profile. The soil has a slightly acidic pH (6.2), and the phosphorus levels are slightly lower than the 10 ppm thought necessary for normal plant development. The estimated effective rooting depth is just over 15 inches, however the presence of both black sagebrush and mountain big sagebrush would indicate that soil depth is variable throughout the area and that various portions of the soil are moderately shallow. Litter primarily accumulates beneath shrubs with areas of bare soil between shrubs. Cover estimates for litter were relatively high in 1987 at 64%, with this estimate decreasing to 41% relative cover in 1994 (drier year), and 45% in 1999. There is some evidence of active erosion with rills and small rocky gullies common on the site. Pedestaling around shrubs was noted in 1999 as well. Herbaceous species account for only 13% of the total vegetative cover with shrubs and trees combining for 87%. This lack of herbaceous understory cover and the low nested frequency for total vegetation (281 in 1994, 297 in 1999), indicates poor distribution of protective ground cover which increases erosion potential on the site from high intensity summer storms.

The key browse species on the site are black sagebrush, mountain big sagebrush, Utah serviceberry, and true mountain mahogany. These species have shown evidence of moderate to heavy utilization in the past, especially the mahogany. However, use was mostly light for the key browse in 1999, with the exception of mahogany showing mostly moderate use on 38% of the plants sampled. Black sagebrush has declined in density over all years, although the increased sample size after the 1987 may account for some of this. The population was estimated at 4,532 plants/acre in 1987, 2,880 plants/acre in 1994 and 1,800 plants/acre in 1999. Percent decadency has decreased over all years. However, the proportion of decadent plants classified as dying remains relatively high (62% in 1999). Those plants showing poor vigor decreased from 35% in 1994 to 9% in 1999. Currently, biotic potential and recruitment are low for this species with an estimated 40 seedlings/acre and 200 young plants/acre. Mountain big sagebrush density has stayed stable over all sampling years. The current population estimate is 2,300 plants/acre. As with black sagebrush, percent decadency has decreased with each reading. Although, the proportion of decadent plants classified as dying is high at 63% in both 1994 and 1999. The ratio of dead to live plants is currently high for mountain big sagebrush at 1:3. Biotic potential (17%) and recruitment are good with young plants comprising 25% of the total population. Utah serviceberry is comprised mostly of mature plants that are nearly 6 feet tall by 5 feet wide. Percent decadency is low at only 1%, and biotic potential is high at 57% (1,040 seedlings/acre). True mountain mahogany has a relatively stable population with 780 plants/acre in 1999. Recruitment is very high with 44% of the population coming from young plants. No decadent or dead plants have been sampled in any year.

Gambel oak provides excellent warm season cover at the site with 6,040 plants/acre being estimated in 1999. Tree species were not counted in the shrub strips in 1994, thus comparisons for this species over the last five years cannot be made. Point quarter data estimated 108 pinyon and 18 juniper trees/acre in 1994, and 107 pinyon and 18 juniper trees/acre in 1999. The line intercept method estimated 12% canopy cover for pinyon and juniper combined in 1999.

There are a large number of herbaceous species on the site, but only a few are abundant. Squirreltail and mutton bluegrass are the only perennial grasses that had quadrat frequencies >10% in 1994. Mutton bluegrass increased in both nested and quadrat frequencies in 1999, while squirreltail decreased in both. Another perennial native grass, needle and thread, has greatly decreased in nested and quadrat frequency since 1987. Cheatgrass significantly increased in nested frequency between 1994 and 1999, and is now the most abundant grass making up 73% of the grass cover. Forbs are diverse with a total of 20 perennial species being sampled in 1994, and 21 in 1999. However, only Erigeron eatonii was abundant with a quadrat frequency of 41% in 1994 and 30% in 1999. There are several good forage species on the site, yet none are common. Perennial species have decreased significantly at the expense of shrubs and trees which are increasing at the site.

#### 1994 TREND ASSESSMENT

Percent bare ground has increased since 1987. Erosion is not a big problem on the site, nevertheless some is occurring. As shrubs continue to increase at the expense of understory plants, erosion could become more of a problem. Trend for soil is slightly down. Browse are diverse and healthy. The key species show reduced heavy browsing, lower decadency rates with stable population densities. Trend for browse is stable. Sum of nested frequencies for perennial grasses have declined since 1987, while those of perennial forbs have also decreased slightly. Trend for herbaceous understory is slightly down.

##### TREND ASSESSMENT

soil - down slightly

browse - stable

herbaceous understory - slightly down with the perennial grass and forb loss

#### 1999 TREND ASSESSMENT

Soil trend is stable with relative herbaceous cover slightly improved, the ratio of protective cover to bare soil also improved, and litter cover increasing from 45% to 64%. Some erosion was evident in 1999 with the formation of rills and small gullies after heavy periods of rain. Trend for the key browse is stable. Light use in recent years has resulted in the key species showing good vigor. Percent decadency of the key species is either low or has decreased since 1994. The main negative indicator of changes in browse at this site is the continued decrease in black sagebrush density and the high proportion of decadent plants classified as dying. However, black sagebrush's contribution to browse cover has only changed from 6% (1994) to 5% currently. Trend for the herbaceous understory is slightly down. Sum of nested frequency for perennial forbs decreased significantly in 1999, and nested frequency for cheatgrass nearly doubled.

##### TREND ASSESSMENT

soil- stable

browse- stable

herbaceous understory- slightly down

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 11

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	3	-	3	1	-	1	-	.00
G	Agropyron spicatum	a-	a-	6	-	-	3	-	.06
G	Bromus tectorum (a)	-	a130	b230	-	48	74	.46	3.12
G	Oryzopsis hymenoides	10	9	10	5	4	5	.02	.05
G	Poa fendleriana	a12	ab35	b55	9	15	22	.20	.88
G	Sitanion hystrix	b67	b30	a8	30	13	4	1.01	.07
G	Stipa comata	b57	a3	a9	24	2	4	.06	.07
G	Stipa lettermani	b4	a-	a-	3	-	-	-	-
G	Unknown grass - perennial	-	5	-	-	3	-	.01	-
Total for Annual Grasses		0	130	230	0	48	74	0.46	3.12
Total for Perennial Grasses		153	82	91	72	37	39	1.31	1.15
Total for Grasses		153	212	321	72	85	113	1.78	4.27
F	Agoseris glauca	a-	b13	b20	-	6	8	.15	.09
F	Agropyron spicatum	-	1	-	-	1	-	.00	-
F	Arabis spp.	4	-	3	2	-	1	-	.00
F	Artemisia ludoviciana	-	-	4	-	-	2	-	.03
F	Aster spp.	a-	b12	a-	-	5	-	.03	-
F	Astragalus spp.	a-	b4	ab3	-	2	3	.03	.04
F	Balsamorhiza sagittata	5	-	3	2	-	1	.09	.09
F	Castilleja chromosa	6	14	3	3	6	1	.08	.03
F	Castilleja linariaefolia	b41	a12	a6	24	6	3	.25	.02
F	Calochortus nuttallii	4	1	6	2	1	3	.00	.01
F	Collomia spp. (a)	b17	b17	a-	7	7	-	.06	-
F	Comandra pallida	-	-	7	-	-	3	-	.04
F	Collinsia parviflora (a)	-	b9	a-	-	3	-	.21	-
F	Crepis acuminata	17	4	12	7	2	4	.01	.10
F	Cymopterus spp.	a-	b8	ab1	-	4	1	.02	.00
F	Erigeron eatonii	b118	ab100	a63	50	41	30	.71	.65
F	Eriogonum racemosum	b35	a14	ab25	18	6	10	.03	.15
F	Gayophytum ramosissimum (a)	-	b62	a16	-	25	7	.15	.03
F	Helianthella microcephala	b33	a-	a-	16	-	-	-	-
F	Helianthella uniflora	-	2	-	-	1	-	.03	-
F	Hymenoxys acaulis	-	2	-	-	1	-	.03	-
F	Lappula occidentalis (a)	-	3	-	-	1	-	.00	-
F	Lesquerella kingii	a12	b44	a22	6	20	10	.73	.10
F	Linum lewisii	ab38	b49	a31	16	22	12	.11	.36
F	Penstemon spp.	10	15	8	5	9	4	.07	.04
F	Petradoria pumila	-	4	-	-	2	-	.15	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	04	09
F	Phlox longifolia	<sub>c</sub> 114	<sub>b</sub> 66	<sub>a</sub> 27	49	28	12	.16	.11
F	Polygonum douglasii (a)	-	<sub>b</sub> 77	<sub>a</sub> 39	-	30	15	.15	.10
F	Senecio multilobatus	8	3	3	4	1	2	.00	.01
F	Taraxacum officinale	5	8	5	3	3	3	.33	.06
F	Tragopogon dubius	6	-	2	2	-	1	-	.00
F	Unknown forb-perennial	4	-	-	2	-	-	-	-
F	Zigadenus paniculatus	<sub>a</sub> 11	<sub>b</sub> 38	<sub>b</sub> 58	8	19	28	.14	.55
Total for Annual Forbs		17	168	55	7	66	22	0.57	0.13
Total for Perennial Forbs		471	414	312	219	186	142	3.20	2.53
Total for Forbs		488	582	367	226	252	164	3.77	2.67

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

#### BROWSE TRENDS --

Herd unit 15 , Study no: 11

Type	Species	Strip Frequency		Average Cover %	
		04	09	04	09
B	Amelanchier utahensis	33	35	9.80	13.51
B	Artemisia nova	54	35	2.28	2.16
B	Artemisia tridentata vaseyana	50	53	5.22	5.02
B	Cercocarpus montanus	20	25	1.76	5.06
B	Chrysothamnus depressus	1	1	.15	-
B	Chrysothamnus nauseosus	0	0	-	-
B	Chrysothamnus viscidiflorus	10	2	.15	-
B	Eriogonum microthecum	8	8	.03	.18
B	Gutierrezia sarothrae	5	9	.01	.04
B	Juniperus osteosperma	0	1	-	.85
B	Opuntia spp.	0	0	-	-
B	Peraphyllum ramosissimum	1	1	.38	.38
B	Pinus edulis	0	8	6.11	8.87
B	Quercus gambelii	0	27	9.88	8.67
B	Sclerocactus	0	1	-	-
B	Tetradymia canescens	-	-	.00	-
Total for Browse		182	206	35.81	44.76

#### CANOPY COVER --

Herd unit 15 , Study no: 11

Species	Percent Cover 09
Juniperus osteosperma	2
Pinus edulis	10



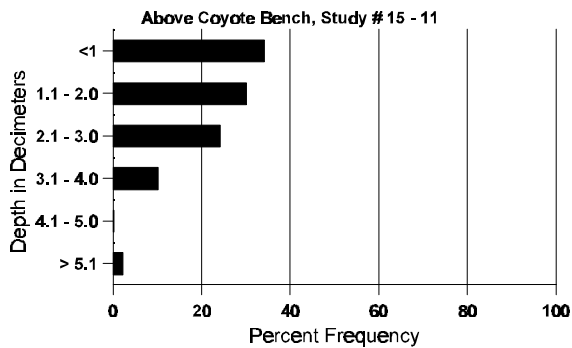
BASIC COVER --  
Herd unit 15 , Study no: 11

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	281	297	7.50	37.68	48.25
Rock	242	192	7.75	13.72	10.86
Pavement	219	167	14.25	2.86	6.46
Litter	383	385	64.25	45.00	63.49
Cryptogams	3	1	0	.00	.00
Bare Ground	220	190	6.25	10.61	12.56

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 11, Study Name: Above Coyote Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.1	51.4 (14.1)	6.2	53.3	22.2	24.6	2.5	7.0	86.4	0.6

### Stoniness Index



PELLET GROUP DATA --  
Herd unit 15 , Study no: 11

Type	Quadrat Frequency	
	'04	'09
Rabbit	11	13
Deer	17	12
Cattle	-	4
Buffalo	1	-

Pellet Transect Days Use/Acre (ha)
'09
N/A
8 (20)
7 (17)
0

BROWSE CHARACTERISTICS --

Herd unit 15 , Study no: 11

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	87	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	94	16	-	-	3	-	-	-	-	-	19	-	-	-	380		19	
	99	11	-	-	16	-	-	25	-	-	52	-	-	-	1040		52	
Y	87	15	1	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	94	5	-	-	13	-	-	3	-	-	21	-	-	-	420		21	
	99	7	1	-	6	-	-	1	-	-	15	-	-	-	300		15	
M	87	1	5	2	-	-	-	-	-	-	8	-	-	-	533	59 47	8	
	94	22	1	-	12	-	-	-	-	-	35	-	-	-	700	86 98	35	
	99	30	3	2	15	2	-	20	3	-	75	-	-	-	1500	68 55	75	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	-	-	1	20		1		
	99	1	-	-	-	-	-	-	-	-	1	-	-	20		1		
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	380		19		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		25%			08%			00%			-29%							
'94		02%			00%			02%			+37%							
'99		07%			02%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1599	Dec:	0%				
											'94	1140		2%				
											'99	1820		1%				
Artemisia nova																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	14	-	-	2	-	-	-	-	-	16	-	-	-	320		16	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	87	4	3	-	-	-	-	-	-	-	7	-	-	-	466		7	
	94	36	-	-	6	-	-	-	-	-	41	-	1	-	840		42	
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	87	12	17	4	-	-	-	-	-	-	29	3	1	-	2200	9 18	33	
	94	60	-	2	2	-	-	-	-	-	43	-	21	-	1280	11 19	64	
	99	63	1	-	3	-	-	-	-	-	67	-	-	-	1340	11 26	67	
D	87	12	11	5	-	-	-	-	-	-	13	-	2	13	1866		28	
	94	37	-	-	1	-	-	-	-	-	9	-	15	14	760		38	
	99	11	1	-	1	-	-	-	-	-	5	-	-	8	260		13	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	420		21		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		46%			13%			24%			-36%							
'94		00%			01%			35%			-38%							
'99		02%			00%			09%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	4532	Dec:	41%				
											'94	2880		26%				
											'99	1800		14%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4											
<i>Artemisia tridentata vaseyana</i>																
S	87	2	-	-	-	-	-	-	2	-	-	-	133		2	
	94	57	-	-	22	-	-	-	-	79	-	-	-	1580		79
	99	15	1	-	3	-	-	-	-	19	-	-	-	380		19
Y	87	6	-	-	-	-	-	-	-	6	-	-	-	400		6
	94	16	-	-	9	-	-	-	-	24	-	1	-	500		25
	99	27	-	-	2	-	-	-	-	29	-	-	-	580		29
M	87	14	5	-	-	-	-	-	-	19	-	-	-	1266	16 22	19
	94	34	-	-	19	-	-	2	-	53	-	2	-	1100	21 27	55
	99	68	1	-	1	-	-	-	-	70	-	-	-	1400	19 30	70
D	87	6	4	1	-	-	-	-	-	9	-	-	2	733		11
	94	16	1	-	6	-	-	1	-	5	-	4	15	480		24
	99	14	2	-	-	-	-	-	-	6	-	-	10	320		16
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	780		39
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		25%		03%		06%		-13%								
'94		.96%		00%		21%		+10%								
'99		03%		00%		09%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	2399	Dec:	31%			
										'94	2080		23%			
										'99	2300		14%			
<i>Cercocarpus montanus</i>																
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	23	-	-	1	-	-	-	-	24	-	-	-	480		24
	99	1	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	87	-	2	4	-	-	-	-	-	6	-	-	-	400		6
	94	3	-	-	2	-	-	-	-	5	-	-	-	100		5
	99	16	-	-	-	1	-	-	-	17	-	-	-	340		17
M	87	-	-	5	-	-	-	-	-	5	-	-	-	333	23 30	5
	94	14	1	-	3	-	-	3	-	21	-	-	-	420	35 39	21
	99	6	12	-	-	2	2	-	-	22	-	-	-	440	40 47	22
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		18%		82%		00%		-29%								
'94		04%		00%		00%		+33%								
'99		38%		05%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	733	Dec:	-			
										'94	520		-			
										'99	780		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Chrysothamnus depressus</b>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%			+ 0%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	20		-			
												'99	20		-			
<b>Chrysothamnus nauseosus</b>																		
Y	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		50%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	-			
												'94	0		-			
												'99	0		-			
<b>Chrysothamnus viscidiflorus</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	14	-	-	1	-	-	-	-	-	15	-	-	-	300	5	8	15
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	7	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%			-89%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	360		-			
												'99	40		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Eriogonum microthecum</b>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	1	-	-	-	-	-	-	-	-	20			1
	99	2	-	-	-	-	-	-	-	-	-	-	-	40			2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	21	-	-	-	-	-	-	-	-	-	-	-	420	13	18	21
	99	12	2	1	-	-	-	-	-	-	-	-	-	300	4	6	15
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			-23%						
'94		00%			00%			00%									
'99		12%			06%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	440		-		
												'99	340		-		
<b>Gutierrezia sarothrae</b>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	2	-	-	-	-	-	-	-	-	-	-	-	40			2
Y	87	6	-	-	-	-	-	-	-	-	-	-	-	400			6
	94	3	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1
M	87	2	-	-	-	-	-	-	-	-	-	-	-	133	9	6	2
	94	3	-	-	-	-	-	-	-	-	-	-	-	60	5	5	3
	99	14	-	-	-	-	-	-	-	-	-	-	-	280	5	6	14
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			-77%						
'94		00%			00%			00%			+63%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	533	Dec:	0%		
												'94	120		0%		
												'99	320		6%		
<b>Juniperus osteosperma</b>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	1	-	-	-	-	-	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'94	0		-		
												'99	20		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	8	17	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-				
											'94	0		-				
											'99	0		-				
Peraphyllum ramosissimum																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20	5	74	1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	44	72	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%			+ 0%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	20		-				
											'99	20		-				
Pinus edulis																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	2	-	-	5	-	-	-	100			5
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	1	-	4	-	-	-	80			4
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	2	-	4	-	-	-	80	-	-	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	266	Dec:	-				
											'94	0		-				
											'99	160		-				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
S	87	17	-	-	-	-	-	-	-	-	17	-	-	-	1133		17	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
Y	87	16	-	-	-	-	-	-	-	-	10	6	-	-	1066		16	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	116	-	-	2	-	-	11	-	-	129	-	-	-	2580		129	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	164	-	-	-	-	5	-	-	169	-	-	-	3380	42 36	169		
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	4	-	-	-	-	-	-	-	3	-	-	1	80		4		
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	300		15		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			02%			.33%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1066	Dec:	0%				
											'94	0		0%				
											'99	6040		1%				
Sclerocactus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4 4	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'94	0		-				
											'99	60		-				

Trend Study 15-12-99

Study site name: Quaking Aspen Spring .

Range type: Chained, Seeded P-J .

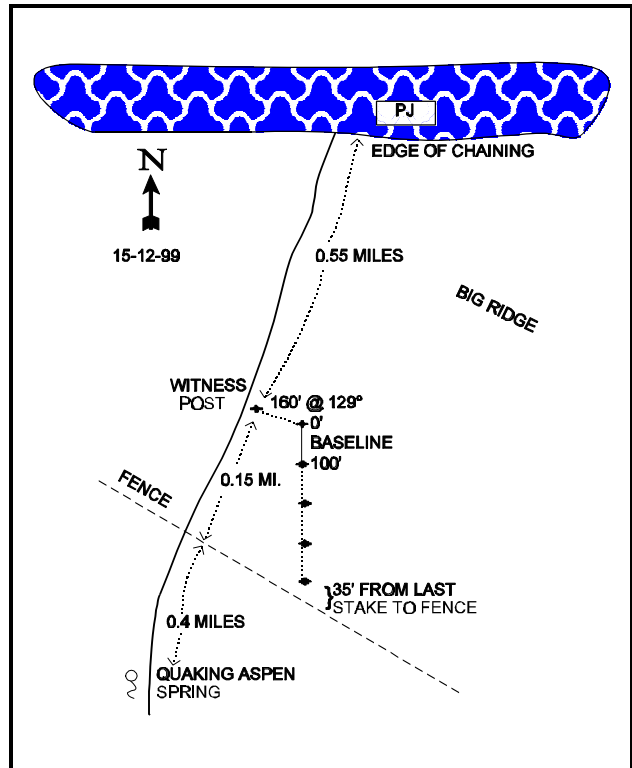
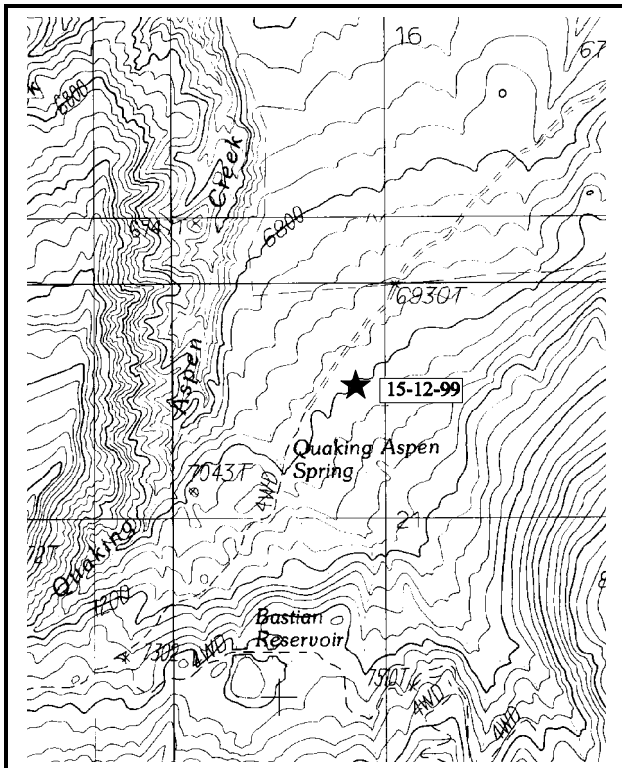
Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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 1/2 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

UTM 4197939.592 N , 526283.144 E



## DISCUSSION

### Trend Study No. 15-12 (38-12)

The Quaking Aspen Spring study is located in the foothills on the north slope of Mt. Hillars in the pinyon-juniper type. The site is within one-half mile of Quaking Aspen Creek which is a drainage divide between the foothills of Mt. Hillars and Mt. Pennell. The site is at an elevation of 7,000 ft and located on a bench that slopes to the northwest at a fairly consistent slope of 12%. The slope at the study site is only 3%. The area was chained years ago and the trees are regaining dominance of the area. The site is just above the oakbrush zone and mean annual precipitation is estimated at 14 inches. Water is available for wildlife and livestock at Quaking Aspen Spring which is located one mile southwest of the transect. This is thought to be a key use area for mule deer which use the area year-round. The road runs past the study site, but it is rarely traveled except during the deer hunt. Pinyon and juniper offer excellent protective cover, minimizing the disturbance caused by occasional vehicle use. Pellet group data from 1999 indicate light use by wildlife and livestock with an estimated 18 deer and 3 cow days use/acre (44 ddu/ha and 7 cdu/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, however it is fairly well distributed under shrub canopies. 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 is only slight at the present time.

The average height of pinyon and juniper trees in the chaining during the 1987 reading was about five feet. The stand is composed of mostly young trees. No seedlings were sampled. Point quarter data from 1994 estimate a total of 382 trees/acre, 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 a total tree density of 380 trees/acre, 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. The high density of these species is due in part to the large number of seedling and young trees present throughout the site.

The key browse species are black sagebrush and true mountain mahogany. Black sagebrush is the most abundant shrub. In 1994, it accounted 69% of the browse cover, and the population was estimated at 14,160 plants/acre. In 1999, this species has an estimated density of 12,600 plants/acre, with the majority being mature and it now provides 50% of the browse cover. Seedling density was estimated at over 4,000 plants per acre in 1987, but in 1994 and 1999, only 360 and 60 seedlings were estimated respectively. Utilization has been mostly light and vigor generally good over all sampling years. Percent decadency has increased from 12% in 1987, to 21% by 1994, and 22% in 1999. However, this rate is still low compared to many other sites. In 1999, mature black sagebrush plants had abundant seed heads from the previous year. Mountain mahogany numbers approximately 400 plants/acre in 1999, a slight decrease from 440 plants/acre estimated in 1994. The 1994 and 1999 estimates are half that of the 1987 estimate, however this is due largely to the much larger shrub sample size taken in 1994 and 1999 which gives a more representative sample. Mahogany receives much heavier use than black sagebrush. 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. Vigor has been good over all sampling years and no decadent plants have been sampled.

There are a large number of herbaceous species on the site, but most of these occur infrequently. Most perennial grasses have decreased in frequency since the initial reading in 1987, with the exception of Indian

ricegrass which has increased. Crested wheatgrass is the only seeded grass remaining in the chaining and showed moderate to heavy utilization in 1999, due in part to its low abundance. Cheatgrass is increasing with a significant increase in nested frequency since 1994. It now accounts for 52% of the grass cover and 35% of the herbaceous cover. Forbs are diverse with 23 species being sampled in 1994 and 21 in 1999. However, all species combined only provide 33 of the total herbaceous cover. Two species, lobeleaf groundsel and desert Indian paintbrush, had received moderate to heavy use when the site was read in June of 1999.

#### 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 nested frequencies of perennial grasses and forbs have declined significantly since 1987.

##### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - declining

#### 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

browse- stable

herbaceous understory- stable

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'87	'99
G	<i>Agropyron cristatum</i>	<sub>b</sub> 63	<sub>a</sub> 9	46	32	5	21	.19	.66
G	<i>Bouteloua gracilis</i>	<sub>b</sub> 174	<sub>a</sub> 118	<sub>a</sub> 97	69	47	43	1.62	.93
G	<i>Bromus tectorum</i> (a)	-	<sub>a</sub> 23	<sub>b</sub> 177	-	12	58	.08	3.40
G	<i>Koeleria cristata</i>	-	-	1	-	-	1	-	.00
G	<i>Oryzopsis hymenoides</i>	<sub>a</sub> -	<sub>a</sub> 1	<sub>b</sub> 57	-	1	24	.03	.46
G	<i>Poa fendleriana</i>	101	95	61	44	44	27	1.25	.88
G	<i>Sitanion hystrix</i>	<sub>c</sub> 163	<sub>b</sub> 113	<sub>a</sub> 14	70	47	8	.43	.17
G	<i>Stipa comata</i>	4	-	3	2	-	1	-	.00
Total for Annual Grasses		0	23	177	0	12	58	0.08	3.40
Total for Perennial Grasses		505	336	279	217	144	125	3.54	3.14
Total for Grasses		505	359	456	217	156	183	3.63	6.54
F	<i>Agoseris glauca</i>	<sub>a</sub> -	<sub>a</sub> 3	<sub>b</sub> 14	-	2	6	.03	.10
F	<i>Allium</i> spp.	2	-	-	1	-	-	-	-
F	<i>Arabis demissa</i>	<sub>b</sub> 31	<sub>a</sub> 8	<sub>ab</sub> 25	13	4	9	.02	.09
F	<i>Astragalus moencopensis</i>	<sub>a</sub> -	<sub>b</sub> 12	<sub>a</sub> -	-	6	-	.03	-
F	<i>Aster</i> spp.	<sub>a</sub> -	<sub>b</sub> 4	<sub>a</sub> -	-	3	-	.01	-
F	<i>Astragalus</i> spp.	16	6	6	8	3	4	.04	.12
F	<i>Castilleja chromosa</i>	<sub>b</sub> 40	<sub>a</sub> 9	<sub>ab</sub> 23	21	4	14	.05	.70
F	<i>Calochortus nuttallii</i>	<sub>a</sub> -	<sub>b</sub> 6	<sub>b</sub> 8	-	5	3	.02	.01
F	<i>Comandra pallida</i>	<sub>a</sub> -	<sub>b</sub> 14	<sub>a</sub> -	-	7	-	.11	-
F	<i>Crepis acuminata</i>	-	2	1	-	1	1	.00	.01
F	<i>Cryptantha</i> spp.	-	-	3	-	-	1	-	.03
F	<i>Descurainia pinnata</i> (a)	-	2	-	-	2	-	.01	-
F	<i>Eriogonum</i> spp.	-	-	3	-	-	1	-	.00
F	<i>Erigeron pumilus</i>	19	19	19	8	10	6	.22	.09
F	<i>Eriogonum umbellatum</i>	<sub>b</sub> 7	<sub>a</sub> -	<sub>ab</sub> 2	3	-	1	-	.00
F	<i>Gayophytum ramosissimum</i> (a)	-	<sub>b</sub> 28	<sub>a</sub> -	-	14	-	.07	-
F	<i>Haplopappus acaulis</i>	-	-	1	-	-	1	-	.00
F	<i>Hymenoxys acaulis</i>	44	29	29	21	16	11	.10	.15
F	<i>Lappula occidentalis</i> (a)	-	<sub>b</sub> 20	<sub>a</sub> -	-	8	-	.12	-
F	<i>Lesquerella kingii</i>	<sub>a</sub> 40	<sub>a</sub> 16	<sub>b</sub> 86	21	9	39	.04	.54
F	<i>Linum lewisii</i>	<sub>b</sub> 51	<sub>ab</sub> 43	<sub>a</sub> 21	26	19	11	.13	.34
F	<i>Lomatium</i> spp.	-	-	1	-	-	1	-	.00
F	<i>Lygodesmia spinosa</i>	<sub>b</sub> 20	<sub>ab</sub> 14	<sub>a</sub> 3	9	6	3	.17	.01
F	<i>Machaeranthera canescens</i>	3	-	-	2	-	-	-	-
F	<i>Penstemon comarrhenus</i>	2	6	3	1	2	2	.18	.01
F	<i>Phlox longifolia</i>	<sub>b</sub> 167	<sub>a</sub> 116	<sub>a</sub> 119	69	52	49	.33	.66
F	<i>Polygonum douglasii</i> (a)	-	<sub>b</sub> 47	<sub>a</sub> 8	-	20	4	.10	.02

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'04	'09
F	Senecio multilobatus	<sub>b</sub> 21	<sub>a</sub> 1	<sub>b</sub> 25	14	1	15	.00	.25
F	Sphaeralcea coccinea	1	2	-	1	1	-	.00	-
F	Unknown forb-perennial	3	-	-	1	-	-	-	-
F	Zigadenus paniculatus	2	1	2	1	1	2	.00	.03
Total for Annual Forbs		0	97	8	0	44	4	0.30	0.01
Total for Perennial Forbs		469	311	394	220	152	180	1.53	3.21
Total for Forbs		469	408	402	220	196	184	1.83	3.23

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

#### BROWSE TRENDS --

Herd unit 15 , Study no: 12

Type	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Amelanchier utahensis	4	3	.03	.03
B	Artemisia nova	96	94	18.32	16.84
B	Cercocarpus montanus	17	13	1.15	2.04
B	Chrysothamnus depressus	15	19	.39	.31
B	Chrysothamnus nauseosus	5	0	.18	-
B	Coryphantha vivipara arizonica	0	0	-	.01
B	Eriogonum microthecum	63	26	.64	.59
B	Gutierrezia sarothrae	12	4	.01	.04
B	Juniperus osteosperma	0	18	2.73	6.50
B	Opuntia spp.	4	1	-	-
B	Pinus edulis	0	12	3.24	7.62
B	Tetradymia canescens	1	0	-	-
Total for Browse		217	190	26.71	34.00

#### CANOPY COVER --

Herd unit 15 , Study no: 12

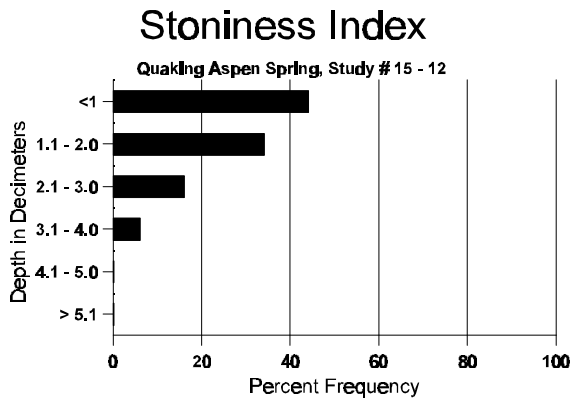
Species	Percent Cover '09
Juniperus osteosperma	5
Pinus edulis	8

BASIC COVER --  
Herd unit 15 , Study no: 12

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	302	330	7.75	33.40	39.97
Rock	308	296	18.50	22.14	24.27
Pavement	254	233	2.25	2.52	6.59
Litter	379	353	57.00	30.12	35.56
Cryptogams	1	72	.25	.00	1.26
Bare Ground	281	249	14.25	12.17	12.61

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 12, Study Name: Quaking Aspen Spring

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.3	55.0 (12.5)	7.5	51.3	22.2	26.6	2.1	6.6	44.8	.6



PELLET GROUP DATA --  
Herd unit 15 , Study no: 12

Type	Quadrat Frequency	
	'04	'09
Rabbit	17	28
Deer	9	16
Cattle	-	3
Buffalo	1	-

Pellet Transect Days Use/Acre (ha)
'09
N/A
12 (30)
3 (7)
0

BROWSE CHARACTERISTICS --

Herd unit 15 , Study no: 12

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	32	51	
	99	-	-	1	-	-	2	-	-	-	3	-	-	-	60	37	48	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		100%			00%			00%			+18%							
'94		00%			00%			00%			-25%							
'99		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'94	80		-			
												'99	60		-			
Artemisia nova																		
S	87	65	-	-	-	-	-	-	-	-	65	-	-	-	4333		65	
	94	16	-	-	2	-	-	-	-	-	18	-	-	-	360		18	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	87	32	11	-	-	-	-	-	-	-	37	6	-	-	2866		43	
	94	35	-	-	-	-	-	-	-	-	35	-	-	-	700		35	
	99	39	-	-	-	-	-	-	-	-	39	-	-	-	780		39	
M	87	75	33	11	-	-	-	-	-	-	103	16	-	-	7933	9	10	
	94	493	-	3	25	-	-	-	-	-	471	-	50	-	10420	11	18	
	99	399	54	-	-	-	-	-	-	-	453	-	-	-	9060	12	19	
D	87	11	7	5	-	-	-	-	-	-	14	5	-	4	1533		23	
	94	138	-	-	12	-	-	2	-	-	79	-	31	42	3040		152	
	99	71	62	4	1	-	-	-	-	-	133	-	-	5	2760		138	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1040		52	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		28%			09%			02%			+13%							
'94		00%			.42%			17%			-11%							
'99		18%			.63%			.79%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	12332	Dec:	12%			
												'94	14160		21%			
												'99	12600		22%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total							
		1	2	3	4										
<b>Cercocarpus montanus</b>															
S	87	1	-	-	-	-	-	-	1	-	-	-	66		1
	94	1	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	1	-	1	-	-	-	-	2	-	-	-	133		2
	94	1	-	-	1	-	-	3	5	-	-	-	100		5
	99	3	-	-	-	-	-	-	3	-	-	-	60		3
M	87	-	3	7	-	-	-	-	10	-	-	-	666	22 30	10
	94	2	10	4	-	-	-	1	17	-	-	-	340	33 26	17
	99	1	5	11	-	-	-	-	17	-	-	-	340	36 41	17
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>				
'87		25%			67%			00%			-45%				
'94		45%			18%			00%			-9%				
'99		25%			55%			00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	799	Dec:	-		
										'94	440		-		
										'99	400		-		
<b>Chrysothamnus depressus</b>															
S	87	5	-	-	-	-	-	-	5	-	-	-	333		5
	94	5	-	-	-	-	1	-	6	-	-	-	120		6
	99	2	-	-	-	-	-	-	2	-	-	-	40		2
Y	87	2	1	-	-	-	-	-	3	-	-	-	200		3
	94	4	-	-	-	-	-	-	4	-	-	-	80		4
	99	4	-	-	-	-	-	-	4	-	-	-	80		4
M	87	13	1	3	-	-	-	-	17	-	-	-	1133	6 6	17
	94	19	-	-	5	-	-	-	24	-	-	-	480	4 7	24
	99	22	2	-	1	1	-	-	26	-	-	-	520	4 9	26
D	87	2	-	-	-	-	-	-	2	-	-	-	133		2
	94	1	-	-	-	-	-	-	1	-	-	-	20		1
	99	3	-	-	-	-	-	-	1	-	-	2	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>				
'87		09%			14%			00%			-60%				
'94		00%			00%			00%			+12%				
'99		09%			00%			06%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	1466	Dec:	9%		
										'94	580		3%		
										'99	660		9%		
<b>Chrysothamnus nauseosus</b>															
M	87	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	94	5	-	-	1	-	-	-	6	-	-	-	120	3 7	6
	99	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>				
'87		00%			00%			00%							
'94		00%			00%			00%							
'99		00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-		
										'94	120		-		
										'99	0		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Coryphantha vivipara arizonica</b>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	4	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	0		-			
<b>Eriogonum microthecum</b>																		
S	87	12	-	-	-	-	-	-	-	-	12	-	-	-	800		12	
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	8	1	-	-	-	-	-	-	-	9	-	-	-	600		9	
	94	16	-	-	2	-	-	-	-	-	18	-	-	-	360		18	
	99	7	2	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	87	13	7	-	-	-	-	-	-	-	20	-	-	-	1333	5	4	20
	94	142	-	-	5	-	-	2	-	-	146	-	3	-	2980	5	6	149
	99	38	11	-	-	-	-	-	-	-	49	-	-	-	980	3	5	49
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	99	4	18	2	-	-	-	-	-	-	22	-	-	2	480		24	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		28%			00%			00%			+43%							
'94		00%			00%			02%			-51%							
'99		38%			02%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1933	Dec:	0%			
												'94	3380		1%			
												'99	1640		29%			



A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total		
		1	2	3	4		1	2			
<b>Gutierrezia sarothrae</b>											
S	87	3	-	-	-	-	-	-	3	-	3
	94	-	-	-	-	-	-	-	0	-	0
	99	3	-	-	-	-	-	-	60	-	3
Y	87	2	-	-	-	-	-	-	133	-	2
	94	1	-	-	-	-	-	-	20	-	1
	99	3	-	-	-	-	-	-	60	-	3
M	87	12	-	-	-	-	-	-	800	7	6
	94	10	-	-	-	-	-	-	200	8	7
	99	2	-	-	-	-	-	-	40	5	5
D	87	1	-	-	-	-	-	-	66	-	1
	94	5	-	-	-	-	-	-	100	-	5
	99	1	-	-	-	-	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		07%		-68%			
'94		00%		00%		06%		-63%			
'99		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	999	Dec:	7%		
						'94	320		31%		
						'99	120		17%		
<b>Juniperus osteosperma</b>											
S	87	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	0	-	0
	99	2	-	-	-	-	-	-	40	-	2
Y	87	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	0	-	0
	99	12	-	-	-	-	-	-	240	-	12
M	87	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	0	-	0
	99	8	-	-	-	-	-	-	160	-	8
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%					
'94		00%		00%		00%					
'99		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-		
						'94	0		-		
						'99	400		-		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	6	-	-	-	-	-	-	-	-	6	-	-	-	400	6	9	6
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	15	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-80%							
'94		00%			00%			00%			-75%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	400	Dec:	-			
												'94	80		-			
												'99	20		-			
Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	55	43	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220	-	-	11
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	532	Dec:	-			
												'94	0		-			
												'99	280		-			
Tetradymia canescens																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	1	99	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	20		-			
												'99	0		-			

Trend Study 15-13-99

Study site name: Sidehill Spring .

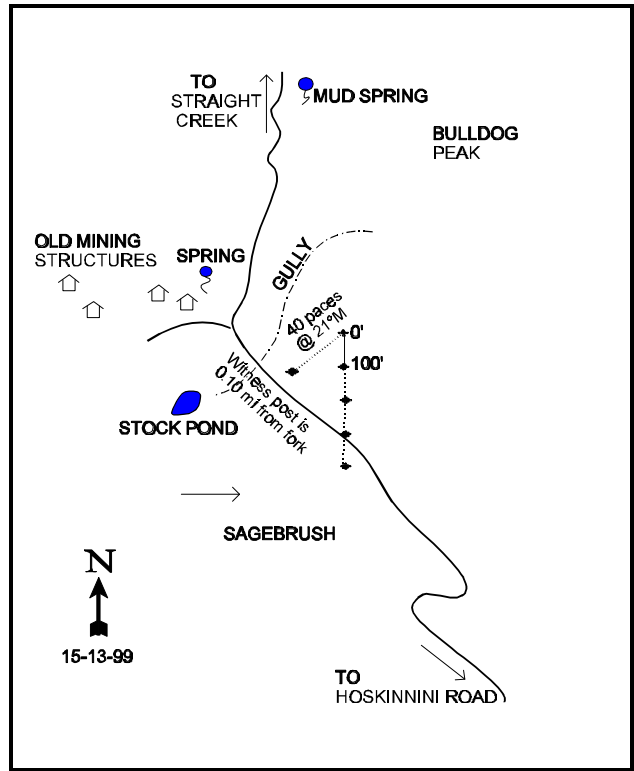
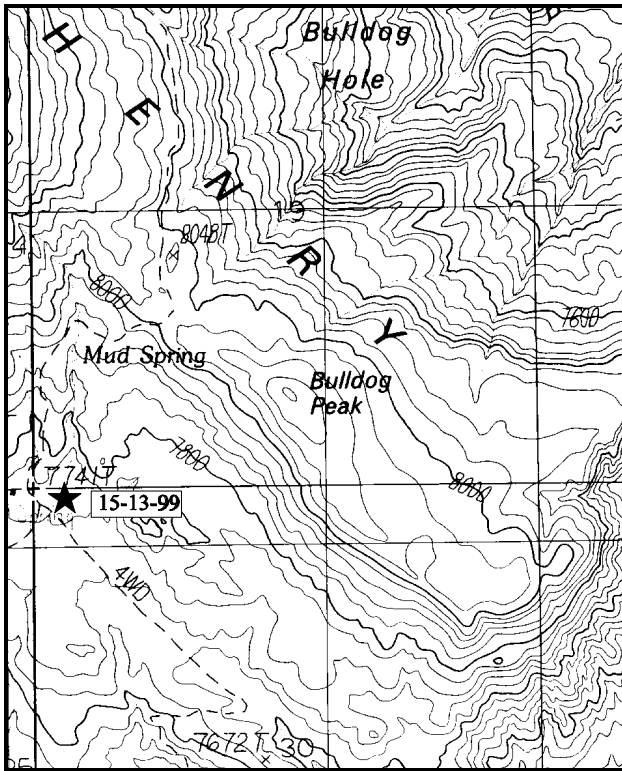
Range type: Big Sagebrush .

Compass bearing: frequency baseline 170°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) 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

UTM 4196156.687 N, 522200.116 E

## DISCUSSION

### Trend Study No. 15-13(38-13)

The Sidehill Spring study is located in a relatively small mountain big sagebrush flat approximately one-half mile west of Bulldog Peak and halfway between Mt. Pennell and Mt. Hillars. The elevation at the site is 7,700 ft and the slope is gradual (4-5%) with a southeast aspect. Precipitation at this elevation probably averages close to 15 inches per year. The sagebrush flat is surrounded by a pinyon-juniper/oak woodland with young trees scattered throughout the flat. Pinyon and juniper have a combined estimated canopy cover of 7%. The area is within the Pennell Allotment. Water is available for livestock and wildlife in a nearby spring, creek, and stock pond. This is considered a key area for mule deer during the summer and during mild winters. The 1999 pellet count data estimate 18 deer days use/acre (44 ddu/ha). This area is currently only lightly used by livestock even though water is available nearby. Pellet transect data from 1999 estimates 25 cow days use/acre (63 cdu/ha). There is evidence of past mining activity; a cabin, pump house, and old mining equipment is located near the spring. The road past the site is seldom used, but perhaps limited use during the hunting season.

The soil is a moderately deep clay loam with an estimated effective rooting depth of over 22 inches. Soil penetrometer readings used to estimate a stoniness profile index, indicate the vast majority of rock to be at least 16 inches down in the profile. There is very little rock or pavement on or near the soil surface. Black sagebrush is present in small scattered patches on the site indicating that at least some rocky, shallow portions exist in the soil profile. Several small gullies are present throughout the site with pedestaling occurring around the base of sagebrush plants. Some gullies appear to be in the process of healing with sloping sides and persistent vegetation. A large active gully is present west of the study site. Organic matter content is low and phosphorus levels are below the 10 ppm determined necessary for normal plant development. The soil is slightly alkaline (pH of 7.5).

A dense stand of mountain big sagebrush dominates the site. Sagebrush density has shown increases each sampling date to where it is now 5,920 plants/acre. Cover of sagebrush has remained relatively stable at about 19% over all sampling years. This dense stand will greatly limit the production of any herbaceous species. Use is mostly light and vigor is good on the majority of the sagebrush. Percent decadency declined from 29% in 1994 to 12% in 1999. However, 53% of the decadent plants were classified as dying in 1999. The number of young plants (800/acre) appears to be adequate to replace those individuals that are dying. Low rabbitbrush is also abundant with an estimated density of 8,340 plants/acre in 1994, up to 11,000 plants/acre in 1999. Mature plants make up 87% of the population. Although use is light on all plants sampled in 1999, plants have a hedged appearance and are small statured. Other important species that occur in low densities include Utah serviceberry and black sagebrush.

During the 1994 reading, grasses made up only 6% of the vegetative cover while forbs provided 13% of the vegetative cover. In 1999, grass cover dramatically increased to nearly 19% (32% of the total vegetative cover) due to the explosion of the annual cheatgrass. Cheatgrass currently provides 89% of the grass cover and 74% of the herbaceous cover. This presents a fire hazard to the sagebrush population and is a cause for concern as it competes with seedlings for establishment. Perennial grasses declined in nested and quadrat frequencies between the 1994 and 1999 readings. Perennial forbs also decreased in nested and quadrat frequency, and no annual forbs were sampled in 1999. Silky lupine remains the dominant forb as it provides 96% of the forb cover at the site. However, it decreased significantly in nested and quadrat frequency in 1999.

### 1994 TREND ASSESSMENT

Basic ground cover estimates are 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

browse - stable

herbaceous understory - improved, but still deficient

#### 1999 TREND ASSESSMENT

Trend for soil is 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

browse- stable

herbaceous understory- down

HERBACEOUS TRENDS --  
Herd unit 15 , Study no: 13

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'87	'99
G	Agropyron spp.	<sub>b</sub> 9	<sub>a</sub> -	-	4	-	-	-	-
G	Agropyron spicatum	-	-	-	-	-	-	-	.01
G	Bouteloua gracilis	-	4	3	-	1	1	.00	.00
G	Bromus tectorum (a)	-	<sub>a</sub> 163	<sub>b</sub> 326	-	61	94	.80	16.80
G	Hilaria jamesii	2	-	-	1	-	-	-	-
G	Oryzopsis hymenoides	<sub>b</sub> 33	<sub>a</sub> 13	<sub>a</sub> 16	18	6	10	.13	.17
G	Poa interior	-	4	2	-	1	1	.03	.00
G	Sitanion hystrix	<sub>b</sub> 138	<sub>b</sub> 138	<sub>a</sub> 88	65	54	39	1.36	1.94
G	Stipa lettermani	<sub>a</sub> -	<sub>b</sub> 6	<sub>b</sub> 1	-	3	1	.01	.03
Total for Annual Grasses		0	163	326	0	61	94	0.80	16.80
Total for Perennial Grasses		182	165	110	88	65	52	1.55	2.16
Total for Grasses		182	328	436	88	126	146	2.35	18.97
F	Astragalus spp.	-	-	-	-	-	-	-	.00
F	Castilleja chromosa	-	-	1	-	-	1	-	.03
F	Castilleja linariaefolia	-	-	2	-	-	1	-	.38
F	Calochortus nuttallii	<sub>a</sub> 7	<sub>b</sub> 54	<sub>b</sub> 41	4	26	19	.14	.29
F	Gayophytum ramosissimum (a)	-	<sub>b</sub> 9	<sub>a</sub> -	-	4	-	.02	-
F	Ipomopsis aggregata	<sub>b</sub> 11	<sub>a</sub> -	<sub>a</sub> -	5	-	-	-	-
F	Lappula occidentalis (a)	-	4	-	-	2	-	.01	-
F	Linum lewisii	5	3	-	2	1	-	.00	-
F	Lomatium spp.	-	3	6	-	1	2	.03	.06
F	Lupinus sericeus	<sub>a</sub> 58	<sub>b</sub> 160	<sub>a</sub> 71	25	66	35	4.92	2.67
F	Penstemon comarrhenus	5	2	4	2	1	4	.00	.02
F	Phlox longifolia	<sub>b</sub> 12	<sub>a</sub> -	<sub>b</sub> 5	5	-	3	-	.01
F	Sphaeralcea coccinea	-	-	1	-	-	1	-	.15
F	Zigadenus paniculatus	-	6	-	-	2	-	.01	.01
Total for Annual Forbs		0	13	0	0	6	0	0.02	0
Total for Perennial Forbs		98	228	131	43	97	66	5.11	3.63
Total for Forbs		98	241	131	43	103	66	5.14	3.63

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

BROWSE TRENDS --  
Herd unit 15 , Study no: 13

T y p e	Species	Strip Frequency		Average Cover %	
		'04	'09	'04	'09
B	Amelanchier utahensis	2	2	.03	-
B	Artemisia nova	0	2	-	.41
B	Artemisia tridentata vaseyana	93	89	19.32	18.78
B	Chrysothamnus viscidiflorus	77	66	6.09	7.08
B	Gutierrezia sarothrae	0	0	-	-
B	Juniperus osteosperma	0	5	4.61	7.52
B	Opuntia spp.	5	5	.00	.00
B	Pinus edulis	0	3	1.61	2.62
B	Symphoricarpos oreophilus	10	7	.33	.18
Total for Browse		187	179	32.02	36.63

CANOPY COVER --  
Herd unit 15 , Study no: 13

Species	Percent Cover '09
Juniperus osteosperma	4
Pinus edulis	3

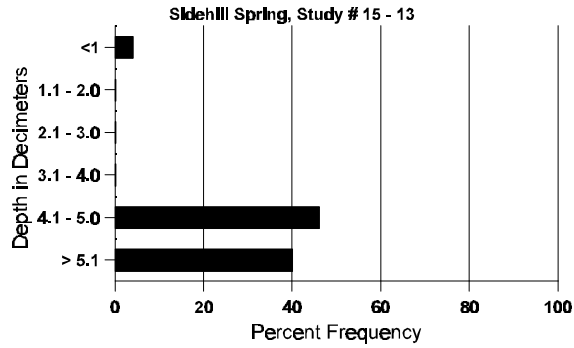
BASIC COVER --  
Herd unit 15 , Study no: 13

Cover Type	Nested Frequency		Average Cover %		
	'04	'09	'87	'94	'99
Vegetation	303	334	7.25	40.99	53.78
Rock	108	63	.25	2.09	1.99
Pavement	103	88	2.00	.50	.99
Litter	376	350	62.75	32.65	39.14
Cryptogams	12	20	0	.18	.38
Bare Ground	263	231	27.75	25.28	24.26

SOIL ANALYSIS DATA --  
Herd Unit 15, Study # 13, Study Name: Sidehill Spring

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
22.2	48.4 (18.1)	7.5	37.3	36.2	26.6	2.1	5.8	83.2	0.5

# Stoniness Index



## PELLET GROUP DATA --

Herd unit 15 , Study no: 13

Type	Quadrat Frequency		Pellet Transect Days Use/Acre (ha)
	'94	'99	
Rabbit	20	24	N/A
Deer	12	5	18 (44)
Cattle	-	2	25 (62)

## BROWSE CHARACTERISTICS --

Herd unit 15 , Study no: 13

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total					
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.						
Amelanchier utahensis																							
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0				
	'94	2	1	-	-	-	-	-	-	-	-	-	-	-	3	60	17	143	3				
	'99	2	-	-	-	-	-	-	-	-	-	-	-	-	2	40	48	44	2				
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>												
'87		00%			00%			00%															
'94		33%			00%			00%			-33%												
'99		00%			00%			00%															
Total Plants/Acre (excluding Dead & Seedlings)												'87		0		Dec:							
												'94		60									
												'99		40									



A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia nova</i>																	
S	87	26	-	-	-	-	-	-	-	-	23	-	3	-	1733		26
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	11	-	-	-	-	-	-	-	-	11	-	-	-	733		11
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	10	2	-	-	-	-	-	-	-	8	-	4	-	800	9 8	12
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	1	-	-	2	-	-	-	-	-	3	-	-	-	60	19 31	3
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		09%			00%			17%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	1533	Dec:	-			
											'94	0		-			
											'99	60		-			
<i>Artemisia tridentata vaseyana</i>																	
S	87	7	-	-	-	-	-	-	-	-	6	-	1	-	466		7
	94	146	-	4	1	-	-	-	-	-	151	-	-	-	3020		151
	99	12	-	-	-	-	-	-	-	-	12	-	-	-	240		12
Y	87	31	3	-	-	-	-	-	-	-	28	1	5	-	2266		34
	94	41	-	-	-	-	-	1	-	-	42	-	-	-	840		42
	99	39	-	-	-	-	-	1	-	-	38	2	-	-	800		40
M	87	21	15	-	-	-	-	-	-	-	28	1	7	-	2400	20 19	36
	94	149	5	-	2	-	-	-	-	-	156	-	-	-	3120	51 54	156
	99	212	5	-	3	-	-	-	-	-	220	-	-	-	4400	24 36	220
D	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2
	94	76	-	2	3	-	-	1	-	-	57	-	-	25	1640		82
	99	35	-	-	1	-	-	-	-	-	17	-	-	19	720		36
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1300		65
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		26%			00%			17%			+14%						
'94		02%			.71%			09%			+ 5%						
'99		02%			00%			06%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	4799	Dec:	3%			
											'94	5600		29%			
											'99	5920		12%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<b>Chrysothamnus viscidiflorus</b>																	
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	94	196	-	-	-	-	-	2	-	-	198	-	-	-	3960		198
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10
Y	87	58	-	-	-	-	-	-	-	-	57	-	1	-	3866		58
	94	32	2	-	-	-	-	2	-	-	36	-	-	-	720		36
	99	70	-	-	-	-	-	-	-	-	70	-	-	-	1400		70
M	87	112	-	-	-	-	-	-	-	-	107	-	5	-	7466	4 8	112
	94	319	-	1	29	-	-	27	-	-	376	-	-	-	7520	31 22	376
	99	476	-	-	-	-	-	1	-	-	477	-	-	-	9540	5 10	477
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5
	99	3	-	-	-	-	-	-	-	-	2	-	-	1	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			04%			-26%						
'94		.47%			.23%			00%			+24%						
'99		00%			00%			.18%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	11332	Dec:	0%			
											'94	8340		1%			
											'99	11000		1%			
<b>Gutierrezia sarothrae</b>																	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	12	-	-	-	-	-	-	-	-	12	-	-	-	800	9 5	12
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	866	Dec:	-			
											'94	0		-			
											'99	0		-			
<b>Juniperus osteosperma</b>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100	- -	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		00%			00%			00%									
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'94	0		-			
											'99	100		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	4	-	-	-	-	-	4	-	-	-	80		4	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	7	1
	94	4	-	-	2	-	-	-	-	-	6	-	-	-	120	5	16	6
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100	4	7	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+34%							
'94		00%			00%			00%			-50%							
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	132	Dec:	-			
												'94	200		-			
												'99	100		-			
Pinus edulis																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'94		00%			00%			00%										
'99		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'94	0		-			
												'99	60		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total									
		1	2	3	4												
Symphoricarpos oreophilus																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	99	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	94	6	2	-	-	-	-	1	-	-	9	-	-	-	180	9	46
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	17	24
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'94		15%			00%			00%			+ 7%						
'99		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	0%				
										'94	260		15%				
										'99	280		0%				

## SUMMARY

### DEER HERD UNIT 15(38) - HENRY MOUNTAINS

Lower elevation winter range transects include Eagle Bench (#1), Cave Flat Chaining (#9), and Cave Flat (#10). Browse trend is stable on Eagle Bench, down on Cave Flat Chaining due to the dominance of broom snakeweed, and up on Cave Flat with sagebrush showing improved vigor, decreased decadency, and good recruitment from young plants. Herbaceous trend is improving on Eagle Bench with perennial species increasing in nested frequency, stable on Cave Flat Chaining although the understory is depleted, and down on Cave Flat with the expansion of cheatgrass. Soil trends on all these sites are stable at this time.

Pinyon-juniper chaining projects make up a large portion of spring and summer range for deer and buffalo on the unit. Five study sites occur in these treatments. They include: South Creek Chaining (#4), Bates Knob (#5), Box Springs Chaining (#6), Airplane Spring (#7), and Quaking Aspen Spring (#12). The most important vegetational aspect of these treatments is the herbaceous understory. All of the chainings in this herd unit showed stable trends for the herbaceous component. Soil trends on all sites are stable with the exception of South Creek Chaining, which has a downward trend due to the decrease in protective ground cover. Browse trends are mixed within the chainings. Two sites, Bates Knob and Airplane Spring show improved browse conditions. Two other sites, South Creek and Box Springs have browse trends that are down. The increase in green rubber rabbitbrush at South Creek and the heavy use and lack of recruitment on bitterbrush at Box Springs are the causes for downward browse trends at these sites. Quaking Aspen Spring has a stable browse trend.

Other summer range sites which occur outside of pinyon-juniper treatments include a pinyon-juniper woodland which is proposed for treatment (Garden Basin #8), a mountain big sagebrush flat (Sidehill Spring #13), two mixed mountain brush sites (Dugout #3 and Above Coyote Bench #11), and one aspen area (Nasty Flat #2). The proposed chaining treatment area at Garden Basin has a stable soil trend although the soil is in poor condition. Trend for browse is down, and the herbaceous understory is stable but severely lacking. This trend study should be discontinued if the chaining treatment is not conducted before the next reading. Sidehill Spring displays stable soil and browse trends and a downward herbaceous trend as cheatgrass dominates the understory and perennial species decreased in nested frequency. This site contains a dense stand of sagebrush and rabbitbrush and would benefit from a treatment to thin these shrubs. The mixed mountain brush site at Dugout has stable trends for all categories. The site at Above Coyote Bench has a stable browse and soil trend but downward trend for the herbaceous understory due to herbaceous perennial species decreasing in nested frequency and cheatgrass increasing in nested frequency. The aspen site at Nasty Flat occurs in a mature aspen stand with little browse. The baseline was relocated closer to the edge of the clone in 1999 to better sample aspen regeneration. Trends are stable for all categories at this site.

Site	Category	1994	1999
15-1 Eagle Bench	soil	0/-	0
	browse	0	0
	herbaceous understory	-	+
15-2 Nasty Flat	soil	0	0
	browse	0	0
	herbaceous understory	0	0

Site	Category	1994	1999
15-3 Dugout	soil	0	0
	browse	0	0
	herbaceous understory	0	0
15-4 South Creek Chaining	soil	+	-
	browse	-	-
	herbaceous understory	0	0
15-5 Bates Knob	soil	0	0
	browse	-	+
	herbaceous understory	-	0
15-6 Box Springs Chaining	soil	0	0
	browse	0	-
	herbaceous understory	0/-	0
15-7 Airplane Spring	soil	0	0
	browse	+	+
	herbaceous understory	-	0
15-8 Garden Basin	soil	0/-	0
	browse	-	-
	herbaceous understory	0	0
15-9 Cave Flat Chaining	soil	+	0
	browse	-	-
	herbaceous understory	0	0
15-10 Cave Flat	soil	+	0
	browse	0	+
	herbaceous understory	-	-

Site	Category	1994	1999
15-11 Above Coyote Bench	soil	-	0
	browse	0	0
	herbaceous understory	-	-
15-12 Quaking Aspen Spring	soil	0	0
	browse	0	0
	herbaceous understory	-	0
15-13 Sidehill Spring	soil	0	0
	browse	0	0
	herbaceous understory	+	-

(0) = stable, (+) = up, (-) = down, (0/+) = stable to up, (0/-) = stable to down

## REFERENCES

- Bureau of Land Management, Richfield District. 1983. Henry Mountains Grazing EIS.
- Coles, F. H. and J. C. Pederson. 1967. Utah big game range inventory, 1966. Publ No. 67-1. Utah Department of Fish and Game, Salt Lake City, Utah. 171 pp.
- Coles, F. H. and J. C. Pederson. 1968. Utah big game range inventory, 1967. Publ No. 68-2. Utah Department of Fish and Game, Salt Lake City, Utah. 120 pp.
- Evans, G., W. Shields and others. 1995. Utah big game annual report, 1995. Publ. No. 95-12. Utah Dept. of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah. 127 pp.
- Evans, G., W. Shields and others. 1997. Utah big game annual report, 1997. Publ. No. 97-17. Utah Dept. of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah. 302 pp.
- Inglot, Corey. 1983. Deer herd unit management plan, herd unit 52. Utah division of Wildlife Resources.
- Guinta, B. C. and R. Musclow. 1983. Utah big game range inventory, 1981. Publ. No. 83-1. Utah Dept of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah. 189 pp.
- Jense, G. K., W. Shields and others. 1993. Utah big game annual report, 1993. Publ. No. 93-3. Utah Dept. of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah.
- Mann, R. P. and G. Wallace. 1983. Draft deer herd unit 31A management plan. Utah Dept of Natural Resources. Division of Wildlife Resources. 23 pp.
- Nelson, K. L. 1965. Status and habits of the American Buffalo in the Henry Mountains area of Utah. Utah State Fish and Game Bulletin No. 65-2. 142 pp.
- Mueggler, W. F., L. R. Mason and J. F. Vallentine. 1984. Utah Grasses. Utah Extension Service. 69 pp.
- Rawley, E. V. 1985. Early records of wildlife in Utah. Publ. No. 86-2. Utah Dept. of Natural Resources, Division of Wildlife Resources, Salt Lake City, Utah. 102 pp.
- Stokes, W. L. 1986. Geology of Utah. Utah Museum of Natural History Occasional Paper No. 6. 280 pp.
- Utah Division of Wildlife Resources. In Press. 1998 Utah Big Game Management Plan (Draft Copy). Utah Dept. of Natural Resources, Division of Wildlife Resources, Salt Lake City, Utah.