

UTAH BIG GAME RANGE TREND STUDIES 2001 Volume 2



Photo courtesy of L. Dalton and L. Romin

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REPORT FOR FEDERAL AID PROJECT W-135-R-21**

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

**UTAH BIG GAME
RANGE TREND STUDIES
2001 Volume 2**

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Performance Report for Federal Aid Project W-135-R-21

Publication No. 02-12

UTAH DEPARTMENT OF NATURAL RESOURCES
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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 2001 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Northern Region. Trend studies surveyed in these management units were established in 1983, 1984, 1985, 1990, 1996 and 2001, with rereads in 1990, 1996, and 2001.

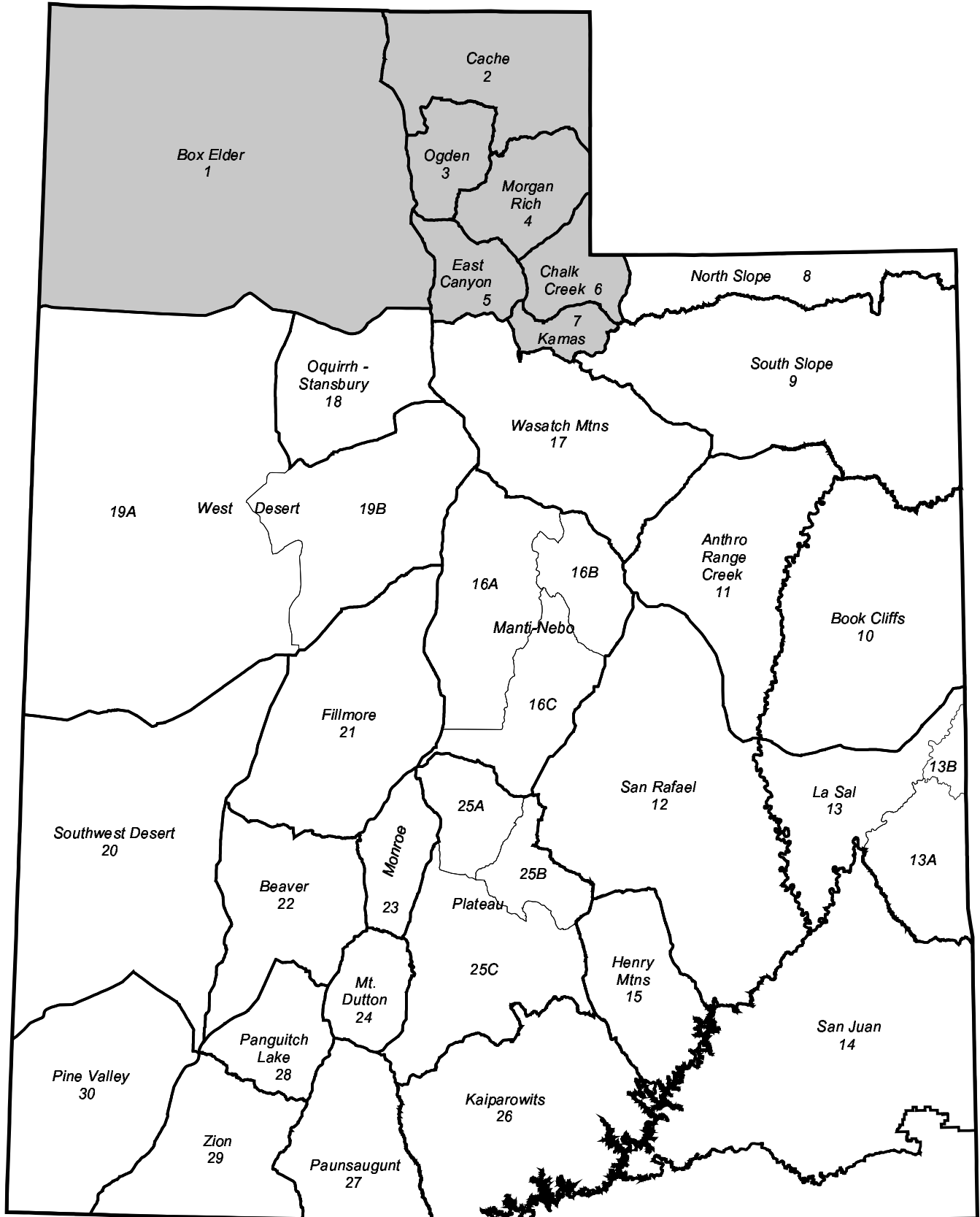
The following Bureau of Land Management and U.S. Forest Service offices provided information and/or assistance in completion of the trend studies which add to the value of this interagency report:

Bureau of Land Management Salt Lake Field Office
Bear River Resource Area

Wasatch-Cache National Forest
Logan Ranger District
Kamas Ranger District
Ogden Ranger District
Salt Lake Ranger District

Most private landowners were cooperative in allowing access to study sites located on their land. However, a few studies were not read because landowners would not allow project personnel access through their private land.

Utah Management Units Surveyed in 2001



RANGE TREND STUDY METHODS

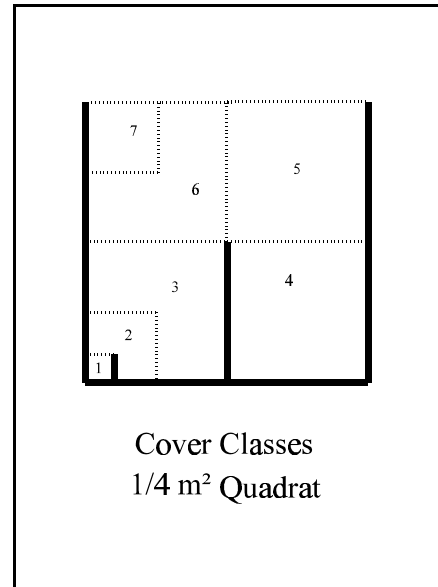
Studies monitoring range trend depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetative or habitat types within a unit, it is necessary to concentrate on specific sites and/or “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, range trend studies are established in conjunction with permanently marked pellet group transects. Once a “key” area has been selected, specific placement for sampling is determined. The sampling grid is carefully placed in order to adequately represent the surrounding area. All sampling baselines are permanently marked by half-high steel fence posts. The first, or beginning baseline stake, is marked with a metal tag for proper identification of the transect. The beginning of each belt is marked by rebar to ensure a more precise alignment of the originally sampled belt.

Vegetative composition

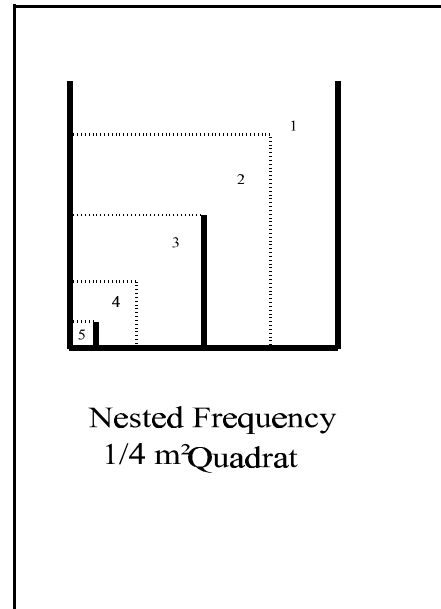
Determining vegetational characteristics for each “key” area is determined by setting up 5 consecutive 100 ft baseline transects in the area of interest. This 500 ft line is the baseline and one, 100 ft belt is placed perpendicular to each 100 ft section of the baseline at random foot marks and centered on the 50 ft mark. A 1/4 m² quadrat is centered every 5 feet along the same side of the belt, starting at the 5 foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all species occurring within a quadrat, including annual species.

Cover is determined using a slightly modified Daubenmire (1959) cover class method (Bailey 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 at a given site.



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 (Smith et al. 1987, Smith et al. 1986, Mosley et al. 1986). Plant cover and density values are not reliable indicators of trend for herbaceous species and can fluctuate greatly with precipitation and time of season sampled.

Therefore, plant cover and density values can be misleading if used by themselves and do not necessarily indicate changes in composition and/or distribution of key plant species. Quadrat frequency is used as 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 “Herbaceous Trends” table. Nested frequency and average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground are summarized in the “Basic Cover” table.

Shrub densities are estimated using five, 1/100th acre strips centered over the length of each 100 foot belt. All shrubs rooted within each strip are counted and placed in the following five classes. (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 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. Therefore, 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, cover, 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
- 10) proportion of cover contributed by key species

Trends in herbaceous plants as a group or as a single "key" species can be determined by comparing the sum of nested 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 "herbaceous trends" table summarizes average cover, quadrat frequency, and nested frequency data for individual grass and forb species. The table contains all the grass and forb 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 slightly decreased to 220. 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. However, 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.

HERBACEOUS TRENDS --

Herd unit 23 , Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	<i>Agropyron spicatum</i>	_b 227	_b 220	_a 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>	_a 6	_b 36	_b 49	3	16	21	.98
G	<i>Poa secunda</i>	_a 3	_b 18	_c 94	1	10	40	2.00
G	<i>Sitanion hystrix</i>	_b 25	_{ab} 20	_a 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.	_a -	_b 18	_a 1	-	9	1	.00
F	<i>Astragalus convallarius</i>	_a 2	_a 4	_b 6	1	1	6	.15
F	<i>Calochortus nuttallii</i>	_{ab} 4	_b 8	_a -	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>	_a 8	_b 27	_a 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
Total for Forbs		14	80	51	7	39	25	.78

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

In 1985, perennial grasses had a sum of nested frequency value of 265. This value 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.

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 1/4m² 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 Ø8	Average Cover % Ø8
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 ft 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 Ø8
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 '98	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:

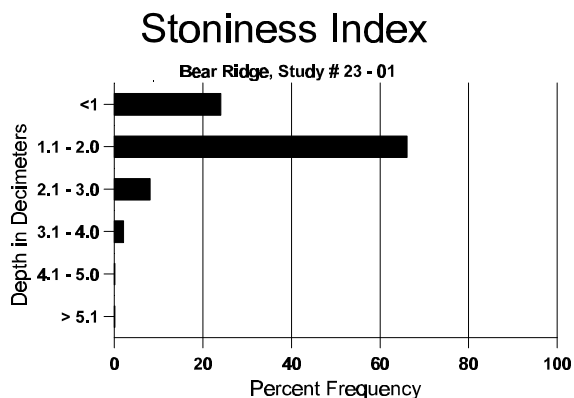
Ultra acid	<3.5
Extremely acid	3.5-4.4
Very strongly acid	4.5-5.0
Strongly acid	5.1-5.5
Moderately acid	5.6-6.0
Slightly acid	6.1-6.5
Neutral	6.6-7.3
Slightly alkaline	7.4-7.8
Moderately alkaline	7.9-8.4
Strongly alkaline	8.5-9.0
Very strongly alkaline	>9.1

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		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'93	'98	Ø8	Ø8
Rabbit	6	25	218	N/A
Elk	2	4	35	3 (5)
Deer	9	36	357	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, 100ft² 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 overestimate or underestimate 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 57% 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

A G 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.	
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 baseline post 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 (²U.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.

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

An introductory segment at the beginning of each 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.

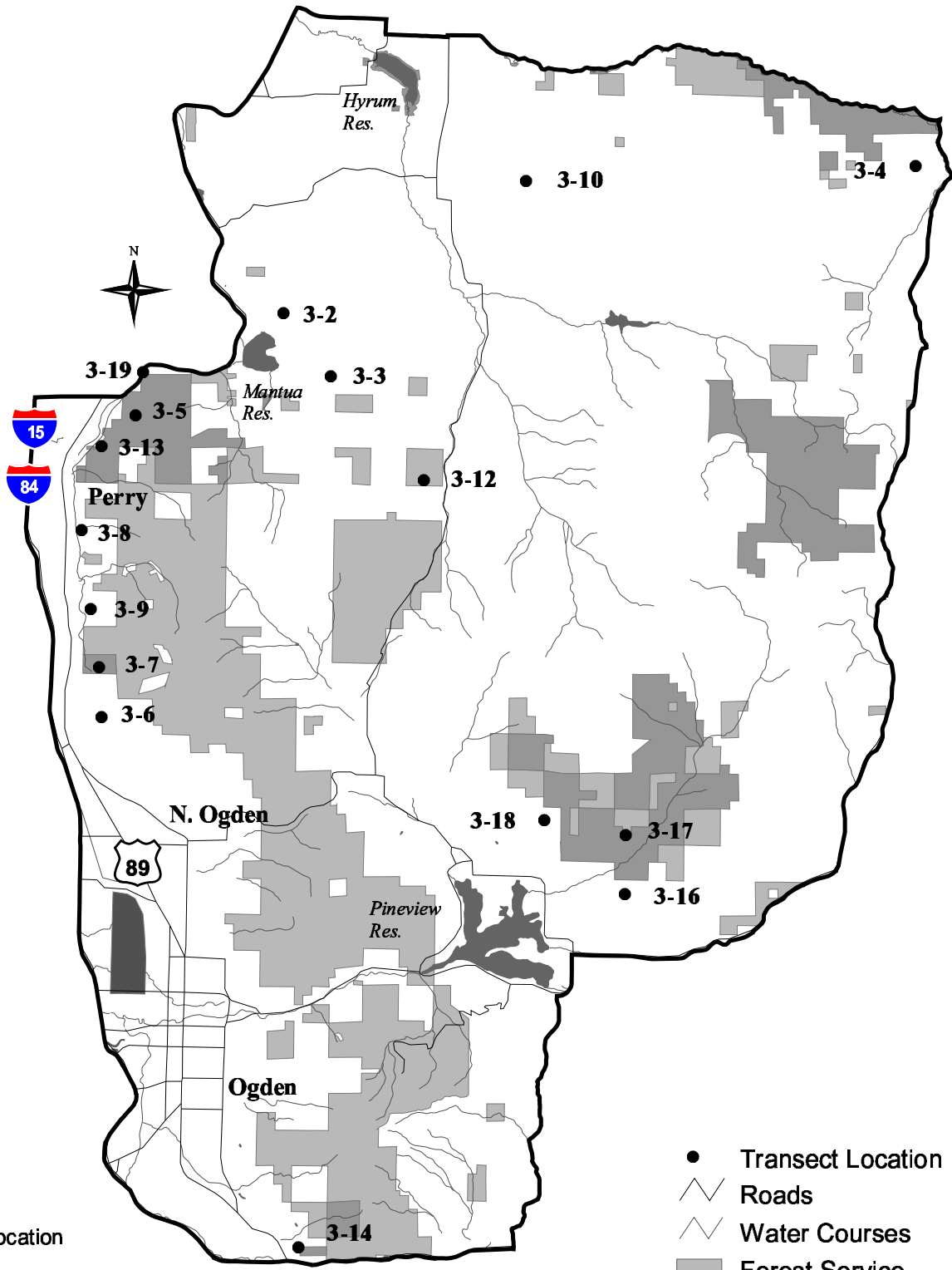
The name of the site and directions for locating the site are given on the location page. Also included on this page are the vegetation type, arrangement and diagrammatic sketch of the baseline, and the location on a topographical map. The 7.5 minute topographical map name and public land survey description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

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

Tables with the compiled data follow the study discussions. A computer-generated data summary presents the pooled data for nested frequency, quadrat frequency, basic ground cover, soil characterization, shrub density, and shrub characterization. A nonparametric statistical analysis, 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.

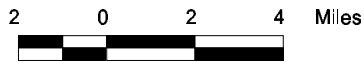
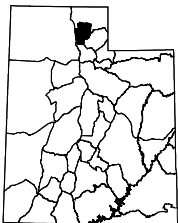
Summaries and evaluations at the end of each management unit address range trends in these key areas. This report will serve to identify and verify changes that are occurring on key areas for big game.

Management Unit 3



- Transect Location
- ∕∕ Roads
- ∕∕ Water Courses
- Forest Service
- BLM
- State of Utah
- Private Land
- Military
- Water Body

Unit Location



MANAGEMENT UNIT 3 - OGDEN

Boundary Description

Weber, Box Elder, Cache and Morgan counties - Boundary begins at Hyrum and SR-101; east on SR-101 to the Ant Flat Road (at Hardware Ranch); south on this road to SR-39; west and south on SR-39 to SR-167 (Trappers Loop Road); south on SR-167 to SR-30 at Mountain Green; west along SR-30 to Interstate 84; west on I-84 to Interstate 15; north on I-15 to US-91; east and north on US-91 to SR-101; east on SR-101 to Hyrum.

The Ogden deer herd unit is located within Weber, Cache, Box Elder and Morgan counties. Municipalities located within or along the unit boundaries include: Hyrum, Wellsville, Mantua, Perry, Willard, Ogden, Mountain Green and Huntsville. The major drainages are the Little Bear River, Ogden River and Box Elder Creek. Smaller drainages are Davenport Creek, Paradise Dry Canyon, Hyrum Dry Canyon, Hyrum Green Canyon, Perry Canyon and Willard Canyon. The topography is steep and rough on the western face of the Wasatch Mountains above Willard, Perry, Ogden, east of Avon and Paradise, and more gentle in-between. Elevation ranges from 4,400 feet near Willard to 9,764 feet on Willard Peak. According to the most recent Utah Big Game Management Plan (1998), there is approximately 233,469 acres of useable deer winter range in the unit. Summer range totals 152,887 acres. A majority of the winter range (82%) and summer range (72%) is on private land. The U.S. Forest Service administers 19% of the summer range and 13% of the winter range. The Division of Wildlife Resources maintains 6% of the deer summer range and 5% of the winter range on the unit.

Major deer wintering areas are found between 4,600 feet and 7,000 feet on the Wasatch face above Willard and Perry; between 5,100 to 7,000 feet north and east of Mantua Reservoir; from 5,600 to 7,000 feet in the Three-Mile Canyon; and between 5,400 and 7,000 feet along the slopes on the southeast side of Cache Valley above Paradise and Avon. During severe winters, snow restricts deer use to Three-Mile Canyon, the East Fork of the Little Bear River, the area south of Porcupine Reservoir, Paradise Dry Canyon, Hyrum Dry Canyon, Perry Canyon and the southeast corner of the unit south of Willard (King and Muir 1971).

Management unit 3 supports approximately 135,907 acres of useable elk summer range and 165,542 acres of elk winter range. Approximately 80% of the summer and 81% of the winter range is privately owned. Most of the remaining range is administered by the U.S. Forest Service and the Division of Wildlife Resources.

Big Game Management Objectives

Unit management objectives for mule deer are to achieve a modeled target population size of 12,000 wintering deer, and a postseason buck-doe ratio of 15:100 with 30% of these bucks being 2-point or better. Unit management elk objectives call for 1,200 wintering elk with the postseason herd composition consisting of a bull to cow ratio of 8:100, with at least half of these bulls being 2½ years of age or older (DeBloois et. al 2001). The overall trend for mule deer fawns/100 does over the past decade appears to be fairly stable, averaging just over 70 fawns/100 does. The high was 96 fawns/100 does in 1998-99, while the low was 45 in 1993-94 (Evans et. al 1996, DeBloois et. al 2001). Continued urbanization and loss of critical winter range on this unit may jeopardize target herd unit objectives.

Study Site Description

Management unit 3 contains a total of 17 trend studies, all of which are located within the winter range. Twelve of these studies were established in 1984, the other five in 1985. All were reread in 1990 and 1996. In 2001, 8 studies were reread, while 9 studies were suspended. Studies were suspended for several reasons. These included the lack of wildlife use, urban development, and sites not being rehabilitated following wildfires resulting in the loss of key browse, primarily sagebrush. Suspended sites will be reevaluated during the next rotation in 2006 to determine whether they will be reread or permanently suspended. Detailed location descriptions, data tables, and a written summary for each study follow.

Trend Study 3-2-01

Study site name: NE Mantua Reservoir.

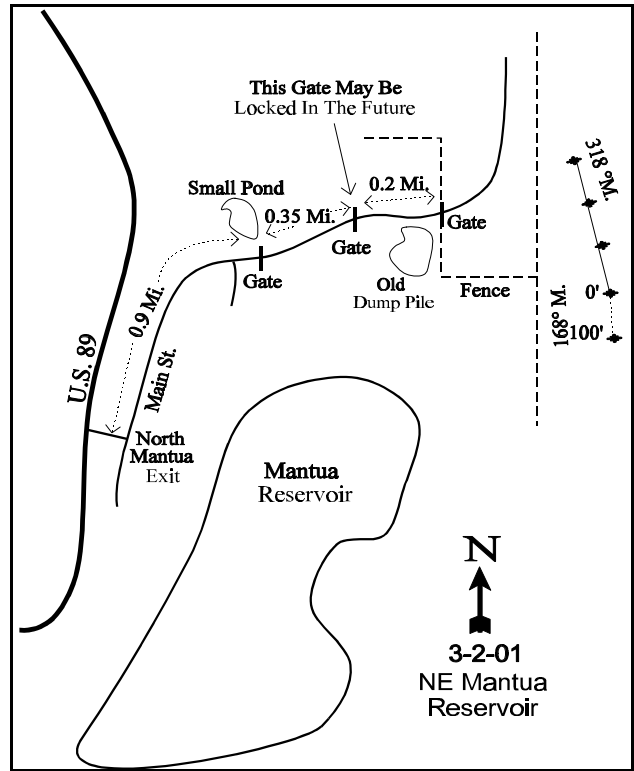
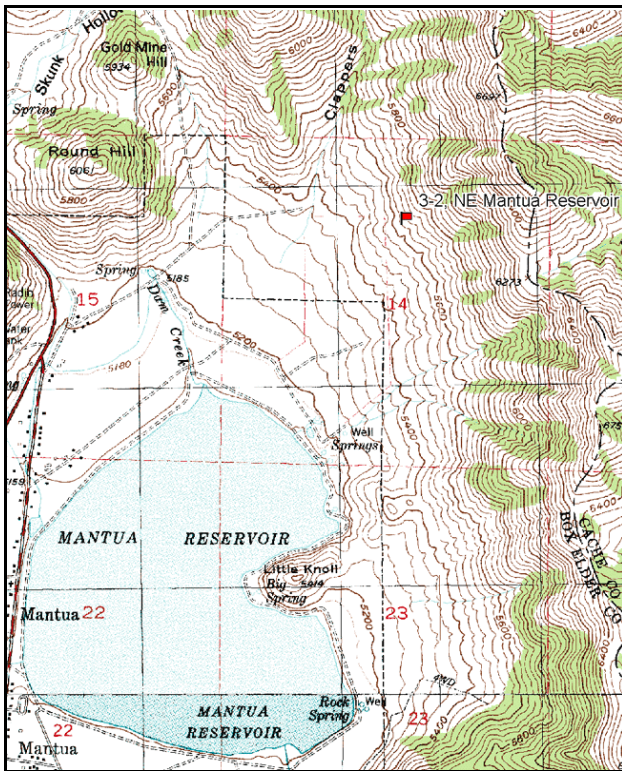
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 168 degrees magnetic.

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

LOCATION DESCRIPTION

Turn east off of U.S. 89-91 at the north Mantua exit and travel east to main street in Mantua. Turn left (north) on main street and proceed 0.9 miles to a gate with a small pond to the left. Proceed through the gate, stopping at another gate after 0.35 miles (this gate may be locked in the future). Proceed 0.2 mile to another gate with an old dump to the south. From the gate walk south-east to a “T” in the fence. From the “T” in the fence, walk 60 paces at a bearing of 112 degrees magnetic to the 0-foot baseline stake. Baseline 0-foot stake is marked by browse tag #7105. The first 100 feet of the baseline runs south at a bearing of 165 degrees magnetic. The last 300 feet run north off of the 0-foot stake at a bearing of 318 degrees magnetic.



Map Name: Mount Pisgah

Diagrammatic Sketch

Township 9N, Range 1W, Section 14

UTM 4596798 N 423322 E

DISCUSSION

Trend Study No. 3-2

The Northeast Mantua Reservoir study samples a mountain big sagebrush community about 1 mile from Mantua Reservoir. The site lies on a moderately steep (25%), west facing slope. Elevation is approximately 5,600 feet. Big game use of this site was light in both 1996 and 2001. A pellet group transect read along the baseline in 2001 estimated 21 deer days use/acre (51 ddu/ha), while no elk pellets were sampled in the transect. Quadrat frequency of deer and elk pellet groups was low in 1996 and 2001. Domestic livestock use the surrounding area in summer, but appear to have had little impact on the immediate area. No cattle pats were sampled in 2001 in either the pellet group transect or within the quadrats.

The NRCS mapping unit describing the site is entitled "Goring-Yates Hollow Association, Moderately Steep." Soils in this unit are alluvially deposited from sandstone and quartzite parent material. These are deep, well drained soils. Soils are clay in texture in the upper horizons and a clay loam grading to a more gravelly clay below. Complete drying of the soil seldom occurs below a depth of 12 inches. Although erosion hazard is moderate (Chadwick et al. 1975), an erosion condition classification determined soils to be stable in 2001 due to adequate vegetation and litter cover. Soils are slightly alkaline (pH of 7.4) and contain moderately high organic matter (3.6%). Effective rooting depth (see methods) was estimated at 15 inches in 1996.

Browse composition at the site is dominated by a moderately dense and stable population of mountain big sagebrush. A stand of antelope bitterbrush, a more preferred species, occurs near the original study, but for some reason, no attempt was made incorporate it into the sample. These bitterbrush plants display heavy use but appear vigorous. On the study site, mountain big sagebrush provides 90% of the total browse cover with a population of approximately 1,800 plants/acre. Mature plants are vigorous and relatively large, with an average height of over 2 feet and a crown of nearly 4 feet. Utilization was heavy in 1984, but has been light to moderate since then. Percent decadency was low from 1984-1996, averaging 15%. Although it did increase somewhat in 2001 to 26%. The number of dead plants in the population more than doubled between 1996 and 2001. Currently ('01) the dead to live ratio is 1 to 4. However, recruitment of young sagebrush has been relatively high in 1996 and 2001 at 17% and 15% respectively. It appears adequate to maintain the population at the present time. Annual leader growth averaged just over 3 inches in 2001.

Other shrubs include occasional individuals of antelope bitterbrush, Rocky Mountain maple and bigtooth maple. Of particular interest is a small population of Stansbury cliffrose and cliffrose/bitterbrush hybrids growing slightly north of the study site. Broom snakeweed was encountered during the 1996 reading with the much larger sample size beginning to be used at that time. Snakeweed density is estimated at 740 plants/acre in 2001.

A vigorous herbaceous understory is associated with the mountain big sagebrush. Perennial grasses comprise a substantial portion of the herbaceous composition. However, annual brome grasses were abundant and accounted for 64% of the grass cover in 1996. Total grass cover contributed by annual grasses decreased to 43% in 2001. This is most likely due to several consecutive years of drought. Bulbous bluegrass is also abundant and has significantly increased in sum of nested frequency with each reading. Bluebunch wheatgrass remains at stable quadrat and nested frequency values in 2001. Other perennial grasses include small numbers of Kentucky bluegrass and Sandberg bluegrass.

A wide variety of forbs of varying growth forms were also found on the site. All forbs combined produced less than 5% total average cover in 1996, increasing to over 14% in 2001. This increase in forb cover is due to the increases in both perennial and annual species. The most common perennial forbs include western yarrow, arrowleaf balsamroot and yellow salsify. The most abundant annual species are willowweed and storksbill. Dyers woad, a noxious weed, is present on the site in low numbers.

1984 APPARENT TREND ASSESSMENT

Although much of the west facing slope surrounding the study area appears to be progressing toward grass-forb dominance, the study site appears to be a relatively stable big sagebrush community. Use is mostly heavy (81%), but vigor is good and percent decadency is within the acceptable range for sagebrush at 15%. Soil trend also appears relatively stable with only minor erosion occurring.

1990 TREND ASSESSMENT

Density of mature big sagebrush increased by 19% on the density plots (from 1,732 to 2,132 plants/acre). Plants show light to moderate hedging and have good vigor. There is a robust population of young sagebrush and few decadent plants. Trend is up for browse. Trend for herbaceous species is stable. Sum of nested frequency for perennial grasses increased while that of forbs decreased. Trend for soil is stable with no significant changes in the elements of ground cover.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - stable, but noticeable increase in bulbous bluegrass (3)

1996 TREND ASSESSMENT

Trend for soil is up with a significant decline in percent bare ground (16% to 5%). Litter cover remained similar and pavement and rock cover declined from 16% to 9%. Trend for browse is stable. The sagebrush density has remained similar between readings, utilization is light to moderate, vigor good, and percent decadence low at 14%. Reproduction remains high at 17%, which is adequate to maintain the population. The herbaceous understory is dominated by annual brome grasses. Trend is down due to a decline in the sum of nested frequency for perennial grasses and forbs. A low value species, bulbous bluegrass, is the only perennial species that increased in sum of nested frequency. Forbs are diverse but not abundant. Dyers woad is still not abundant, although it has doubled in its sum of nested frequency value since 1990.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - down and dominated by annual grasses (1)

2001 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover remain high and percent bare ground remains low. Trend for browse is stable. Mountain big sagebrush shows mostly light to moderate use, good vigor and adequate recruitment from young plants. Percent decadency did increase from 14% to 26%, but the current level is not excessive especially with several consecutive years of drought. Trend for the herbaceous understory is up as sum of nested frequency for perennial grasses and forbs nearly doubled.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up (5)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 2

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	_a 140	_b 204	_{ab} 163	_{ab} 167	71	79	61	61	5.26	6.80
G	Bromus japonicus (a)	-	-	_b 349	_a 201	-	-	96	72	16.42	3.60
G	Bromus tectorum (a)	-	-	_a 36	_b 179	-	-	14	57	.86	7.52
G	Koeleria cristata	-	-	2	6	-	-	1	4	.00	.12
G	Melica bulbosa	7	3	-	-	3	1	-	-	-	-
G	Poa bulbosa	_a 5	_b 41	_c 79	_d 192	2	17	30	67	4.22	7.69
G	Poa fendleriana	4	-	-	-	1	-	-	-	-	-
G	Poa secunda	_{ab} 20	_c 113	_a 12	_b 41	12	42	6	18	.05	.35
Total for Annual Grasses		0	0	385	380	0	0	110	129	17.28	11.13
Total for Perennial Grasses		176	361	256	406	89	139	98	150	9.54	14.97
Total for Grasses		176	361	641	786	89	139	208	279	26.82	26.10
F	Achillea millefolium	_b 119	_a 47	_a 57	_a 82	47	21	22	33	1.41	1.87
F	Agoseris glauca	-	3	1	-	-	1	1	-	.00	-
F	Allium acuminatum	2	-	-	-	1	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	_a 94	_b 205	-	-	35	75	.20	1.60
F	Artemisia ludoviciana	1	5	3	4	1	4	1	2	.15	.41
F	Aster chilensis	-	-	-	7	-	-	-	2	-	.30
F	Astragalus spp.	_b 32	_b 30	_a -	_a 8	16	13	-	4	-	.07
F	Balsamorhiza sagittata	17	20	13	14	9	11	6	8	.66	1.94
F	Camelina microcarpa (a)	-	-	-	-	-	-	-	-	-	.03
F	Calochortus nuttallii	_{ab} 5	_a -	_{ab} 3	_b 10	2	-	1	5	.00	.05
F	Cirsium undulatum	-	-	2	-	-	-	1	-	.00	-
F	Collomia linearis (a)	-	-	_a 5	_b 22	-	-	2	10	.01	.07
F	Comandra pallida	-	-	-	9	-	-	-	4	-	.04
F	Collinsia parviflora (a)	-	-	-	1	-	-	-	1	-	.00
F	Epilobium brachycarpum (a)	-	-	_b 155	_a 64	-	-	66	27	1.39	.21
F	Erodium cicutarium (a)	-	-	_a 3	_b 76	-	-	1	23	.03	2.55
F	Eriogonum umbellatum	-	-	-	1	-	-	-	1	-	.00
F	Galium aparine (a)	-	-	-	3	-	-	-	1	-	.03
F	Hackelia patens	_a 3	_b 35	_a 3	_a 11	1	16	2	6	.06	.16
F	Hedysarum boreale	-	-	-	2	-	-	-	1	-	.03
F	Holosteum umbellatum (a)	-	-	_a -	_b 15	-	-	-	7	-	.20
F	Isatis tinctoria	3	9	18	9	2	5	9	6	.24	.08
F	Lappula occidentalis (a)	-	-	5	5	-	-	2	3	.01	.39

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Lactuca serriola	a-	a ³	a-	b ³⁰	-	1	-	17	-	.24
F	Lithospermum ruderales	ab ²	a-	ab ²	b ¹¹	2	-	2	5	.18	.38
F	Lomatium spp.	-	-	-	2	-	-	-	1	-	.00
F	Lupinus argenteus	a-	a-	ab ⁴	b ⁹	-	-	2	5	.21	.39
F	Madia glomerata (a)	-	-	2	-	-	-	1	-	.00	-
F	Microsteris gracilis (a)	b ⁵⁴	a-	a ³	a ⁶	26	-	1	2	.00	.01
F	Polygonum douglasii (a)	-	-	7	8	-	-	5	3	.03	.04
F	Ranunculus testiculatus (a)	-	-	2	5	-	-	1	3	.00	.01
F	Rumex spp.	-	-	-	3	-	-	-	1	-	.03
F	Senecio multilobatus	-	-	-	1	-	-	-	1	-	.03
F	Tragopogon dubius	c ¹²²	b ⁷⁴	a ¹²	c ¹⁰⁹	56	34	4	51	.04	2.66
F	Unknown forb-perennial	-	5	-	-	-	3	-	-	-	-
F	Veronica biloba (a)	-	-	a ⁹	b ²⁷	-	-	3	10	.01	.12
F	Wyethia amplexicaulis	b ¹⁴	a-	a ³	a-	8	-	1	-	.03	-
F	Zigadenus paniculatus	-	-	7	-	-	-	2	-	.04	.01
Total for Annual Forbs		54	0	285	437	26	0	117	165	1.70	5.30
Total for Perennial Forbs		320	231	128	322	145	109	54	153	3.05	8.74
Total for Forbs		374	231	413	759	171	109	171	318	4.76	14.04

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	60	55	16.34	15.71
B	Gutierrezia sarothrae	11	13	.36	.78
B	Prunus virginiana	2	2	.00	.15
B	Purshia tridentata	1	1	.66	.85
Total for Browse		74	71	17.37	17.49

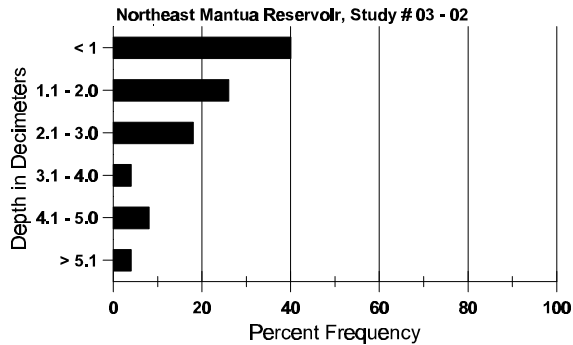
BASIC COVER --
Herd unit 03 , Study no: 2

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	385	381	3.25	10.25	50.70	55.77
Rock	203	148	6.75	4.75	5.68	4.36
Pavement	207	200	6.50	11.75	3.84	3.82
Litter	399	378	66.00	57.25	58.45	45.47
Cryptogams	-	-	0	0	0	0
Bare Ground	167	170	17.50	16.00	5.36	9.88

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 02, NE Mantua Reservoir

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.1	66.0 (14.0)	7.4	22.0	36.4	41.6	3.6	29.4	179.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 2

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Rabbit	-	2	01	01
Elk	-	1	26	N/A
Deer	5	10	-	-
Cattle	2	-	270	21 (51)
			-	-

BROWSE CHARACTERISTICS --

Herd unit 03 , 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 alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	37	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	30	35	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			
<i>Artemisia tridentata vaseyana</i>																		
S	84	47	-	-	-	-	-	-	-	-	47	-	-	-	3133			47
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	14	-	-	-	-	-	-	-	-	14	-	-	-	933			14
	96	16	-	-	-	-	-	-	-	-	15	-	1	-	320			16
	01	13	-	-	1	-	-	-	-	-	14	-	-	-	280			14
M	84	-	3	18	-	-	-	-	-	-	21	-	-	-	1400	33	36	21
	90	12	1	-	-	-	-	-	-	-	11	1	1	-	866	35	36	13
	96	40	24	-	-	-	-	-	-	-	64	-	-	-	1280	27	49	64
	01	23	26	5	-	-	-	-	-	-	52	2	-	-	1080	27	44	54
D	84	-	1	3	-	-	-	-	-	-	3	-	1	-	266			4
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	96	7	6	-	-	-	-	-	-	-	10	-	1	2	260			13
	01	9	13	2	-	-	-	-	-	-	21	-	-	3	480			24
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	420			21
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		19%			81%			04%			+19%							
'90		03%			00%			03%			-13%							
'96		32%			00%			04%			- 1%							
'01		42%			08%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1732	Dec:	15%			
												'90	2132		16%			
												'96	1860		14%			
												'01	1840		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		1	2				
<i>Gutierrezia sarothrae</i>												
Y	84	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	0	-	0	
	96	16	-	-	-	-	-	-	16	-	16	
	01	-	-	-	-	-	-	-	0	-	0	
M	84	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	0	-	0	
	96	20	-	-	1	-	-	-	21	11	15	21
	01	34	-	-	-	-	-	-	34	11	17	34
D	84	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	0	-	0	
	01	3	-	-	-	-	-	-	1	-	2	3
X	84	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	0	-	0	
	01	-	-	-	-	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		00%		+ 0%				
'01		00%		00%		05%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%			
						'90	0		0%			
						'96	740		0%			
						'01	740		8%			
<i>Prunus virginiana</i>												
Y	84	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	0	-	0	
	96	1	-	-	2	-	-	-	3	-	3	
	01	-	-	-	-	-	-	-	0	-	0	
M	84	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	0	20	13	0
	01	2	-	-	4	-	-	-	6	-	-	6
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		00%		+50%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	-			
						'90	0		-			
						'96	60		-			
						'01	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				
Purshia tridentata																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20	75	98	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			100%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	20		0%			
												'01	20		100%			

Trend Study 3-3-01

Study site name: Clay Basin.

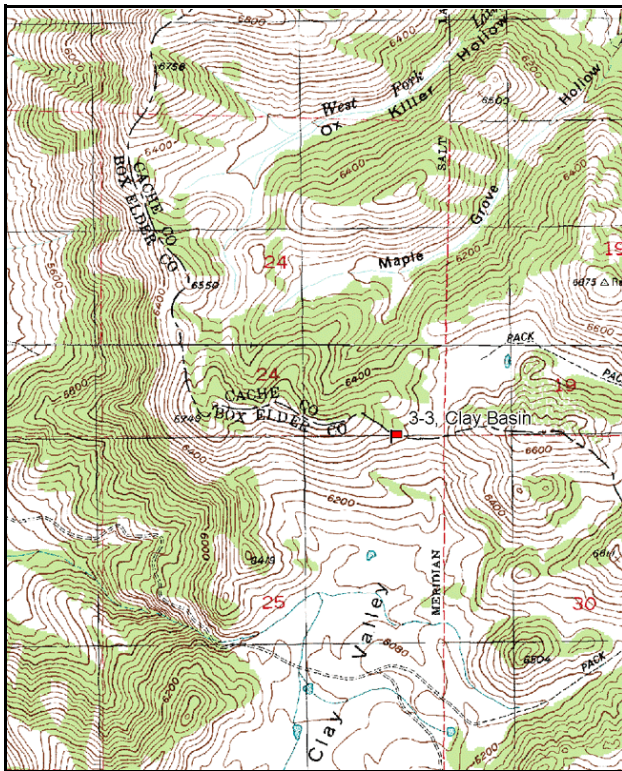
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 163 degrees magnetic.

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

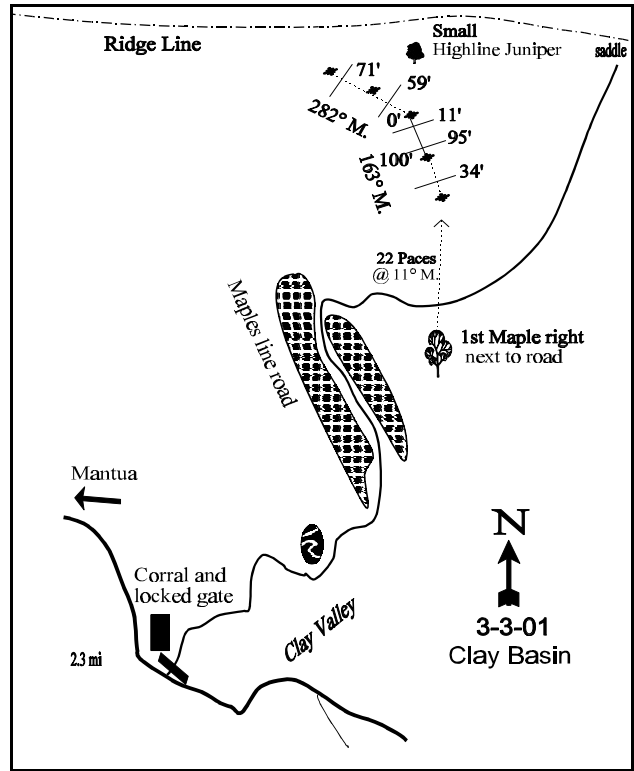
LOCATION DESCRIPTION

From Mantua Hatchery, proceed 0.65 mile (towards Mantua) to first possible right turn. Turn right and proceed 2.3 miles up the canyon to Clay Valley and stop at a locked gate on the east end of the corral. Cross the gate and begin walking down the road in a northern direction. You will pass a stock pond on the left side of the road. After approximately 0.75 miles, the road will pass through a dense stand of maples. Hook sharply to the right and break out of the maples. Proceed 54 paces past switchback to first lone maple on right side of the road. From the maple, walk approximately 22 paces on a bearing of 11 degrees magnetic to the 200-foot stake of the baseline. The 0-foot baseline stake is 200 feet at a bearing of 343 degrees magnetic and is marked by browse tag #7997. The first 200 feet of the baseline run 163 degrees magnetic. The second 200 feet run off the 0-foot baseline stake at a bearing of 282 degrees magnetic.



Map Name: Mantua

Township 9N, Range 1W, Section 25



Diagrammatic Sketch

UTM 4593957 N 425426 E

DISCUSSION

Trend Study No. 3-3

The Clay Basin study is east of Mantua in Clay Valley. Situated at a relatively high elevation (6,320 feet), the site is on a 30%, south-facing slope occupied by a mountain big sagebrush-grass community. Although within the limits of deer winter range, there were few signs of any significant deer use from 1984-1996. Currently, there appears to be moderate use by deer and light use by elk. Pellet group transect data taken in 2001 estimated 61 deer days use/acre (150 ddu/ha) and 3 elk days use/acre (8 edu/ha). Spring and summer sheep grazing was obvious during the 1984 reading, but was light in 1996 and 2001. Cattle were using the area during the 1996 reading. Use was considered light on site, with heavy use being observed in the bottoms near water. Livestock use on site was estimated at 2 cow days use/acre (5 cdu/ha) in 2001.

Soil at the study site is "Yeates Hollow Stony Loam", a well-drained, moderately deep soil derived from sandstone and quartzite. It is rocky or cobbly on the surface, and usually dries completely in the upper 4 to 12 inches after 60 to 90 consecutive days in summer (Chadwick et al. 1975). Although this soil type has a moderate erosion hazard, the current erosion condition classification ('01) determined soils to be stable. Protective cover provided by vegetation and litter prevent all but minor erosion. Soils at the site have a clay loam texture and a soil reaction that is slightly acidic (pH of 6.3). Effective rooting depth (see methods) was estimated at just over 12 inches. Gravel is abundant throughout the profile. Bare ground is rare and usually associated with cattle trails. Organic matter is relatively high at over 5%.

The key browse species is a vigorous stand of mountain big sagebrush which provides over 90% of the browse cover. Other shrubs such as mountain snowberry and stickyleaf low rabbitbrush are sparsely distributed throughout the area. The mountain big sagebrush population is stable with mostly light to occasionally moderate hedging. Density is estimated at 2,620, mostly mature, plants/acre in 2001. Recruitment from young plants declined from 23% in 1996 to 2% in 2001. This decline is most likely due to the extended drought as well as competition with the abundant herbaceous understory. Decadence was moderately high in 1990 at 42%, but has since declined to 18% in 1996 and 2001. Vigor is normal on all except a few decadent shrubs. Annual leader growth was relatively low at just over 2 inches in 2001, but seed production was abundant.

Perennial grasses show exceptionally vigorous growth and consist of a wide variety of species. Among the most frequently occurring are bluebunch wheatgrass, bulbous bluegrass, Sandberg bluegrass and Kentucky bluegrass. Bulbous bluegrass has significantly increased in nested frequency every year since the site was established in 1984. Bluebunch wheatgrass is currently ('01) second in abundance to bulbous bluegrass. In 1996, Japanese brome was extremely abundant providing 33% of the grass cover and 21% of total vegetative cover at the site. Due to drought conditions in 2000 and 2001, this species dramatically declined between 1996 and 2001. It currently ('01) provides only 2% of the grass cover. Slightly lower on the slope are significant amounts of slender wheatgrass, mountain brome, smooth brome, subalpine needlegrass, crested wheatgrass and Great Basin wildrye. Grasses show evidence of light to negligible grazing use.

Forbs are diverse yet have not been particularly abundant. Weedy forb species include western yarrow, thistle, willowweed, dyers woad, prickly lettuce, sunflower, tarweed and yellow salsify which accounted for the majority of the forb cover in 1996. Silvery lupine is currently the most abundant forb due to a dramatic increase in 2001. Many of the more palatable forb species had been moderately grazed by sheep during the 1984 reading.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable. Erosion is slight due to a good vegetative cover on a gentle to moderate slope. Vegetative trend also seems stable, at least temporarily. However, there is a potential for change. Grass density may be thickening at the expense of desirable forbs, perhaps in response to the grazing habits of sheep. Such a trend could also inhibit sagebrush reproduction. Another possibility is an increase of undesirable weeds and annuals. These are common on the study area and could easily become more so.

1990 TREND ASSESSMENT

This privately owned sagebrush/grass range in Clay basin has recently been grazed by cattle and receives moderate winter deer use. Mountain big sagebrush has remained stable and vigorous since 1984. Seedling and young sagebrush commonly occur in limited areas, but were not sampled by the density plots. The majority of the sagebrush have a light or moderately hedged growth form. Trend for herbaceous species is slightly up with significant increases in the nested frequency of the desirable perennial grasses, bluebunch wheatgrass and Sandberg bluegrass. One negative aspect is the increase in dyer's woad which should be closely monitored in the future. Cheatgrass remains a commonly occurring undesirable. Under the current management and grazing by cattle instead of sheep, the trends for winter range values appear stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable, with sagebrush slightly increasing (3)

herbaceous understory - slightly up (4)

1996 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground (12% to 2%). Litter cover increased while rock and pavement cover declined from 13% to 4%. Trend for mountain big sagebrush is stable. Population density declined somewhat, but much of the decline is due to the much larger sample used in 1996 which gives a much better estimate of sagebrush densities. Dead plants are fairly rare (220 plants/acre or 7%), indicative of a stable population. Utilization is mostly light, decadence has declined from 42% to 18%, and recruitment is high at 23%. Trend for the herbaceous understory is slightly down. The herbaceous understory is dominated by bulbous bluegrass and Japanese brome. Nested frequency for bluebunch wheatgrass has increased significantly since 1990, but nested frequency for Kentucky bluegrass and Sandberg bluegrass have declined. Sum of nested frequency for perennial forbs significantly decreased, while that of annual forbs significantly increased. However, forbs are a minor component as they contribute to only 6% of the total vegetation cover at the site.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is stable. Although bare ground slightly increased, vegetation and litter cover are adequate to prevent serious erosion. An erosion condition classification determined soils to be stable at the present time. Trend for browse is stable. The key species, mountain big sagebrush, remains at a nearly stable density. Percent recruitment declined from 23% to 2%, but percent decadence is unchanged since 1996. Vigor is good in the majority of the population as use remains light to moderate. Trend for the herbaceous understory is

slightly up. Sum of nested frequency for perennial grasses and forbs increased in 2001. Although much of this increase is due to the increase in bulbous bluegrass, a low value perennial, Japanese brome dramatically decreased in nested and quadrat frequencies in 2001.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 3

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	a28	b87	c156	c176	10	31	68	65	8.15	11.82
G	Agropyron trachycaulum	2	2	-	1	1	1	-	1	-	.00
G	Bromus japonicus (a)	-	-	b293	a64	-	-	87	30	12.51	.86
G	Bromus marginatus	-	3	-	-	-	1	-	-	-	-
G	Bromus tectorum (a)	-	-	25	29	-	-	9	10	.31	.64
G	Koeleria cristata	1	-	-	-	1	-	-	-	-	-
G	Melica bulbosa	44	36	15	28	19	21	9	12	.22	.17
G	Poa bulbosa	a18	b63	c213	d307	6	26	68	91	12.98	19.38
G	Poa pratensis	ab79	b97	a44	b86	30	41	20	33	1.30	3.42
G	Poa secunda	a20	b129	b87	a41	8	49	33	20	2.44	.68
G	Stipa columbiana	-	-	-	3	-	-	-	1	-	.15
Total for Annual Grasses		0	0	318	93	0	0	96	40	12.83	1.50
Total for Perennial Grasses		192	417	515	642	75	170	198	223	25.12	35.64
Total for Grasses		192	417	833	735	75	170	294	263	37.95	37.15
F	Achillea millefolium	b99	b87	a51	ab51	39	34	25	27	.89	1.21
F	Agoseris glauca	b50	b37	a10	ab32	20	18	5	17	.02	.26
F	Allium acuminatum	c44	b14	a-	ab3	20	8	-	1	-	.03
F	Alyssum alyssoides (a)	-	-	25	11	-	-	11	7	.05	.06
F	Arabis spp.	-	-	-	-	-	-	-	-	-	.00
F	Aster spp.	1	-	-	-	1	-	-	-	-	-
F	Astragalus spp.	b20	b28	a-	a-	12	10	-	-	-	-
F	Camelina microcarpa (a)	-	-	3	-	-	-	1	-	.00	-
F	Calochortus nuttallii	5	6	-	-	2	5	-	-	-	-
F	Cirsium undulatum	a3	b23	ab16	ab11	3	12	7	6	.77	.30
F	Collomia linearis (a)	-	-	b28	a1	-	-	16	1	.08	.00
F	Collinsia parviflora (a)	-	-	a1	b9	-	-	1	3	.00	.01
F	Crepis acuminata	3	-	1	-	1	-	1	-	.00	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Cryptantha spp.	-	-	3	3	-	-	2	1	.03	.00
F	Draba spp. (a)	-	-	1	10	-	-	1	5	.00	.02
F	Epilobium brachycarpum (a)	-	-	_b 39	_a 3	-	-	16	2	.35	.01
F	Eriogonum brevicaulis	-	-	-	3	-	-	-	1	-	.03
F	Erodium cicutarium (a)	-	-	-	5	-	-	-	2	-	.06
F	Galium aparine (a)	-	-	_b 11	_a -	-	-	5	-	.10	-
F	Geranium spp.	3	-	3	-	1	-	1	-	.01	-
F	Gilia spp. (a)	-	-	-	1	-	-	-	1	-	.00
F	Grindelia squarrosa	-	2	-	4	-	1	-	2	-	.53
F	Helianthus annuus (a)	-	5	13	3	-	3	5	1	.10	.00
F	Holosteum umbellatum (a)	-	-	41	35	-	-	16	18	.22	.15
F	Isatis tinctoria	_a 9	_b 109	_a 6	_a 5	5	47	4	2	.04	.03
F	Lappula occidentalis (a)	-	-	1	1	-	-	1	1	.00	.00
F	Lactuca serriola	_a -	_b 75	_a 1	_a 3	-	32	1	1	.00	.00
F	Lupinus argenteus	_a 23	_a 33	_a 21	_b 118	13	16	11	55	.47	7.05
F	Madia glomerata (a)	-	_{ab} 11	_b 19	_a 3	-	5	8	1	.21	.00
F	Microsteris gracilis (a)	9	-	6	-	4	-	2	-	.03	-
F	Phlox longifolia	-	2	-	-	-	1	-	-	-	-
F	Polygonum douglasii (a)	-	-	35	-	-	-	20	-	.10	-
F	Senecio multilobatus	_b 53	_a 7	_a -	_a 8	26	2	-	4	-	.02
F	Taraxacum officinale	_a 3	_b 13	_a 1	_a -	1	6	1	-	.00	-
F	Tragopogon dubius	_a 11	_c 117	_a 13	_b 63	7	53	6	34	.08	1.63
F	Unknown forb-perennial	_a -	_b 25	_a -	_a -	-	14	-	-	-	-
F	Viola spp.	_a -	_b 19	_a -	_a -	-	12	-	-	-	-
Total for Annual Forbs		9	16	223	82	4	8	103	42	1.28	0.34
Total for Perennial Forbs		327	597	126	304	151	271	64	151	2.34	11.13
Total for Forbs		336	613	349	386	155	279	167	193	3.62	11.48

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Acer grandidentatum	1	1	.03	.15
B	Artemisia tridentata vaseyana	78	73	16.62	23.46
B	Chrysothamnus nauseosus albicaulis	2	2	.03	-
B	Chrysothamnus viscidiflorus viscidiflorus	2	3	.03	.00
B	Gutierrezia sarothrae	1	0	-	-
B	Juniperus osteosperma	1	1	.53	.03
B	Symphoricarpos oreophilus	6	9	.21	1.50
Total for Browse		91	89	17.45	25.14

CANOPY COVER --
Herd unit 03 , Study no: 3

Species	Percent Cover
	'01
Acer grandidentatum	.60
Juniperus osteosperma	1

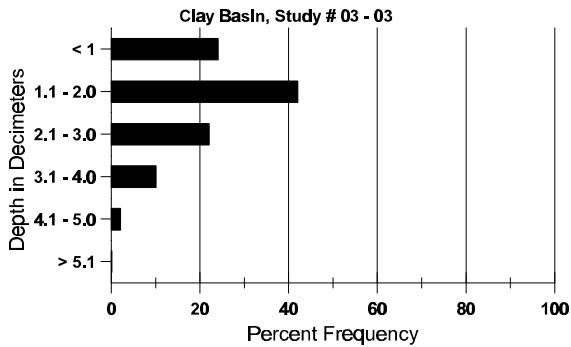
BASIC COVER --
Herd unit 03 , Study no: 3

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	383	371	3.00	14.25	58.50	67.65
Rock	50	25	3.75	1.75	.58	.28
Pavement	154	136	3.50	10.75	3.86	1.87
Litter	398	391	76.25	61.50	66.88	55.39
Cryptogams	9	24	.50	0	.07	.15
Bare Ground	88	130	13.00	11.75	2.17	5.49

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 03, Clay Basin

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.3	61.0 (13.4)	6.3	28.7	42.0	29.3	5.3	29.3	240.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 3

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Sheep	1	-	-	-
Elk	3	-	44	3 (8)
Deer	7	22	792	61 (150)
Cattle	4	1	26	2 (5)

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 3

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.	
Acer grandidentatum																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	1	-	-	-	-	-	-	-	-	-	20		1	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	22	29	
	'01	1	-	-	-	-	-	-	-	-	-	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%				+ 0%						
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	20		-			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3		4		
Artemisia tridentata vaseyana																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	-	-	-	100			5
	01	2	-	-	-	-	-	-	-	-	-	-	-	40			2
Y	84	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	33	-	-	-	-	-	-	-	-	-	-	-	660			33
	01	2	-	-	-	-	-	-	-	-	-	-	-	40			2
M	84	25	16	5	-	-	-	-	-	-	-	-	-	3066	29	43	46
	90	22	3	-	8	-	-	-	-	-	-	-	-	2200	39	38	33
	96	79	7	-	-	-	-	-	-	-	-	-	-	1720	22	41	86
	01	93	13	-	-	-	-	-	-	-	-	-	-	2120	27	42	106
D	84	2	2	2	-	-	-	-	-	-	-	-	-	400			6
	90	16	4	1	3	-	-	-	-	-	-	-	-	1600			24
	96	22	3	-	1	-	-	-	-	-	-	3	-	520			26
	01	13	10	-	-	-	-	-	-	-	-	5	-	460			23
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	220			11
	01	-	-	-	-	-	-	-	-	-	-	-	-	380			19
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		34%				13%				04%				+ 7%			
'90		12%				02%				04%				-24%			
'96		07%				00%				02%				-10%			
'01		18%				00%				05%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	3532	Dec:	11%		
												'90	3800		42%		
												'96	2900		18%		
												'01	2620		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		1	2				
Chrysothamnus nauseosus albicaulis												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	20	32	60	1
	01	1	-	-	-	-	-	-	20	29	41	1
D	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	20			1
	01	1	-	-	-	-	-	1	20			1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		00%		+ 0%				
'01		00%		00%		50%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%			
						'90	0		0%			
						'96	40		50%			
						'01	40		50%			
Chrysothamnus viscidiflorus viscidiflorus												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	20	12	24	1
	01	3	-	-	-	-	-	-	60	15	24	3
D	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	1	20			1
	01	1	-	-	-	-	-	1	20			1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		50%		+50%				
'01		00%		00%		25%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%			
						'90	0		0%			
						'96	40		50%			
						'01	80		25%			

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>Gutierrezia sarothrae</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13	20	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	118	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	0		-			
<i>Juniperus osteosperma</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	1	-	-	-	1	-	-	-	20	-	-	1
	01	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	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				
Symphoricarpos oreophilus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	4	-	-	-	-	-	4	-	-	-	80	22	47	4
	01	8	3	-	1	-	-	-	-	-	12	-	-	-	240	61	48	12
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	1	1	-	-	-	1	-	-	2	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		14%			14%			29%			+42%							
'01		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	140		43%			
												'01	240		0%			

Trend Study 3-4-01

Study site name: Anderson Ranch.

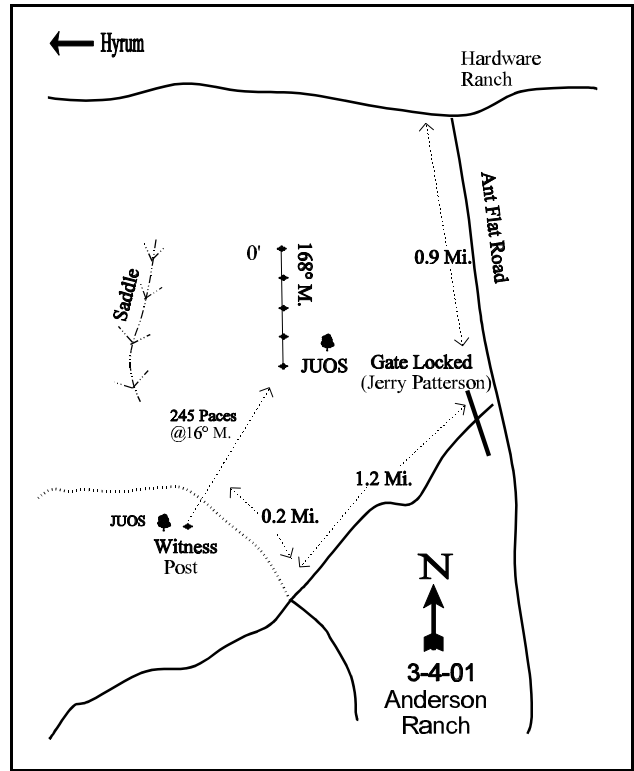
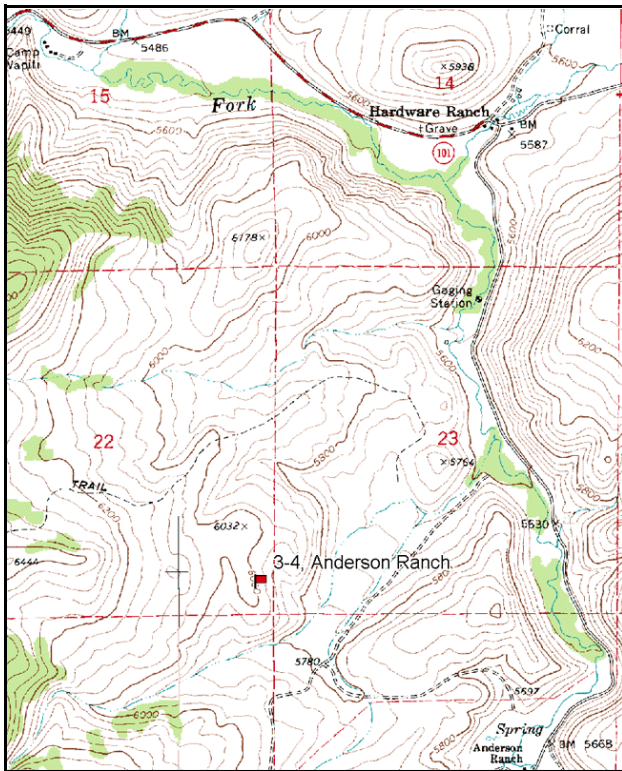
Vegetation type: Sagebrush-Bitterbrush.

Compass bearing: frequency baseline 168 degrees magnetic.

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

LOCATION DESCRIPTION

From Hardware Ranch, travel south on the Ant Flat Road for 0.9 miles. Turn right and go through a locked gate. Cross the Blacksmith Fork River and then proceed up the canyon 1.2 miles to a fork. Turn right (west) and travel 0.2 mile to the witness post by the road on the left side. From the witness post, walk 245 paces at 16 degrees magnetic to the 400-foot stake of the baseline. The 0-foot baseline stake is 400 feet to the north at a bearing of 348 degrees magnetic. The 0-foot stake is marked by browse tag #7932. Baseline bearing is 168 degrees magnetic.



Map Name: Hardware Ranch

Diagrammatic Sketch

Township 10N, Range 3E, Section 22

UTM 4603382 N 451731 E

DISCUSSION

Trend Study No. 3-4

The Anderson Ranch trend study is located on normal deer and elk winter range in upper Blacksmith Fork Canyon. Elevation is approximately 6,000 feet on a nearly level ridge. The prevailing plant community is mountain big sagebrush/grass with a good association of antelope bitterbrush. Mule deer use of the site was moderate in 1996 and heavy in 2001. Pellet group transect data taken in 2001 estimated 140 deer days use/acre (346 ddu/ha). Elk use was lighter at an estimated 32 elk days use/acre (79 edu/ha). Domestic sheep and cattle also utilize the area, but use in 1996 and 2001 was light.

Soil is classed as "Ant Flat Loam", a well drained series derived from sandstone and shale. This soil has a porous surface horizon about 7 inches thick. Below this depth, the subsoil is increasingly clay in texture and has concentrations of leached calcium carbonate at about 60 inches. Plant root penetration is not a problem until the calcareous zone is reached. Although the erosion hazard is moderate for this soil type (Erickson and Mortensen, 1974), the current ('01) erosion condition classification shows soils to be stable with minimal erosion occurring. Soils at the site have a clay loam texture and a neutral soil reaction (pH of 7.0). It is extremely rocky and compacted. Effective rooting depth (see methods) was estimated at over 11 inches in 1996.

The key species are bitterbrush and mountain big sagebrush which together provide 74% of the browse cover. The estimated density of bitterbrush decreased in 1996 and 2001 compared to previous readings. The difference in density is attributed to the much larger sample used beginning in 1996, which tripled the original sample size and better estimates shrub populations which often have clumped and/or discontinuous distributions. Percent decadency in the bitterbrush population was very high in 1984 at 92%, decreasing to 67% in 1990. Currently, decadency is low at 6%. Recruitment of young plants increased from 6% in 1996 to 12% in 2001. Use on bitterbrush has been moderate to heavy in all sampling years. Vigor is good in the majority of the population with bitterbrush annual leader growth averaging just over 4 inches in 2001.

Mountain big sagebrush was also heavily utilized in 1984 with all plants sampled displaying a heavily hedged growth form. Use has since stabilized at a more moderate level. Decadent plants made up 67% of the population in 1984, decreasing to around 20% in 1990 and 2001. No decadent plants were sampled in 1996. The increase in decadent plants since 1996 is due most likely to the extended drought of the past few years. This should improve with the return of more normal precipitation patterns. During the 1996 and 2001 readings, the density of sagebrush was similar to 1984 estimates (400 plants/acre). Utilization was light to moderate and no decadent plants were found. However, dead plants, first sampled in 1996, numbered more than live ones (460 plants/acre) indicating a past die-off. Most likely this die-off was associated with the several years of continuous drought from about 1987 to 1990 (Utah climate summaries 2001). Recruitment of young plants has been moderate from 1990-2001, currently ('01) at 14%. However, the number of dead plants was higher than the number of young in both 1996 and 2001. Annual leader growth averaged just over 2 inches in 2001.

The most numerous shrub on the site is stickyleaf low rabbitbrush. It provided 26% of the browse cover in 2001 and had an estimated density of 2,380 plants/acre. This species appears to be stable as 85% of the population consisted of mature plants. Plants are not utilized and vigor is normal. Decadency increased from 2% in 1996 to 13% in 2001.

Understory composition and density are dominated by perennial grasses, most notably bluebunch wheatgrass and Sandberg bluegrass. Annual grasses, first included in 1996, were also abundant with Japanese brome and cheatgrass producing 29% of the grass cover in 1996. Due to drought conditions of the past 2 years, these 2

species have decreased to only 7% of the grass cover. Bulbous bluegrass, a low value perennial, has increased significantly in nested frequency between 1996 and 2001. Considering elevation and annual precipitation, the forb composition is not very abundant and its composition is poor. A long history of sheep grazing has possibly given grasses a competitive advantage. The most common forb in 1996 was western yarrow, which is reputedly unpalatable to livestock but is used by deer and elk. Storksbill provides the most cover of any forb species in 2001. Most forbs are occasional in their occurrence and provide relatively little forage.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable because of a moderately dense cover of perennial grasses that is effective in preventing runoff and erosion. Vegetative trend may be declining because of unfavorable age structures in populations of the key browse species and an apparent increase in density and cover of grass and stickyleaf low rabbitbrush.

1990 TREND ASSESSMENT

Contrary to the downward trends predicted in 1984, the browse component on this site has not experienced a significant decline. In fact, mountain big sagebrush and bitterbrush have increased while percent decadence has decreased. The sagebrush and bitterbrush have a more balanced age class structures now. Low rabbitbrush remains a prominent factor in the understory as it has increased also. There is still a high percentage of decadence in the bitterbrush population. The sagebrush and bitterbrush have a heavily hedged growth form, as some forage production is unavailable. The healthy understory of grasses and forbs has stayed about the same. The understory provides adequate vegetative and litter ground cover.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - slightly improving (4)

1996 TREND ASSESSMENT

The soil trend is up with a considerable decline in bare ground cover (22% down to 11%). Litter cover remained similar to 1990 estimates, while cryptogamic cover nearly doubled. Vegetation and litter cover are abundant and well dispersed and effectively limit erosion. The browse trend appears stable. Bitterbrush density declined from 999 plants/acre in 1990 to 320 by 1996. However, the lack of a high number of dead plants (only 100 plants/acre) would indicate that most of the change in density is due to the much larger sample size giving a more accurate population estimate. Utilization is moderate to heavy, vigor normal, with no decadent plants encountered. The mountain big sagebrush population has declined 60% since 1990. The large number of dead plants (460 plants/acre) would suggest that this change is less related to sample size, and more closely associated with many years of extended drought (1987 to 1990). Stickyleaf low rabbitbrush is currently the most abundant shrub. It appears to have a stable population. The herbaceous understory is dominated by grasses. Sum of nested frequency for perennial grasses has declined since 1990. Bluebunch wheatgrass has maintained a stable nested frequency. However, Prairie junegrass and Sandberg bluegrass have declined. Annual grasses are also common but were not included in the previous samples so no comparisons can be made. The forb component is still poor, as it makes up only 7% of the herbaceous cover. Sum of nested frequency for perennial forbs has declined 53% in nested frequency since 1990. Overall, trend is considered slightly down.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is stable. Protective cover from vegetation and litter remain at 1996 levels. Trend for the key browse species is stable. Densities for bitterbrush and mountain big sagebrush remain stable. Percent decadency increased for both species in 2001 due to the drought conditions of the past 2 years. Although these increases are small and vigor remains good. The herbaceous understory has a slightly upward trend. Sum of nested frequency for perennial grasses slightly increased, with the most abundant species, bluebunch wheatgrass, remaining stable. Sandberg bluegrass and bulbous bluegrass both significantly increased in nested frequency. Another positive aspect is the significant decrease in annual brome grasses on the site due to drought.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 4

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	271	276	267	237	90	91	88	77	12.89	12.87
G	Bromus japonicus (a)	-	-	_b 186	_a 81	-	-	61	37	5.14	.85
G	Bromus tectorum (a)	-	-	_b 114	_a 46	-	-	40	17	2.62	.73
G	Elymus cinereus	-	-	2	3	-	-	1	1	.53	.85
G	Hordeum jubatum	4	5	-	-	2	3	-	-	-	-
G	Koeleria cristata	52	53	28	32	21	20	13	16	.79	.55
G	Poa bulbosa	_a -	_a -	_b 52	_c 85	-	-	23	30	1.55	2.82
G	Poa pratensis	-	-	-	4	-	-	-	3	-	.04
G	Poa secunda	_{ab} 202	_c 267	_a 160	_{bc} 213	81	90	63	70	3.42	4.59
G	Stipa comata	-	-	-	1	-	-	-	1	-	.00
Total for Annual Grasses		0	0	300	127	0	0	101	54	7.76	1.59
Total for Perennial Grasses		529	601	509	575	194	204	188	198	19.20	21.74
Total for Grasses		529	601	809	702	194	204	289	252	26.96	23.33
F	Achillea millefolium	_b 191	_a 84	_a 49	_a 55	73	40	21	24	.60	.42
F	Agoseris glauca	_a -	_b 126	_a 1	_a 2	-	59	1	1	.00	.00
F	Allium acuminatum	_b 23	_a 4	_a -	_a 1	10	2	-	1	-	.00
F	Alyssum alyssoides (a)	-	-	_b 114	_a 67	-	-	45	31	.32	.18

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Antennaria rosea</i>	-	-	-	2	-	-	-	1	-	.03
F	<i>Arabis drummondii</i>	a-	ab1	b9	a-	-	1	5	-	.02	-
F	<i>Aster chilensis</i>	-	1	3	3	-	1	1	1	.00	.03
F	<i>Astragalus convallarius</i>	a-	b17	b10	ab2	-	11	5	1	.05	.03
F	<i>Calochortus nuttallii</i>	3	-	-	1	2	-	-	1	-	.00
F	<i>Cirsium undulatum</i>	12	12	14	7	6	6	6	5	.39	.24
F	<i>Collomia linearis</i> (a)	-	-	9	4	-	-	5	3	.02	.01
F	<i>Collinsia parviflora</i> (a)	-	-	60	58	-	-	24	27	.11	.16
F	<i>Crepis acuminata</i>	a-	b10	a-	a-	-	6	-	-	-	-
F	<i>Cryptantha</i> spp.	-	6	-	-	-	3	-	-	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	3	-	-	-	1	-	.00	-
F	<i>Draba</i> spp. (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	13	19	-	-	6	8	.03	.16
F	<i>Eriogonum cernuum</i> (a)	-	-	1	-	-	-	1	-	.00	-
F	<i>Erodium cicutarium</i> (a)	-	-	a7	b50	-	-	4	20	.07	1.65
F	<i>Erigeron</i> spp.	-	-	-	3	-	-	-	2	-	.06
F	<i>Eriogonum umbellatum</i>	-	3	1	2	-	2	1	1	.03	.00
F	<i>Holosteum umbellatum</i> (a)	-	-	b76	a29	-	-	31	14	.28	.44
F	<i>Lappula occidentalis</i> (a)	-	-	2	11	-	-	1	5	.00	.03
F	<i>Lactuca serriola</i>	-	-	-	3	-	-	-	2	-	.01
F	<i>Lithospermum ruderales</i>	a-	a-	b10	a-	-	-	5	-	.24	-
F	<i>Lupinus argenteus</i>	9	7	8	3	4	2	6	2	.06	.04
F	<i>Microsteris gracilis</i> (a)	-	-	b44	a4	-	-	17	2	.08	.01
F	<i>Orthocarpus tolmiei</i> (a)	-	-	b19	a-	-	-	10	-	.30	.03
F	<i>Phlox longifolia</i>	-	5	-	-	-	2	-	-	-	-
F	<i>Polygonum douglasii</i> (a)	-	-	b32	a5	-	-	14	3	.07	.01
F	<i>Ranunculus testiculatus</i> (a)	-	-	9	-	-	-	3	-	.01	-
F	<i>Taraxacum officinale</i>	-	9	-	-	-	3	-	-	-	-
F	<i>Tragopogon dubius</i>	ab21	a3	a9	b33	10	1	5	18	.05	.34
F	<i>Trifolium gymnocarpon</i>	-	-	4	-	-	-	2	-	.01	-
F	Unknown forb-perennial	-	2	-	-	-	1	-	-	-	-
F	<i>Veronica biloba</i> (a)	-	-	1	-	-	-	1	-	.00	-
F	<i>Zigadenus paniculatus</i>	-	3	-	-	-	1	-	-	-	-
Total for Annual Forbs		0	0	390	250	0	0	163	114	1.34	2.71
Total for Perennial Forbs		259	293	118	117	105	141	58	60	1.47	1.24
Total for Forbs		259	293	508	367	105	141	221	174	2.81	3.95

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	19	15	3.47	5.05
B	Chrysothamnus viscidiflorus viscidiflorus	66	57	4.69	3.65
B	Eriogonum heracleoides	0	1	-	-
B	Gutierrezia sarothrae	9	1	.24	-
B	Purshia tridentata	15	16	4.09	5.25
B	Tetradymia canescens	2	4	-	-
Total for Browse		111	94	12.50	13.97

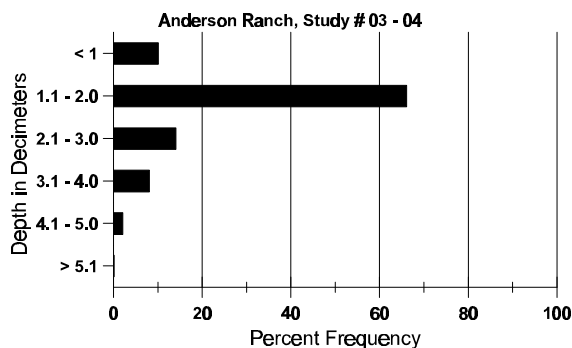
BASIC COVER --
Herd unit 03 , Study no: 4

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	383	364	6.25	19.75	43.24	47.43
Rock	102	30	1.00	.75	.86	.36
Pavement	140	130	1.25	0	.95	.93
Litter	399	385	70.75	50.75	51.29	52.27
Cryptogams	219	150	5.50	7.00	12.98	6.75
Bare Ground	179	183	15.25	21.75	10.92	14.55

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 04, Anderson Ranch

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.5	57.4 (15.1)	7.0	42.7	24.0	33.3	3.7	14.3	115.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 4

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Sheep	4	3	261	N/A
Rabbit	5	8	52	N/A
Grouse	-	1	-	-
Elk	23	10	418	32 (79)
Deer	38	53	1818	140 (346)
Cattle	2	-	-	-

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 4

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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	8	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	2	-	-	-	-	-	266		4		
	96	4	1	-	-	-	-	-	-	-	-	-	-	100		5		
	01	2	1	-	-	-	-	-	-	-	-	-	-	60		3		
M	84	-	-	2	-	-	-	-	-	-	-	-	-	133	28	35	2	
	90	4	2	-	2	-	-	-	-	-	-	-	-	533	28	31	8	
	96	3	12	-	-	-	-	-	-	-	-	-	-	300	35	50	15	
	01	11	3	-	-	-	-	-	-	-	-	-	-	280	33	50	14	
D	84	-	-	4	-	-	-	-	-	-	-	-	-	266			4	
	90	2	1	-	-	-	-	-	-	-	-	-	-	200			3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	2	2	-	-	-	-	-	-	-	-	-	-	80			4	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	460			23	
	01	-	-	-	-	-	-	-	-	-	-	-	-	180			9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			+60%							
'90		20%			00%			00%			-60%							
'96		65%			00%			00%			+ 5%							
'01		29%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec:	67%			
												'90	999		20%			
												'96	400		0%			
												'01	420		19%			

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									
Chrysothamnus viscidiflorus viscidiflorus																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	7	-	-	-	-	-	-	-	7	-	-	-	466		7	
	90	9	-	-	1	-	-	-	-	10	-	-	-	666		10	
	96	3	1	-	-	-	-	-	-	4	-	-	-	80		4	
	01	2	1	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	30	-	-	-	-	-	-	-	30	-	-	-	2000	12	13	30
	90	27	1	-	9	1	-	1	-	39	-	-	-	2600	13	17	39
	96	136	11	-	2	-	-	-	-	149	-	-	-	2980	15	23	149
	01	91	1	-	9	-	-	-	-	101	-	-	-	2020	12	20	101
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	1	-	-	-	-	-	-	1	-	-	1	133		2	
	96	3	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	14	-	-	1	-	-	-	-	14	-	-	1	300		15	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'84		00%		00%		00%		+27%									
'90		06%		00%		02%		- 8%									
'96		08%		00%		00%		-24%									
'01		02%		00%		.84%											
Total Plants/Acre (excluding Dead & Seedlings)										'84	2466	Dec:	0%				
										'90	3399		4%				
										'96	3120		2%				
										'01	2380		13%				
Eriogonum heracleoides																	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	1	-	-	-	-	-	-	-	1	-	-	-	20	4	10	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'84		00%		00%		00%											
'90		00%		00%		00%											
'96		00%		00%		00%											
'01		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	-				
										'90	0		-				
										'96	0		-				
										'01	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				
<i>Gutierrezia sarothrae</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	21	-	-	-	-	-	-	-	-	21	-	-	-	420	7	9	21
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	5	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			-95%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	440		-			
												'01	20		-			
<i>Juniperus scopulorum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	1	-	1	-	-	-	66	134	81	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	66		-			
												'96	0		-			
												'01	0		-			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3		4		
Purshia tridentata																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	1	-	-	1	-	-	3	-	-	200			3
	96	1	-	-	-	-	-	-	-	-	1	-	-	20			1
	01	1	-	-	-	1	-	-	-	-	2	-	-	40			2
M	84	-	-	1	-	-	-	-	-	-	1	-	-	66	32	37	1
	90	1	1	-	-	-	-	-	-	-	2	-	-	133	15	26	2
	96	4	7	4	-	-	-	-	-	-	15	-	-	300	29	55	15
	01	5	-	6	-	1	2	-	-	-	14	-	-	280	36	62	14
D	84	-	-	8	-	1	3	-	-	-	11	-	1	800			12
	90	-	-	-	1	4	-	-	-	5	8	-	-	666			10
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	1	-	-	-	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		08%				92%				08%				+13%			
'90		33%				33%				13%				-68%			
'96		44%				25%				00%				+ 6%			
'01		12%				53%				06%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	866	Dec:	92%		
												'90	999		67%		
												'96	320		0%		
												'01	340		6%		
Symphoricarpos oreophilus																	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	15	16	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	19	28	0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		00%				00%				00%							
'90		00%				00%				00%							
'96		00%				00%				00%							
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	0		-		
												'01	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				
Tetradymia canescens																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	1	-	-	1	-	-	-	-	-	-	-	-	40	18	33	2	
	'01	4	-	-	-	-	-	-	-	-	-	-	-	80	17	33	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
	'84	00%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%				+50%						
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
												'01	80		-			

Suspended

Trend Study 3-5-96

Study site name: Mathias Canyon.

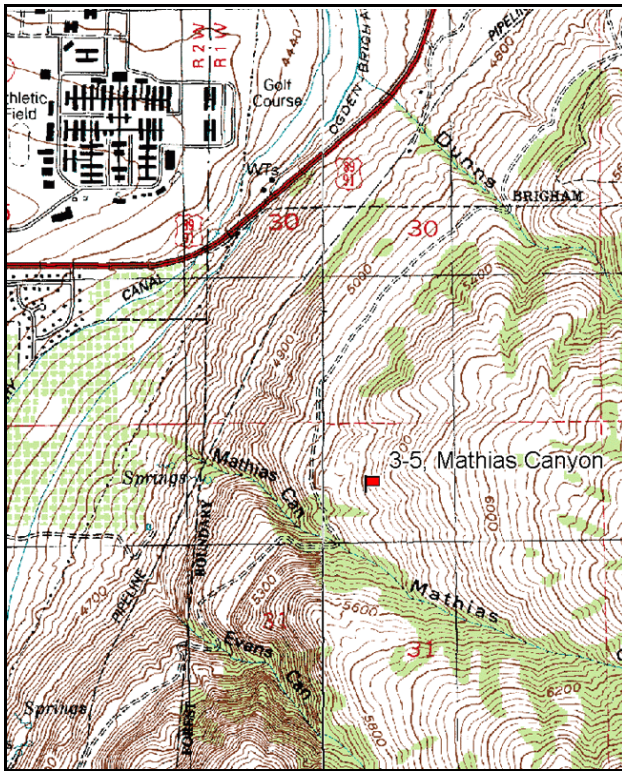
Vegetation type: Smooth Sumac.

Compass bearing: frequency baseline 165 degrees magnetic.

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

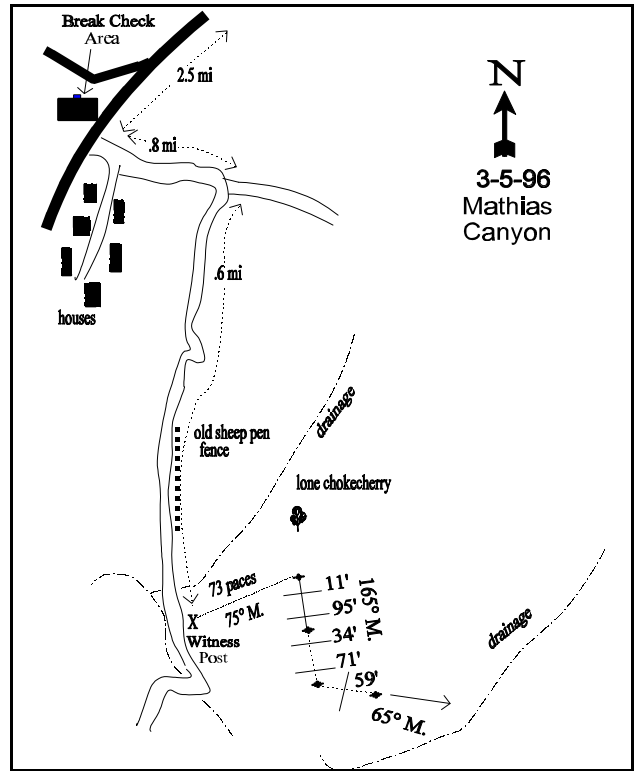
LOCATION DESCRIPTION

From Mantua Hatchery, proceed to Box Elder Canyon road (west bound), turn left toward Brigham City, and travel 2.5 miles to a point where a dirt road takes off to the left. A truck brake test area is just opposite and slightly north of this point. Turn left, take left fork up a dugway to DWR property and proceed 0.7 miles toward bench and mouth of Box Elder Canyon. After 0.7 mile you will come to a sharp hairpin turn to the right. Turn right here and travel 0.6 miles up onto bench and stop just before Mathias Creek passes under the road. Just before this the creek will pass across the face of an old sheep pen. Approximately 40 feet north of where the creek crosses the road there is a witness post on the east side of the road. From the witness post to the 0-foot baseline stake walk 70 paces at a bearing of 75 degrees magnetic. The 0-foot baseline stake is marked with browse tag #7996. The baseline runs 165 degrees magnetic.



Map Name: Mantua

Township 9N, Range 1W, Section 31



Diagrammatic Sketch

UTM 4592180 N 416650 E

DISCUSSION

Trend Study No. 3-5

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. In 2001, this site was evaluated by the Project Leader and it was determined that there was no wildlife use and very little important browse on the site. This was the case in 1996 when the study was sampled last. Text and data tables are included from the 1996 report.

The Mathias Canyon study samples a very steep (65%), west facing slope that is located above the upper Lake Bonneville terrace on the north side of Mathias Canyon. Elevation is approximately 5,280 feet. Thought to be important as severe winter range in the past, the study site is characterized by an extremely rocky soil surface and a badly depleted vegetative composition. Heavy deer use in 1984 was confirmed by pellet group frequency and the level of browsing on available shrubs. Currently ('96), there is no sign of wildlife use.

The study area falls within the "Foxol-Elzinga Association" soil mapping unit. This designation describes shallow and excessively drained soils with textures ranging from silt loam to gravelly loam. The area soils tend to be gravelly with abundant surface rock. Because maximum soil depth is only about 17 inches, these soils become very dry in the summer. Depth to fractured bedrock is less than 10 inches in many places (Chadwick et al. 1975). Soils on the site have a clay loam texture with a neutral reactivity (pH of 6.7). Rocks are common on the surface and throughout the profile. Effective rooting depth (see methods) was estimated at less than 8 inches. Soil temperature is relatively high averaging nearly 72° F at a depth of about 10 inches. Due to the abundance of rock, vegetation and litter cover, erosion is not currently a problem on the site.

Quality browse forage is in short supply. Rocky Mountain smooth sumac is the most abundant species, a vigorously sprouting shrub that tends to die-back severely each year. This species occurs in large patches over most of the Brigham-Willard face. It has replaced much of the native big sagebrush in the last couple of decades. Small numbers of mountain big sagebrush (200 plants/acre) still persist, but they have had a low reproductive potential resulting in very little recruitment of young plants into the population. Both smooth sumac and big sagebrush sustained moderate to heavy use in 1984, although current use is light. Other browse include increasers such as stickleaf low rabbitbrush and broom snakeweed, with patches of taller shrubs such as bigtooth maple and black chokecherry.

Herbaceous species currently determine the study area's dominant vegetative character. Grasses are the most productive class of plants and consist primarily of bluebunch wheatgrass and cheatgrass brome. Sandberg bluegrass occurs frequently but produces little forage. Annual grasses and annual forbs were not included in the previous sampling method, so no abundance comparisons can be made. Forb composition is dominated by a mixture of poor value perennials and a variety of weeds. The most abundant forbs include milkweed, dyers woad, yellow salsify and ragweed.

1984 APPARENT TREND ASSESSMENT

This study area is representative of the depleted range that extends all along west-facing mountain slopes of management unit 3. Soil condition is perhaps a little poorer than average and appears to be declining. Vegetatively, most of the native plants have been replaced by undesirable shrubs and noxious weeds. Trend appears to be down and no prospects for improvement are in sight.

1990 TREND ASSESSMENT

The limited browse on this rather depleted site has been only lightly used the last several years. It has good vigor. The limited distribution of mountain big sagebrush has experienced a small increase in density. The stand of smooth sumac is unchanged. Bluebunch wheatgrass declined significantly in frequency, but overall the site remains stable but in poor range condition. Although there is a substantial amount of similar range on the west-facing slopes of the Wasatch Mountains in this unit, there is also a surprisingly large amount of productive range on the narrow terraces. Just below the steep and rocky study site, there is a stand of lightly used big sagebrush and tall bitterbrush.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3), should carefully monitor weedy species, especially dyers woad which has increased

1996 TREND ASSESSMENT

Trend for soil is up due to an increase in percent litter cover and a decline in percent bare ground. Erosion is not currently a problem on this site. The browse trend is stable but dominated by smooth sumac. Density of mountain big sagebrush is similar to 1990 estimates. The small decline in density is likely the result of the much larger sample size used this year giving more accurate estimates of shrub density. Density of smooth sumac is unchanged. Trend for the herbaceous understory is down. Sum of nested frequency of perennial grasses has declined. Both bluebunch wheatgrass and Sandberg bluegrass have declined in their sum of nested frequency values. Currently, annual brome grass accounts for 62% of the grass cover. The forb composition is extremely poor and dominated by weeds including ragweed, milkweed, dyers woad and yellow salsify. Dyers woad has increased in abundance with each reading.

TREND ASSESSMENT

soil - up (5)

browse - stable but dominated by smooth sumac (3)

herbaceous understory - down and in poor condition due to weedy composition (1)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	202	172	168	82	74	70	12.33
G	Bromus brizaeformis (a)	-	-	104	-	-	40	.85
G	Bromus japonicus (a)	-	-	273	-	-	87	6.67
G	Bromus tectorum (a)	-	-	332	-	-	94	14.35
G	Poa bulbosa	a-	b15	a-	-	5	-	-
G	Poa secunda	b69	b79	a28	32	36	12	.81
Total for Annual Grasses		0	0	709	0	0	221	21.88
Total for Perennial Grasses		271	266	196	114	115	82	13.14
Total for Grasses		271	266	905	114	115	303	35.03
F	Achillea millefolium	4	-	2	2	-	1	.15
F	Agoseris glauca	4	2	-	2	1	-	-
F	Allium acuminatum	b9	b12	a-	6	6	-	-
F	Alyssum alyssoides (a)	-	-	2	-	-	1	.00
F	Ambrosia psilostachya	b36	ab32	a21	15	14	10	.32
F	Apocynum androsaemifolium pumilum	1	-	-	1	-	-	-
F	Artemisia ludoviciana	-	1	-	-	1	-	-
F	Asclepias hallii	10	9	14	4	5	5	1.12
F	Comandra pallida	-	-	2	-	-	1	.03
F	Crepis acuminata	-	4	-	-	1	-	-
F	Epilobium brachycarpum (a)	-	-	9	-	-	3	.04
F	Galium aparine (a)	-	-	2	-	-	1	.00
F	Hackelia patens	b23	a-	a-	12	-	-	-
F	Isatis tinctoria	a48	ab81	b97	26	36	46	1.14
F	Lactuca serriola	a-	b26	a9	-	12	4	.04
F	Lomatium spp.	a-	c131	b38	-	64	16	.08
F	Microseris nutans	4	-	-	2	-	-	-
F	Phlox longifolia	-	7	1	-	3	1	.00
F	Tragopogon dubius	a12	b43	c118	7	20	54	2.30
Total for Annual Forbs		0	0	13	0	0	5	0.04
Total for Perennial Forbs		151	348	302	77	163	138	5.20
Total for Forbs		151	348	315	77	163	143	5.25

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 5

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier alnifolia	0	1.25
B	Artemisia tridentata vaseyana	9	.59
B	Gutierrezia sarothrae	22	.92
B	Opuntia fragilis	4	.03
B	Rhus glabra cismontana	70	8.48
Total for Browse		105	11.30

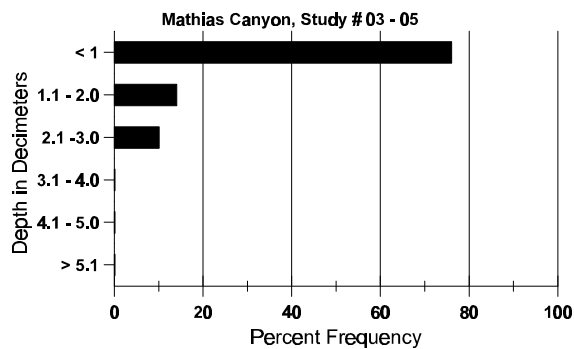
BASIC COVER --
Herd unit 03 , Study no: 5

Cover Type	Nested Frequency	Average Cover %		
	'96	'84	'90	'96
Vegetation	380	1.25	8.50	47.75
Rock	341	52.00	43.00	44.36
Pavement	90	5.50	13.75	2.08
Litter	394	34.75	30.50	38.79
Cryptogams	2	0	.25	.01
Bare Ground	55	6.50	4.00	.32

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 05, Mathias Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
7.6	71.5 (9.8)	6.7	27.9	42.1	30.0	2.5	18.8	172.8	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 5

Type	Quadrat Frequency '96
Deer	2

BROWSE CHARACTERISTICS --

Herd unit 03 , 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>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	106	123	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
M	84	-	-	4	-	-	-	-	-	-	4	-	-	-	266	26	30	4
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	31	51	4
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	22	42	4
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			+20%							
'90		00%			00%			00%			-40%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	0%			
												'90	332		0%			
												'96	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				
<i>Gutierrezia sarothrae</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	12	9	3
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	9	17	4
	96	27	-	-	1	-	-	-	-	-	28	-	-	-	560	11	17	28
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	-	-	1	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+40%							
'90		00%			00%			20%			+55%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	0%			
												'90	332		20%			
												'96	740		0%			
<i>Opuntia fragilis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	1	-	-	2	-	-	-	40	5	3	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	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>Prunus virginiana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	1	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	20	-	-	-	-	-	-	-	-	20	-	-	-	1333		20	
	90	40	-	-	-	-	-	-	-	-	4	21	15	-	2666		40	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	19	12	-	-	-	-	-	-	28	-	3	-	2066	13	7	31
	90	-	1	-	-	-	-	-	-	-	-	1	-	-	66	34	53	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		37%			24%			06%			-20%							
'90		02%			00%			37%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	3399	Dec:	-				
											'90	2732		-				
											'96	0		-				
<i>Rhus glabra cismontana</i>																		
S	84	2	-	1	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	16	-	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	90	15	-	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	96	42	-	-	-	-	-	-	-	-	34	7	1	-	840		42	
M	84	-	-	30	-	-	-	-	-	-	30	-	-	-	2000	22	18	30
	90	9	27	-	-	-	-	-	-	-	36	-	-	-	2400	23	20	36
	96	115	11	-	-	-	-	-	-	-	126	-	-	-	2520	23	27	126
D	84	-	-	5	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			69%			00%			+ 0%							
'90		53%			00%			00%			+ 0%							
'96		07%			00%			.58%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	3399	Dec:	10%				
											'90	3400		0%				
											'96	3400		1%				

Trend Study 3-6-01

Study site name: White's Orchard.

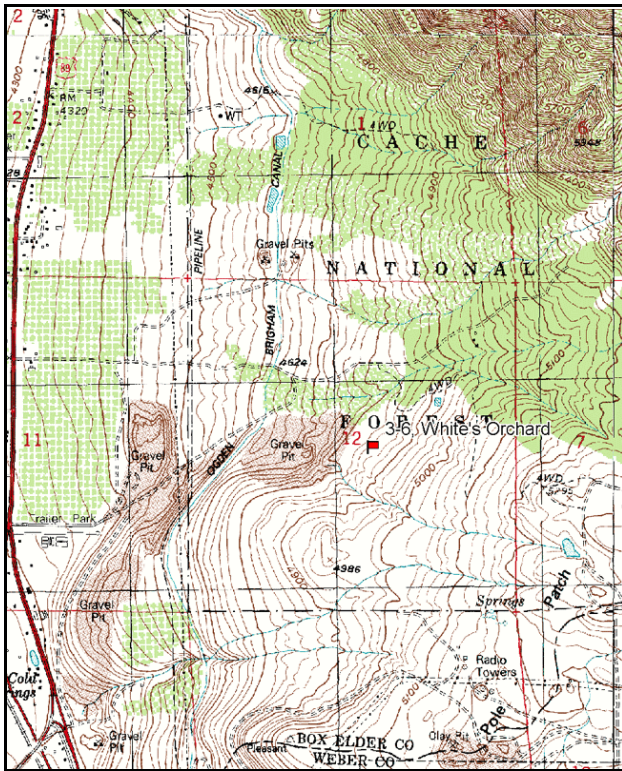
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 165 degrees magnetic.

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

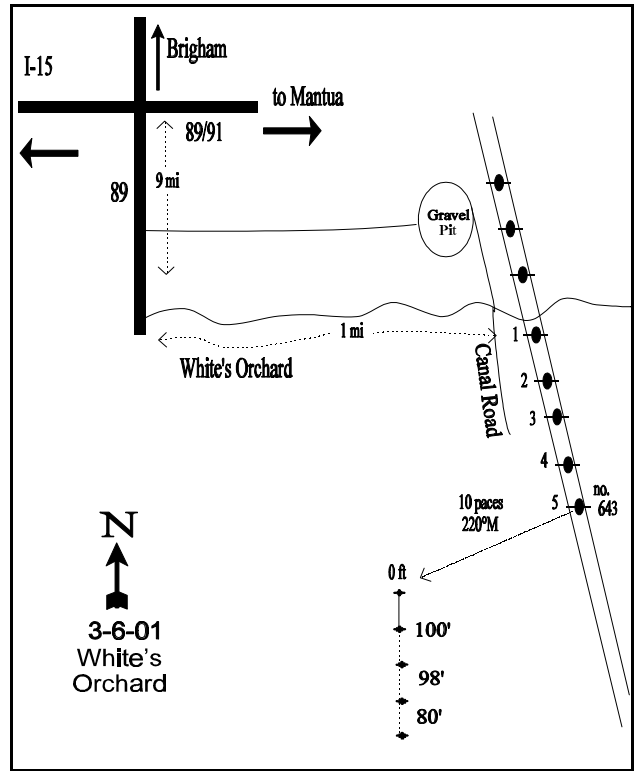
LOCATION DESCRIPTION

In Brigham City, at the junction of US 89 and 91, turn south on US 89 and proceed 9.0 miles. Turn left and drive through White's Orchard, stopping after 1.0 mile where the power lines cross the road. Power poles run at 137 degrees magnetic. Walk south to the fifth pole, number 643. From the base of this pole walk 10 paces at 220 degrees magnetic to the baseline 0-foot stake with browse tag #7920. The first two posts are bent over.



Map Name: Plain City

Township 7N, Range 2W, Section 12



Diagrammatic Sketch

UTM 4578643 N 415163 E

DISCUSSION

Trend Study No. 3-6

The White's Orchard study, located near the south boundary of the herd unit, samples an extensive big sagebrush type on a moderate (20%), northwest slope. Elevation of the site is 4,820 feet. Although winter deer use of the area was reportedly heavy in the past, few pellet groups were observed during the 1996 and 2001 readings. Pellet group transect data taken in 2001 estimated less than 1 deer day use/acre (2 ddu/ha). Browse utilization was intense in 1984, but it appeared to be largely a function of livestock use. Cattle pats were very common in 1984 as utilization of the available grass forage approached 80%. In 1996 and 2001, cattle sign was moderately abundant and probably high because of a watering trough near the base of the hill. In 2001, cattle use was estimated at 68 cow days use/acre (168 cdu/ha) from pellet transect data. Coyote scat was also noted in the area along with some den sites ('96).

Soil is a "Wasatch Gravelly Sandy Loam," a moderately deep alluvially deposited soil with slightly alkaline characteristics. Water permeability is rapid and drainage is excessive. Soils on the site have a sandy loam texture with a soil reaction that is moderately acidic (6.0 pH). Small sized gravel is found on the surface and within the profile. Effective rooting depth (see methods) was estimated at less than 10 inches. Average soil temperature is moderately high at 67°F at an average depth of 12 inches. Complete soil drying may occur as deep as 35 inches for 90 consecutive days in summer. This soil has a moderate erosion hazard but current vegetation and litter cover appear sufficient to control most soil movement. Heavy cattle grazing and trampling damage has resulted in some sheet and gully erosion in the past.

Browse composition consists almost exclusively of basin big sagebrush. During the 1984 and 1990 readings, the sagebrush was classified as mountain big sagebrush (*Artemisia tridentata vaseyana*). However, in 1996 this was changed to basin big sagebrush (*A. tridentata tridentata*). The only other shrub present is an occasional broom snakeweed. Sagebrush density is moderate, estimated at nearly 2,000 plants/acre in 2001. Current density estimates are lower than those taken in 1984 and 1990. However, the number of young plants in the population and 1,000 plants/acre of decadent sagebrush appear to have died since 1990. Dead plants, first sampled in 1996, number about 1,100 plants/acre in 1996 and 2001, supporting the assumption that the sagebrush population has declined with the long periods of drought and winter injury since 1985. The result is a smaller and healthier population of sagebrush which is lightly utilized, generally in good vigor with a lower percent decadency (decreasing from 48% in 1984 to 16% in 2001). Utilization was extremely heavy in 1984, with all plants sampled being heavily hedged (>60% of twigs browsed). From 1990-2001, use has decreased and is currently ('01) classified as light. In 1996 and 2001, recruitment from young plants was moderate at 14% and 24% respectively. However, the average number of young since 1984 is not high enough to replace the dead in the population at the present time. Average leader growth on basin big sage was just under 3 inches in 2001.

The herbaceous understory is dominated by perennial grasses with the principal species being bulbous bluegrass and intermediate wheatgrass. Bulbous bluegrass, a less desirable perennial, significantly increased in nested frequency between 1996 and 2001. It currently accounts for 67% of the grass cover and 51% of the total vegetation cover. Intermediate wheatgrass maintained a stable nested frequency in 2001, providing 21% of the grass cover. In 2001, cheatgrass and Japanese brome combine to provide 11% of the grass cover. Cheatgrass significantly increased in nested frequency and Japanese brome remained stable between 1996 and 2001. Forbs were nearly absent in 1984 and 1990, but have increased since. Composition is extremely poor and dominated by annuals. Storksbill is the most abundant species in 2001. Weedy perennial species which should be closely monitored in the future include: curlycup gumweed, ragweed, sunflower, thistle and tarweed.

1984 APPARENT TREND ASSESSMENT

In spite of light to moderate erosion, this site appears to have a relatively stable soil trend. The lack of steep slope and low precipitation as well as a fair amount of cover, helps prevent excessive soil loss. Although subsequent readings of the study plots may indicate otherwise, the vegetative trend appears stable. If heavy cattle grazing persists, it is possible that basin big sagebrush may even increase in density, although plant size, vigor, and vegetative diversity will continue to be limited.

1990 TREND ASSESSMENT

Basin big sagebrush shows a notable increase in density. Further data comparisons reveal that the number of mature sagebrush increased from 1,266 to 1,600 plants per acre. The largest increase was in the number of seedlings. The shrubs are vigorous with light to moderate hedging. While the increase in sagebrush could be related to heavy cattle grazing on this private land, the frequency of intermediate wheatgrass also increased. The amount of litter cover decreased and the percentage of bare soil increased from 1% to 15%, but overall there is minimal soil erosion.

TREND ASSESSMENT

soil - stable (3)

browse - improving (4)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The soil trend is up slightly. Percent bare ground declined from 15% to 9%. Erosion is not currently a problem. Trend for browse is stable. The sagebrush population has declined due to a reduction in young and decadent plants, but the number of mature plants has actually increased. Seedlings and young are less abundant yet appear in sufficient numbers to maintain or even increase the current population. Utilization is mostly light and percent decadence has declined from 30% to 14%. Although the herbaceous understory continues to be dominated by grasses, sum of nested frequency for perennial grasses has declined slightly. Nested frequency of intermediate wheatgrass declined significantly. Annual grasses and bulbous bluegrass are abundant and account for nearly half of the grass cover. Forbs are lacking and species composition is extremely poor. Several aggressive weeds were found on the site which included ragweed, thistle, curlycup gumweed, sunflower and tarweed. Trend for the herbaceous understory is considered slightly down due to the significant decline in intermediate wheatgrass.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - slightly down because of the losses to key perennial grass species (2)

2001 TREND ASSESSMENT

Soil trend is stable. Perennial grasses dominate the understory, and although bulbous bluegrass is a less desirable species, it is fairly good at holding soils in place. Bare ground remains near 1996 levels. Trend for browse is slightly down. Due to low deer numbers in this unit, use on sagebrush remains light. Vigor is generally good. However, the population appears to be slowly decreasing as recruitment from the young age class is not adequate to replace the dead in the population. Sagebrush strip frequency also declined in 2001. Trend for the herbaceous understory is slightly down. Although sum of nested frequency for perennial grasses increased, most of this increase is due to the significant increase in bulbous bluegrass, a less desirable

species. Cheatgrass brome also significantly increased in nested frequency. Forb composition is poor with annuals and weedy perennials being the most abundant.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 6

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	a6	a1	ab9	b24	3	1	4	11	.10	.47
G	Agropyron intermedium	ab222	b248	ab190	a180	82	88	58	60	14.46	10.28
G	Agropyron spicatum	-	-	-	4	-	-	-	2	-	.06
G	Bromus japonicus (a)	-	-	212	216	-	-	70	81	7.41	2.67
G	Bromus tectorum (a)	-	-	a36	b106	-	-	12	36	.89	2.66
G	Festuca myuros (a)	-	-	4	6	-	-	4	4	.04	.02
G	Poa bulbosa	b270	a146	a141	c325	99	61	49	93	3.67	32.27
G	Sporobolus cryptandrus	-	-	5	-	-	-	3	-	.18	-
Total for Annual Grasses		0	0	252	328	0	0	86	121	8.35	5.36
Total for Perennial Grasses		498	395	345	533	184	150	114	166	18.43	43.09
Total for Grasses		498	395	597	861	184	150	200	287	26.78	48.46
F	Alyssum alyssoides (a)	-	-	-	5	-	-	-	3	-	.01
F	Ambrosia psilostachya	a-	a-	a5	b23	-	-	3	12	.04	1.12
F	Artemisia ludoviciana	a-	a-	a3	b9	-	-	1	3	.03	1.03
F	Cirsium spp.	-	-	1	5	-	-	1	2	.00	.01
F	Collomia linearis (a)	-	-	-	2	-	-	-	2	-	.01
F	Collinsia parviflora (a)	-	-	-	8	-	-	-	3	-	.09
F	Cynoglossum officinale	-	-	-	3	-	-	-	1	-	.03
F	Descurainia pinnata (a)	-	-	b48	a13	-	-	17	7	.79	.06
F	Draba spp. (a)	-	-	-	14	-	-	-	5	-	.02
F	Epilobium brachycarpum (a)	-	-	b52	a8	-	-	24	4	.20	.02
F	Erodium cicutarium (a)	-	-	a41	b142	-	-	16	51	.46	4.96
F	Erigeron pumilus	a-	a-	b8	a-	-	-	4	-	.21	.00
F	Grindelia squarrosa	a-	a-	b12	a-	-	-	6	-	.20	-
F	Helianthus annuus (a)	-	a3	b25	a-	-	2	12	-	.28	-
F	Holosteum umbellatum (a)	-	-	1	-	-	-	1	-	.00	-
F	Lactuca serriola	a-	a-	b11	b24	-	-	6	10	.20	.12
F	Madia glomerata (a)	-	-	17	-	-	-	8	-	.04	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Plantago patagonica</i> (a)	-	-	32	22	-	-	14	11	.14	.10
F	<i>Polygonum douglasii</i> (a)	-	-	_b 35	_a 12	-	-	19	5	.17	.05
F	<i>Taraxacum officinale</i>	-	-	-	3	-	-	-	1	-	.03
F	<i>Tragopogon dubius</i>	1	-	1	-	1	-	1	-	.00	-
Total for Annual Forbs		0	3	251	226	0	2	111	91	2.09	5.33
Total for Perennial Forbs		1	0	41	67	1	0	22	29	0.69	2.36
Total for Forbs		1	3	292	293	1	2	133	120	2.79	7.70

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 6

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Artemisia tridentata tridentata</i>	66	51	16.13	7.64
B	<i>Gutierrezia sarothrae</i>	1	0	-	-
Total for Browse		67	51	16.13	7.64

BASIC COVER --

Herd unit 03 , Study no: 6

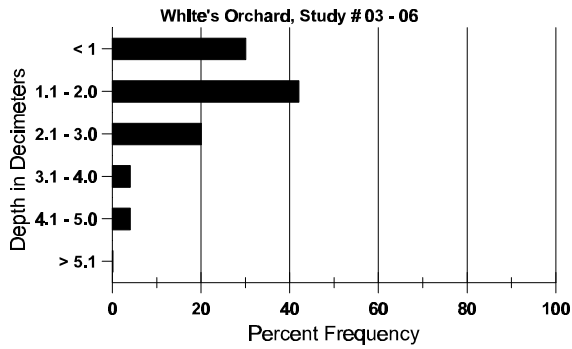
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	364	379	1.00	15.50	45.02	65.48
Rock	67	19	0	.50	.57	.19
Pavement	208	111	17.25	7.00	3.35	2.08
Litter	400	353	80.50	56.75	53.93	37.77
Cryptogams	99	33	0	5.50	2.65	.41
Bare Ground	249	185	1.25	14.75	9.26	8.38

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 06, White's Orchard

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.7	67.2 (12.0)	6.0	64.6	16.1	19.4	1.9	17.1	137.6	.3

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 6

Type	Quadrat Frequency	
	'96	'01
Rabbit	1	1
Deer	1	1
Cattle	14	8

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
9	1 (2)
818	68 (168)

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 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				
Artemisia tridentata tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	156	-	-	-	-	-	-	-	-	156	-	-	-	10400			156
	96	33	-	-	-	-	-	-	-	-	33	-	-	-	660			33
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	5	-	-	-	-	-	-	4	-	1	-	333			5
	90	20	-	-	-	-	-	-	-	-	20	-	-	-	1333			20
	96	19	1	-	-	-	-	-	-	-	19	-	1	-	400			20
	01	24	-	-	-	-	-	-	-	-	24	-	-	-	480			24
M	84	-	-	19	-	-	-	-	-	-	19	-	-	-	1266	29	20	19
	90	18	6	-	-	-	-	-	-	-	24	-	-	-	1600	30	38	24
	96	90	9	-	-	-	-	-	-	-	86	-	12	1	1980	31	40	99
	01	59	-	-	-	-	-	-	-	-	55	1	3	-	1180	29	40	59
D	84	-	-	21	-	-	-	-	-	1	16	-	6	-	1466			22
	90	10	8	-	1	-	-	-	-	-	12	-	-	7	1266			19
	96	13	4	1	1	-	-	-	-	-	12	1	3	3	380			19
	01	16	-	-	-	-	-	-	-	-	11	-	-	5	320			16
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1160			58
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1100			55
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			15%			+27%							
'90		22%			00%			11%			-34%							
'96		10%			.72%			14%			-28%							
'01		00%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	3065	Dec:	48%			
												'90	4199		30%			
												'96	2760		14%			
												'01	1980		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				
Gutierrezia sarothrae																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	2	-	-	-	-	-	-	-	2	-	-	-	40	5	8	2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	200	Dec:	-				
											'90	0		-				
											'96	40		-				
											'01	0		-				

Suspended

Trend Study 3-7-96

Study site name: Mouth of Pearson's Canyon.

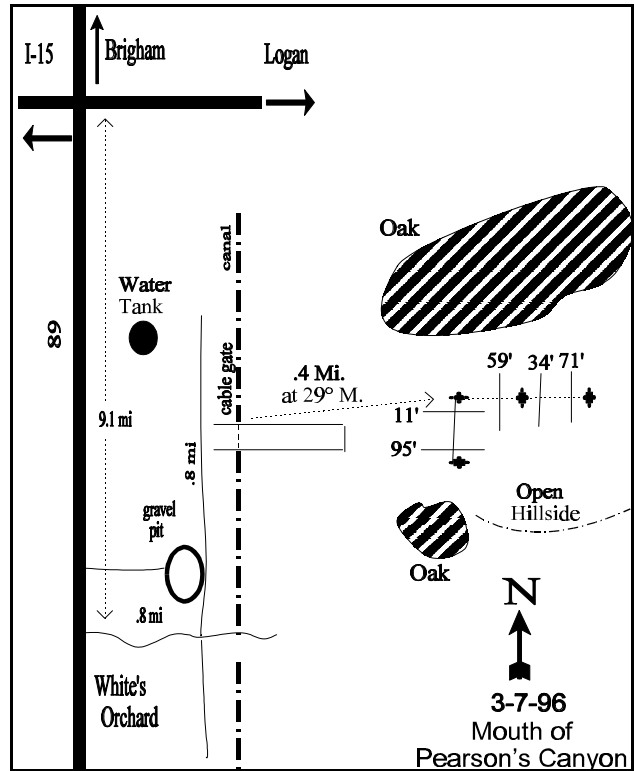
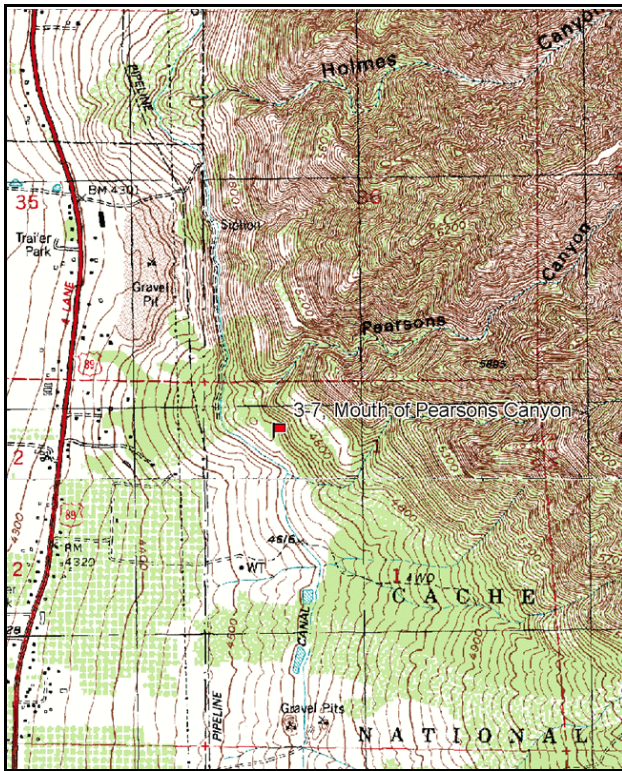
Vegetation type: Perennial Grass.

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction of Highway 89 and 91 in Brigham City proceed south on 89 for 9.1 miles. Turn left at White's Orchard and travel east for 0.8 miles. Before crossing the canal turn left (north) and proceed 0.8 miles. Turn right and walk across the canal continuing 0.4 miles at a bearing of 29 degrees magnetic to the 0-foot baseline stake. The 0-foot stake is marked by browse tag #7922. The rest of the baseline doglegs off the 0-foot baseline stake at a bearing of 29 degrees magnetic.



Map Name: Willard

Diagrammatic Sketch

Township 7N, Range 8W, Section 1

UTM 4580879 N 415012 E

DISCUSSION

Trend Study No. 3-7

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This site was evaluated by the Project Leader and was suspended due to low browse abundance and no signs of use by wildlife at the present time. It also is in close proximity to other trend studies in the unit. Text and data tables are included from the 1996 report.

The Mouth of Pearson's Canyon study samples critical deer winter range at 4,680 feet in elevation, thought to be important in the early 1980's. The site has a southwest exposure and a moderate slope of 25%. This entire area is characterized by small to medium sized clumps of Gambel oak separated by larger open areas. The site samples an opening surrounded by various sized oak clones. There is little sagebrush to sample directly on the site. Sagebrush are more abundant lower down the slope. Judging from pellet group frequency and browse utilization, the intensity of deer use is light. The area contains relatively little available browse to attract deer. Even oak clumps have little available forage. Livestock use is light.

Soil at the site is part of the "Ridd Rock Outcrop Complex." These are shallow, very coarse textured, well-drained soils that formed in alluvium and colluvium from quartzite, gneiss and schist. Soil reaction is neutral throughout the 24 inch soil profile. Water permeability is moderately rapid with low water holding capability. The result is a soil that often is totally dry in mid-summer (Chadwick et al. 1975). Soils at the site are fairly deep, dry and gravelly with a sandy loam texture and a neutral soil reaction (6.8 pH). Effective rooting depth (see methods) was estimated at 14 inches with a relatively high soil temperature of nearly 76° F at an average depth of 13 inches. Organic matter is relatively low at 1.3%. The study site has fair plant cover composed of perennial grasses, annual grasses and weedy forbs. Relatively little browse is present. The rate of erosion is negligible.

The principle browse species are Wyoming big sagebrush and Gambel oak. The former species constitutes a sparse stand that will probably become even more so in the future. Although existing plants show fair vigor and generally light use, they are currently (1996) so few in number (100 plants/acre) that it is difficult to envision any significant increase because of the competitive nature of the herbaceous understory. Gambel oak occurs as large mature clones that contain little available forage due to its height. Oak shows no sign of expansion or clone enlargement.

Herbaceous composition consists of warm season perennial grasses, annual grasses and forbs, and perennial or biennial weeds. The principal perennial grasses are red three-awn and sand dropseed, both of which are moderately abundant but show no evidence of current or past grazing use. Annual grasses include cheatgrass and rattail fescue, both of which are abundant and account for 79% of the grass cover. The forb composition is extremely poor with common ragweed and hairy goldaster providing 79% of the forb cover. Perennial forbs possessing even moderate forage value are rare.

1984 APPARENT TREND ASSESSMENT

Soil trend seems relatively stable. Although some erosion is apparent, it is not serious. Vegetative trend indicators suggest a declining or at best, stable population of Wyoming big sagebrush. Gambel oak clones are self-sustaining and are neither decreasing or expanding. The most likely trend would seem to be a continued increase in weed densities.

1990 TREND ASSESSMENT

Identified as a perennial grass range type in 1984, the area could also be classified as a oak/sagebrush range type. Most openings on the slope support moderately dense stands of sagebrush, a condition lacking on the study site. While it remains sparse, Wyoming big sagebrush increased in density and in the percentage of seedling and young plants. It is very vigorous with good growth and seed production. The sagebrush do not appear to be browsed and there is no sign of recent deer use. Cows were grazing in the area, apparently for the first time in many years. They prefer sand dropseed, the only palatable herbaceous forage on the site. Dropseed, along with the undesirable three-awn, shows a significant increase in sum of nested frequency since 1984. Other weedy species, especially hairy goldaster and Dyers woad, have also increased. One large, mature oak clone was encountered both years. The soil is shallow and loosely compacted. It is easily disturbed and has a high erosion potential. The soil trend currently appears stable. The vegetative trend is more difficult to assess. With the predominance of invader and increaser species, it is contradictory to assess an improving trend for the site even though sagebrush is increasing. Future management of this private rangeland, where an increase in shrubs is an unlikely goal, will have the greatest impact on the site.

TREND ASSESSMENT

soil - stable (3)

browse - upward, but still only about 500 sagebrush per acre (5)

herbaceous understory - downward, most of the species are weedy increasers, especially three-awn, dyers woad, and hairy goldaster (1)

1996 TREND ASSESSMENT

The soil trend is up with a significant decline in percent bare ground (19% to <1%) and an increase in litter cover. Vegetation and litter cover are very abundant, well dispersed and effectively limit erosion. The browse trend appears stable but limited in density. The change in density from 1990 to 1996 is mostly the result of the much larger sample used in 1996, because the number of dead in the population cannot explain the drop in density. Oak appears to be unutilized with a stable population density. The herbaceous understory is poor and dominated by annual grasses and perennial weeds. Cheatgrass and rattail fescue account for 79% of the grass cover, while common ragweed and hairy goldaster provide 79% of the forb cover. The only useful species on the site that is fairly common is sand dropseed. Sum of nested frequency for perennial grasses and forbs declined since 1990. Trend is considered down.

TREND ASSESSMENT

soil - up (5)

browse - stable but very low population (3)

herbaceous understory - down and in poor condition and composition (1)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	<i>Aristida purpurea</i>	_b 161	_c 212	_a 115	70	83	53	4.99
G	<i>Bromus tectorum</i> (a)	-	-	384	-	-	100	26.94
G	<i>Festuca myuros</i> (a)	-	-	139	-	-	48	2.77
G	<i>Poa bulbosa</i>	-	1	-	-	1	-	-
G	<i>Poa pratensis</i>	-	2	-	-	1	-	-
G	<i>Poa secunda</i>	5	10	3	2	5	1	.03
G	<i>Sporobolus cryptandrus</i>	_a 35	_{ab} 50	_b 81	18	22	35	2.69
Total for Annual Grasses		0	0	523	0	0	148	29.72
Total for Perennial Grasses		201	275	199	90	112	89	7.71
Total for Grasses		201	275	722	90	112	237	37.43
F	<i>Alyssum alyssoides</i> (a)	-	-	11	-	-	5	.02
F	<i>Ambrosia artemisifolia</i>	_b 226	_a 61	_a 101	80	29	44	3.47
F	<i>Artemisia ludoviciana</i>	19	15	26	7	5	9	1.10
F	<i>Astragalus utahensis</i>	_b 14	_a 6	_a -	8	3	-	.21
F	<i>Cuscuta</i> spp.	-	-	-	-	-	-	.03
F	<i>Erodium cicutarium</i> (a)	-	-	47	-	-	18	.29
F	<i>Euphorbia</i> spp.	_a -	_a -	_b 23	-	-	13	.29
F	<i>Heterotheca villosa</i>	_a 70	_b 206	_a 81	32	79	40	6.87
F	<i>Isatis tinctoria</i>	_a -	_b 63	_a 7	-	27	3	.10
F	<i>Lactuca serriola</i>	-	7	-	-	3	-	-
F	<i>Lygodesmia grandiflora</i>	_a -	_a -	_b 13	-	-	7	.67
F	<i>Tragopogon dubius</i>	-	-	1	-	-	1	.00
Total for Annual Forbs		0	0	58	0	0	23	0.31
Total for Perennial Forbs		329	358	252	127	146	117	12.75
Total for Forbs		329	358	310	127	146	140	13.06

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 7

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia tridentata wyomingensis	4	.93
B	Opuntia fragilis	8	.15
Total for Browse		12	1.08

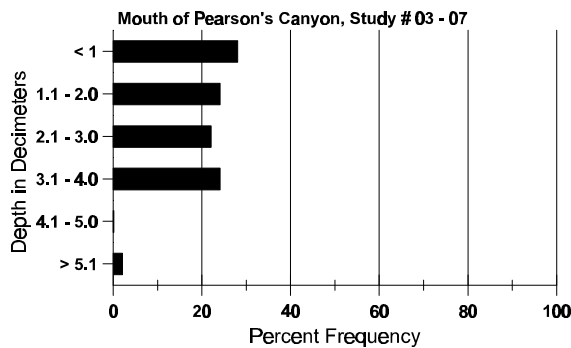
BASIC COVER --
Herd unit 03 , Study no: 7

Cover Type	Nested Frequency	Average Cover %		
		'96	'84	'90
Vegetation	393	9.50	14.00	56.20
Rock	228	7.00	8.00	11.60
Pavement	161	16.00	13.00	2.90
Litter	395	54.00	46.25	59.95
Cryptogams	23	0	0	.10
Bare Ground	66	13.50	18.75	.53

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 07, Mouth of Pearson's Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.1	75.8 (12.8)	6.8	77.6	10.4	12.0	1.3	13.8	105.6	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 7

Type	Quadrat Frequency '96
Rabbit	4
Deer	3
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 03 , 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				
<i>Artemisia tridentata wyomingensis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	4	-	-	1	-	-	-	-	-	5	-	-	-	166			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	24	39	1
	90	9	-	-	-	-	-	-	-	-	8	-	1	-	300	26	20	9
	96	1	3	-	-	-	-	-	-	-	4	-	-	-	80	22	48	4
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		50%			00%			00%			+86%							
'90		00%			00%			07%			-79%							
'96		60%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	466		-			
												'96	100		-			
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	72	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	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				
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	1	-	1	-	66			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	5	9	1
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	7	14	10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			33%			+55%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	99		-			
												'96	220		-			
<i>Quercus gambelii</i>																		
M	84	-	-	-	-	1	-	-	-	-	1	-	-	-	33	69	61	1
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	33	98	106	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	38	46	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		100%			00%			00%			+ 0%							
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	-			
												'90	33		-			
												'96	0		-			

Suspended

Trend Study 3-8-96

Study site name: Facer Canyon.

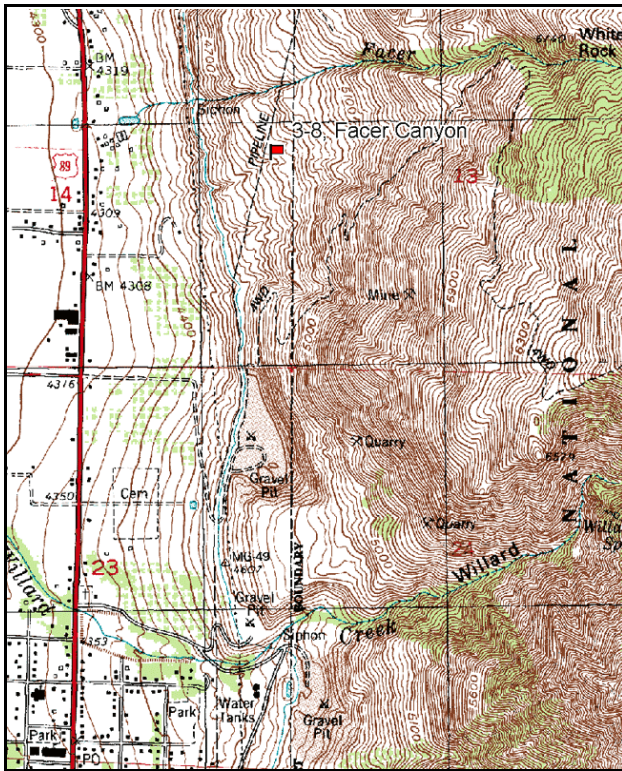
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

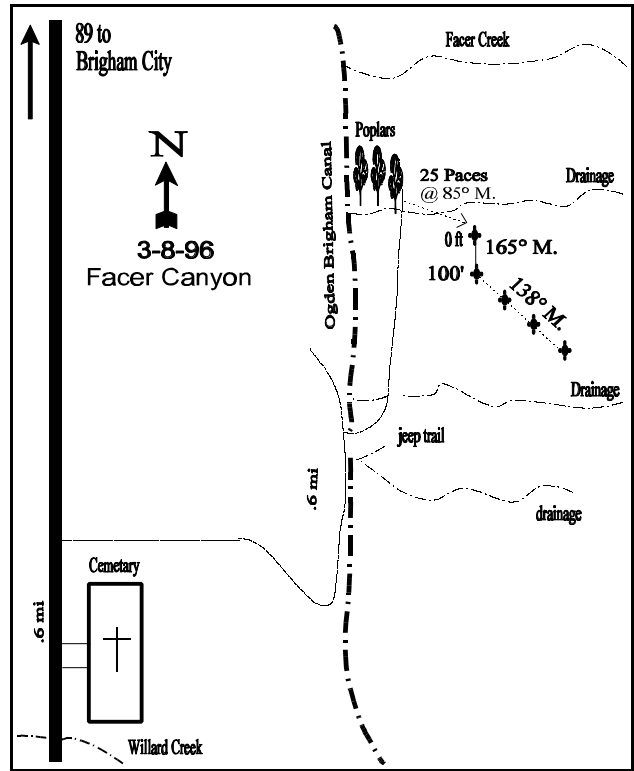
LOCATION DESCRIPTION

From Willard, proceed north on US 89 to Willard Creek and begin to note mileage. Proceed north 0.6 miles to a private road just south of marker 367 and turn right. Proceed to the Ogden/Brigham canal, turn left on west side of canal and proceed north 0.6 miles to a flood water bridge. Park here and walk across bridge, turn left (north) and follow trail approximately 0.25 miles crossing one wash and stopping at second wash. From the poplar trees on north side of wash, walk 25 paces at 85 degrees magnetic to the 0-foot baseline stake.



Map Name: Willard

Township 8N, Range 2W, Section 14



Diagrammatic Sketch

UTM 4587031 N 414218 E

DISCUSSION

Trend Study No. 3-8

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This site burned in 1995 and was not rehabilitated. It was sampled in 1996 following the burn. This site was evaluated by the Project Leader in 2001. It was suspended due to the loss of browse after the fire and no apparent wildlife use. Text and data tables are included from the 1996 report.

The Facer Canyon study site, located on the upper Lake Bonneville terrace, slopes moderately (15%) to the west at an elevation of 4,800 feet. Like much of the Brigham City-Willard face, this area was considered critical deer winter range in past years. Deer use, as estimated from pellet group frequency and browse utilization in 1984 and 1990, was mostly light since 1990. No deer or elk pellet groups were encountered in 1996. The dominant range type is a mixed population of basin and mountain big sagebrush with an herbaceous understory composed principally of annual forbs and grasses, a few perennial or biennial weeds, and a sparse cover of perennial grass.

Soil is "Wasatch Gravelly Sandy Loam," similar to that described in the write-up for study number 3-6. This is a deep, well drained soil with good potential for producing range forage. Although the upper horizons often become very dry in summertime, potential rooting depth is good enough to allow deeper rooted species uninterrupted access to available water (Chadwick et al. 1975). Soils at the site have a sandy clay loam texture with a neutral soil reaction (6.8 pH). The soil is extremely gravelly with an effective rooting depth (see methods) estimated at almost 12 inches. Soil temperature is moderately high, averaging nearly 72° F at an average depth of over 15 inches. The site supports abundant vegetation and litter cover which adequately protects the soil from erosion.

Browse composition consisted of a dominant population of mixed basin and mountain big sagebrush and scattered plants of broom snakeweed and white rubber rabbitbrush in 1984 and 1990. The sagebrush was classified as all basin big sagebrush (*Artemisia tridentata tridentata*) in 1984. During the 1990 reading, the sagebrush was split and classified as both basin big sagebrush and mountain big sagebrush (*A. tridentata vaseyana*). The big sagebrush varied in size from new seedlings, of which there were many, to mature plants in excess of four feet in height. A large number of established seedlings (i.e., 2-3 years old) in comparison to decadent plants, suggests that the population was at least maintaining itself if not actually increasing in density. However, given the size of mature plants it is difficult to see how the stand could become more dense. Utilization varied between individual shrubs from light to moderate and overall vigor was good.

The site burned during the summer of 1995 which eliminated all of the browse on the site. There was evidently no rehabilitation effort after the fire and there are no remnant sagebrush near or on site.

As of 1990, the herbaceous cover was relatively high, but composition was poor. The area was characterized by a dense growth of annual grasses and forbs as well as perennial and biennial weeds. Perennial grasses, represented mainly by bearded bluebunch wheatgrass and red three-awn, were common but were far outnumbered and outproduced by broad-leafed plants. Undesirable increaser and invader species such as ragweed, autumn willowweed, dyers woad and annual brome grasses comprised the bulk of the understory biomass. After the fire, annual grasses, annual forbs and weeds totally dominate the site. Japanese brome, cheatgrass and rattail fescue account for 98% of the grass cover, while storksbill, dyers woad, prickly lettuce and common sunflower provide 92% of the forb cover. Bluebunch wheatgrass is currently the only desirable perennial grass found on the site. However, it is uncommon and had a quadrat frequency of only 1% in 1996.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable but this entire area is subject to high flows in stream channels that originate higher up the mountain. High spring flows in these channels are extremely destructive and result in very deep and narrow gullies. Sheet erosion does not seem a serious problem at this time. However, large scale slippage and mud slides are a distinct possibility. From a vegetative standpoint, the dominant sagebrush population appears stable or even increasing. The herbaceous understory is comprised of a dense cover of annuals and other weeds which dry up very early in the season and provide abundant fuel capable of carrying a potentially destructive fire.

1990 TREND ASSESSMENT

The dense sagebrush stand on the sampled terrace has increased. Seedling and young shrubs make up 50% of the population. Sagebrush canopy cover is estimated at 28%. The abundant browse forage is virtually unutilized, with very little sign of big game. While bluebunch wheatgrass was more prevalent in 1990, the understory remains in a depleted condition dominated by weedy species.

TREND ASSESSMENT

soil - stable (3)

browse - upward (5)

herbaceous understory - downward, composition is mostly weeds and they are increasing, especially dryers woad; weedy understory could easily carry a destructive fire (1)

1996 TREND ASSESSMENT

A fire burned the site during the summer of 1995. All browse species were eliminated and the herbaceous understory is dominated by annual grasses, annual forbs and weeds. Soil trend is still stable even though percent bare ground increased and percent litter cover declined. The herbaceous vegetation cover and litter are abundant and well dispersed. Erosion is currently not a problem. The browse trend is down and totally absent. There are no signs of any browse in the immediate area. Due to the thick herbaceous understory dominated by annuals and weeds, shrub establishment will be difficult. The only effective way to reestablish sagebrush or other shrubs on the site would be to transplant them. Currently, with no browse species, this site is insignificant as big game winter range. Trend for the herbaceous understory is down. Abundance of grasses and forbs are up but the composition is extremely poor.

TREND ASSESSMENT

soil - stable (3)

browse - down and absent due to fire (1)

herbaceous understory - down and totally dominated by annuals and weeds (1)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 8

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron spicatum	a-	b ¹²	a ³	-	6	1	.03
G	Bromus japonicus (a)	-	-	255	-	-	90	10.21
G	Bromus tectorum (a)	-	-	147	-	-	50	6.07
G	Festuca myuros (a)	-	-	53	-	-	22	.89
G	Poa bulbosa	a-	ab ⁵	b ¹⁶	-	2	6	.30
Total for Annual Grasses		0	0	455	0	0	162	17.19
Total for Perennial Grasses		0	17	19	0	8	7	0.32
Total for Grasses		0	17	474	0	8	169	17.51
F	Achillea millefolium	1	3	-	1	1	-	-
F	Agoseris glauca	-	7	-	-	4	-	-
F	Alyssum alyssoides (a)	-	-	57	-	-	23	.44
F	Ambrosia psilostachya	42	49	27	15	19	14	.45
F	Collinsia parviflora (a)	-	-	10	-	-	5	.10
F	Epilobium brachycarpum (a)	-	-	7	-	-	4	.14
F	Erodium cicutarium (a)	-	-	264	-	-	86	16.23
F	Galium aparine (a)	-	-	22	-	-	10	.12
F	Helianthus annuus (a)	-	-	28	-	-	16	1.20
F	Holosteum umbellatum (a)	-	-	87	-	-	35	.35
F	Isatis tinctoria	a ¹³	b ¹³⁴	b ¹²⁴	7	62	54	6.86
F	Lactuca serriola	a-	a ²	b ⁵²	-	2	24	1.68
F	Lithospermum ruderae	-	1	-	-	1	-	-
F	Melilotus officinalis	-	-	2	-	-	1	.03
F	Microsteris gracilis (a)	3	-	5	1	-	3	.04
F	Polygonum douglasii (a)	-	-	3	-	-	3	.02
F	Rumex spp.	-	-	1	-	-	1	.15
F	Taraxacum officinale	1	-	-	1	-	-	-
F	Tragopogon dubius	b ³⁴	ab ²⁵	a ¹⁸	19	9	10	.40
F	Unknown forb-annual (a)	-	-	4	-	-	2	.01
F	Veronica biloba (a)	-	-	5	-	-	2	.03
Total for Annual Forbs		3	0	492	1	0	189	18.71
Total for Perennial Forbs		91	221	224	43	98	104	9.59
Total for Forbs		94	221	716	44	98	293	28.30

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

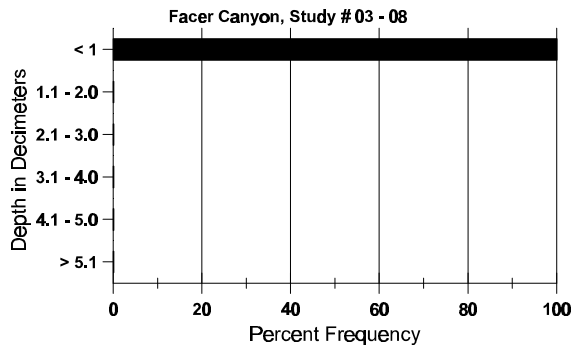
BASIC COVER --
Herd unit 03 , Study no: 8

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	353	1.00	5.25	49.09
Rock	122	.50	0	3.29
Pavement	251	3.25	6.25	7.67
Litter	384	95.00	85.75	24.46
Cryptogams	-	0	0	0
Bare Ground	211	.25	2.75	7.08

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 08, Facer Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.6	71.6 (15.6)	6.8	53.7	24.0	22.3	2.7	19.8	256.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 8

Type	Quadrat Frequency '96
Rabbit	3

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 8

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 tridentata tridentata																		
S	84	92	-	-	-	-	-	-	-	-	92	-	-	-	6133		92	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	2	3	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	23	-	-	7	-	-	-	-	-	27	-	3	-	2000		30	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	8	8	-	-	-	-	-	-	16	-	-	-	1066	48 55	16	
	90	16	4	-	1	1	-	-	-	-	22	-	-	-	1466	39 29	22	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
D	84	1	2	8	-	-	-	-	-	-	9	-	2	-	733		11	
	90	10	1	-	-	-	-	-	-	-	8	-	2	1	733		11	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		41%			50%			06%			+49%							
'90		10%			00%			10%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2132	Dec:	34%			
												'90	4199		17%			
												'96	0		0%			
Artemisia tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	23	-	-	-	-	-	-	-	-	23	-	-	-	1533		23	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	10	-	-	-	-	-	1	-	-	11	-	-	-	733		11	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	26	-	-	-	-	-	-	-	-	26	-	-	-	1733	24 20	26	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	5	-	-	1	-	-	-	-	-	6	-	-	-	400		6	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	2040		102	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	2866		14%			
												'96	0		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				
Chrysothamnus nauseosus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	31	21	3
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	37	26	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	1	-	-	-	-	-	3	-	1	-	266		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+57%							
'90		00%			00%			14%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	0%			
												'90	465		57%			
												'96	0		0%			
Gutierrezia sarothrae																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	14	-	-	-	-	-	-	-	-	14	-	-	-	933		14	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	33	-	-	-	-	-	-	-	-	33	-	-	-	2200	16	14	33
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	800	13	10	12
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	9	-	-	-	-	-	-	-	-	8	-	-	1	600		9	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-55%							
'90		00%			00%			05%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	3133	Dec:	0%			
												'90	1400		43%			
												'96	0		0%			

Trend Study 3-9-01

Study site name: Cook Canyon.

Vegetation type: Big Sagebrush-Grass.

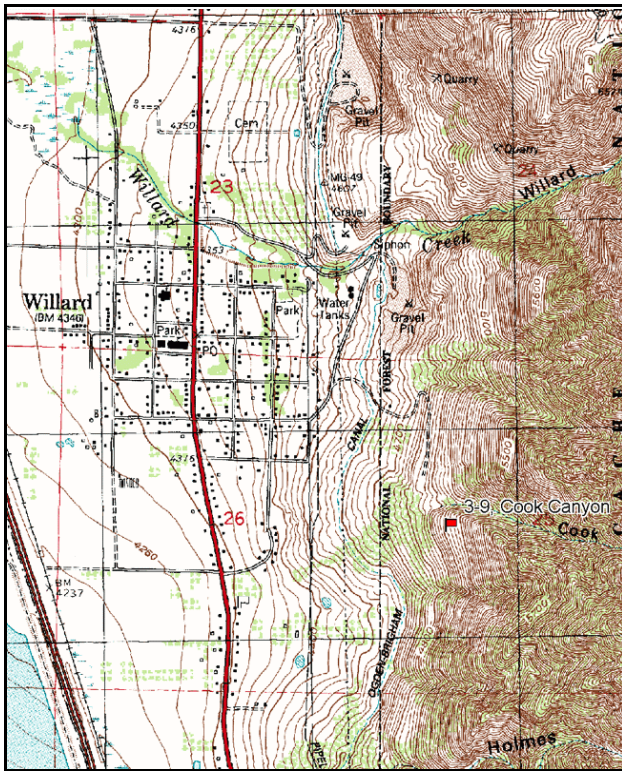
Compass bearing: frequency baseline 162 degrees magnetic.

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

LOCATION DESCRIPTION

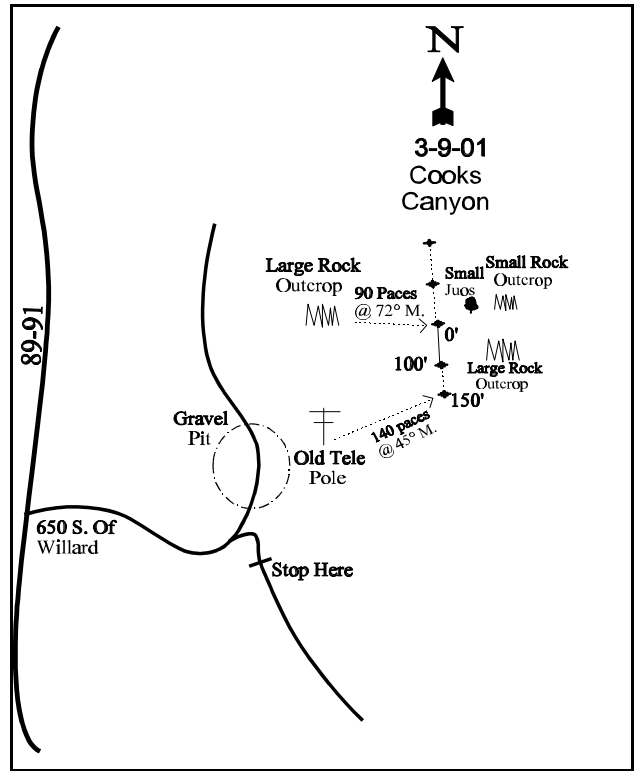
From the intersection of US-89/91 in Brigham City, proceed south 6.6 miles on US 89. Turn left (east) on 700 South (south of Willard) and go 0.6 miles to a gravel pit and the Ogden/Brigham Canal. From the point where the canal goes underground, take an azimuth of 30 degrees magnetic and walk approximately ¼ mile up the steep slope to a large rock outcrop. From the rock outcrop, take an azimuth of 87 degrees magnetic and walk 91 paces to the 0-foot stake of the frequency baseline, marked with a browse tag #7924.

Alternate route: Drive along canal road from White's Orchard to a gravel pit. Park here and walk up the slope at a bearing of 65 degrees magnetic for 1/4 mile. The 0-ft post is between two large rock outcrops.



Map Name: Willard

Township 8N, Range 2W, Section 25



Diagrammatic Sketch

UTM 4583504 N 414655 E

DISCUSSION

Trend Study No. 3-9

The Cook Canyon study is situated on a west-facing slope at 4,760 feet elevation, just south of Cook Canyon. The plant community is a mountain big sagebrush type with scattered white rubber rabbitbrush. It also contains widely scattered Utah juniper and Gambel oak clones. A sparse understory consists of warm season perennial grasses, annual grasses, and a few broadleaf weeds. The 35% to 45% slope is steep enough to contribute to some soil instability and erosion. Deer pellet groups occurred frequently in 1984, overall browse utilization was relatively heavy, suggesting that the area was an important wintering site through the critical winters of 1983-84. Two winter killed carcasses from those winters were found nearby. Deer use on available browse has been light from 1990-2001. Deer pellet groups had a quadrat frequency of only 8% in 1996 and 4% in 2001. Pellet group transect data taken in 2001 estimated 2 deer days use/acre (5 ddu/ha). No elk pellets have been sampled in any year.

The soil is "Wasatch Cobbly Sandy Loam" with a gravelly subsoil. The surface layer averages 17 inches in thickness, but is underlain by a highly permeable subsoil extending to below five feet in depth. Drainage is excessive and water holding capacity is poor. During the mid-summer period, the top 35 to 40 inches are often completely dry. The erosion hazard for this soil is moderate (Chadwick et al. 1975). The study site is very rocky and has incomplete plant cover. Soil at the site has a sandy loam texture with a soil reaction that is moderately acidic (6.0 pH). The soil is rocky with abundant gravel throughout the profile. Effective rooting depth was estimated at under 9 inches in 1996. Soil temperature is high, averaging 75.6° F at a depth of 10 inches. In 1996, erosion was moderate as evidenced by the prevalence of erosion pavement, gullies, rills and plant pedestaling. In 2001, erosion seemed to be more stabilized.

The key browse species is mountain big sagebrush. Other shrubs include a small population of broom snakeweed, an occasional mature white rubber rabbitbrush, a few junipers, and isolated patches of Gambel oak and bigtooth maple. During the initial reading in 1984, the mountain big sagebrush stand seemed rather sparse and slightly decadent. However, closer examination revealed the presence of abundant seedlings (5,800 per acre). The previous two or three years (1981-82) must have been highly favorable for seedling establishment. This same trend was apparent at several other locations along the front. Although, apparently few of the seedlings encountered in 1984 survived. During the 1990 reading, population density remained similar to 1984 estimates (2,399 and 2,599 plants/acre) with only a slight increase in young plants. Utilization was light and decadence relatively low at 21%. By 1996, population density declined slightly yet the number of mature plants was similar at 1,460 plants/acre. The largest decline came from the decadent age class which fell from 533 plants/acre to only 180 plants/acre. As a result, percent decadency declined to only 9%. Utilization was light and vigor normal. Seed production was extremely good in 1996. Percent decadency increased in 2001 to 29%, with 50% of this age class classified as dying. This points to a possible die-off in the future. Recruitment was low in 2001, and the average number of young plants since site establishment is not adequate to replace the number of dead, decadent and dying plants within the population. Plants displaying poor vigor also increased in 2001 to 21%. The extended drought, coupled with high competition from annual species in the understory, is most likely the cause of the negative parameters for sagebrush. Annual growth on sagebrush was relatively low in 2001 at less than 2 inches.

Like many sites along the front, the herbaceous understory on this site is dominated by annuals and weedy perennial forbs. Annual brome species and rattail fescue combine to produce 87% of the grass cover in 1996, declining to 56% in 2001. Cheatgrass and rattail fescue both decreased significantly in nested frequency in 2001, most likely due to drought. However, they are still abundant enough to pose a fire hazard, especially in years with normal or above-normal precipitation. Moderately abundant perennial species include Sandberg bluegrass, bluebunch wheatgrass, bulbous bluegrass and purple three-awn (a warm season increaser). As a

group, perennial grasses more than doubled in sum of nested frequency in 2001. Forbs are fairly diverse yet produce less than 10% of the total vegetative cover on the site. Annual forbs increased dramatically in both frequency and cover in 2001. The most common perennial species are dyers woad, Louisiana sagebrush, wild onion and fleabane.

1984 APPARENT TREND ASSESSMENT

This site appears to have an unacceptable rate of soil erosion and for this reason, soil trend appears to be declining. Plant composition may be at a turning point. The established mountain big sagebrush community appears decadent but could be rejuvenated by a large population of seedlings. If these succeed, they will ensure the continued dominance of big sagebrush. Herbaceous composition is somewhat depleted but seems relatively stable.

1990 TREND ASSESSMENT

Trend for big sagebrush is stable. Seedlings made up 71% of the population in 1984. In 1990, the stand is dominated by a slightly increased density of mature shrubs. The number of decadent plants declined while the number of young increased. Sagebrush canopy cover was estimated at 14%. The understory is largely cheatgrass, but there is a significant amount of Sandberg bluegrass, three-awn and bluebunch wheatgrass. Sum of nested frequency for perennial grasses and forbs increased since 1984, yet composition is still poor.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up slightly but poor composition (4)

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 7% to 1%. However, some erosion is still occurring even though herbaceous vegetation and litter cover is abundant and well dispersed. Trend for sagebrush is stable. Total density has declined slightly but the decrease comes primarily from the decadent age class. Utilization is light, vigor normal and percent decadence low at 9%. Trend for the herbaceous understory is down. Composition is poor and sum of nested frequency for perennial grasses has declined by 58%. Currently, annual grasses account for 87% of the grass cover. Forbs are limited and dominated by annuals and weedy species.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - down (1)

2001 TREND ASSESSMENT

Trend for soil is stable. Ground cover characteristics remain similar to 1996 levels. Bare ground is almost non-existent and protective cover from vegetation and litter are well dispersed. Trend for browse is slightly down. Mountain big sagebrush remains at a stable density, but percent decadency and poor vigor both increased. The number of decadent plants classified as dying also increased to 50%. These negative parameters are likely drought related and could improve with better precipitation in the future. The proportion of young plants is not adequate to replace the dead and decadent, dying individuals in the population. Trend for the herbaceous understory is slightly up. Sum of nested frequency for perennial grasses

doubled, while that of annual grasses decreased by 24%. Annual forbs did increase in frequency and cover, but forbs only provide 14% of the total herbaceous cover. The increase in perennial grass frequency outweighs the increase in annual forbs.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 9

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	ab18	b37	a15	b42	11	14	6	18	.81	1.88
G	Aristida purpurea	c208	c184	b76	a39	76	70	31	14	2.40	1.23
G	Bromus japonicus (a)	-	-	8	-	-	-	2	-	.18	-
G	Bromus tectorum (a)	-	-	b350	a286	-	-	97	89	23.83	15.73
G	Festuca myuros (a)	-	-	b145	a95	-	-	52	36	2.98	1.96
G	Poa bulbosa	ab2	a-	b9	c72	1	-	6	26	.13	3.63
G	Poa secunda	a27	b130	a37	b151	13	61	20	54	.53	6.96
G	Sporobolus cryptandrus	7	5	13	3	4	3	6	2	.18	.21
Total for Annual Grasses		0	0	503	381	0	0	151	125	27.00	17.70
Total for Perennial Grasses		262	356	150	307	105	148	69	114	4.06	13.93
Total for Grasses		262	356	653	688	105	148	220	239	31.06	31.63
F	Achillea millefolium	-	-	3	3	-	-	1	1	.00	.18
F	Alyssum alyssoides (a)	-	-	-	5	-	-	-	2	-	.03
F	Allium spp.	a-	a-	a-	b35	-	-	-	21	-	.23
F	Arabis spp.	-	-	-	8	-	-	-	3	-	.01
F	Artemisia ludoviciana	a6	ab15	b25	ab9	3	6	12	4	.73	.21
F	Collomia linearis (a)	-	-	-	2	-	-	-	2	-	.01
F	Collinsia parviflora (a)	-	-	a2	b31	-	-	1	12	.00	.23
F	Descurainia pinnata (a)	-	-	-	7	-	-	-	3	-	.09
F	Draba spp. (a)	-	-	a-	b141	-	-	-	49	-	.66
F	Epilobium brachycarpum (a)	-	-	22	10	-	-	10	4	.10	.04
F	Erodium cicutarium (a)	-	-	a7	b57	-	-	3	26	.01	1.20
F	Erigeron spp.	-	-	b16	a2	-	-	7	2	.66	.04
F	Eriogonum spp.	-	-	-	1	-	-	-	1	-	.00
F	Euphorbia spp.	a-	a-	b14	a-	-	-	6	-	.22	-
F	Galium aparine (a)	-	-	a-	b7	-	-	-	5	-	.05
F	Helianthus annuus (a)	-	b5	a-	a-	-	5	-	-	.00	-

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Holosteum umbellatum (a)	-	-	_a 5	_b 137	-	-	2	48	.01	1.02
F	Isatis tinctoria	_a -	_b 13	_c 33	_{bc} 21	-	7	16	11	.37	.11
F	Lactuca serriola	-	-	-	1	-	-	-	1	.00	.00
F	Machaeranthera canescens	-	-	-	5	-	-	-	3	-	.18
F	Microsteris gracilis (a)	-	-	4	6	-	-	2	2	.01	.03
F	Phlox longifolia	_a -	_{ab} 11	_a 7	_b 15	-	5	2	9	.01	.46
F	Polygonum douglasii (a)	-	-	-	1	-	-	-	1	-	.00
F	Senecio multilobatus	-	-	4	-	-	-	2	-	.06	-
F	Sisymbrium altissimum (a)	-	-	1	-	-	-	1	-	.00	-
F	Tragopogon dubius	7	-	2	9	4	-	1	3	.00	.06
F	Unknown forb-perennial	-	-	-	4	-	-	-	2	-	.30
Total for Annual Forbs		0	5	41	404	0	5	19	154	0.15	3.40
Total for Perennial Forbs		13	39	104	113	7	18	47	61	2.09	1.81
Total for Forbs		13	44	145	517	7	23	66	215	2.24	5.22

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 9

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	64	69	19.13	18.40
B	Chrysothamnus nauseosus albicaulis	3	0	.15	-
B	Chrysothamnus viscidiflorus viscidiflorus			.00	.03
B	Gutierrezia sarothrae	7	9	.96	.53
B	Juniperus osteosperma	0	4	-	2.14
B	Opuntia spp.	0	1	-	-
B	Quercus gambelii	1	2	.63	-
B	Unknown browse	0	2	-	-
Total for Browse		75	87	20.88	21.11

CANOPY COVER --
Herd unit 03 , Study no: 9

Species	Percent Cover '01
Juniperus osteosperma	2
Quercus gambelii	2

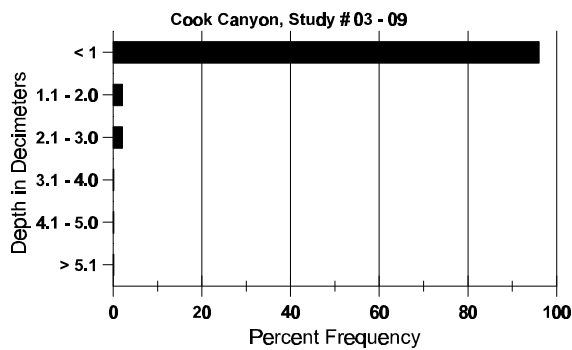
BASIC COVER --
Herd unit 03 , Study no: 9

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	364	366	2.25	17.00	53.98	59.46
Rock	230	235	20.50	14.25	21.08	23.55
Pavement	77	75	8.50	5.50	.55	1.67
Litter	375	352	66.50	56.25	47.18	37.92
Cryptogams	35	54	.25	.50	.50	1.11
Bare Ground	88	77	2.00	6.50	.85	.91

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 09, Cook Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
8.9	75.6 (10.1)	6.0	54.7	26.0	19.3	1.8	13.5	131.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 9

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	4	1	-	-
Deer	8	4	26	2 (5)

BROWSE CHARACTERISTICS --

Herd unit 03 , 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.		
<i>Artemisia tridentata vaseyana</i>																		
S	84	87	-	-	-	-	-	-	-	-	87	-	-	-	5800			87
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	1	-	-	-	-	-	-	2	-	-	-	133			2
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	84	-	1	21	-	-	-	-	-	-	22	-	-	-	1466	23	39	22
	90	25	-	-	-	-	-	-	-	-	25	-	-	-	1666	24	32	25
	96	71	2	-	-	-	-	-	-	-	73	-	-	-	1460	27	47	73
	01	65	6	-	-	-	-	-	-	-	68	-	3	-	1420	29	42	71
D	84	-	1	11	-	-	-	-	-	-	9	1	2	-	800			12
	90	8	-	-	-	-	-	-	-	-	-	3	3	2	533			8
	96	7	2	-	-	-	-	-	-	-	8	-	-	1	180			9
	01	26	4	-	-	-	-	-	-	-	11	-	4	15	600			30
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	520			26
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	440			22
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		06%			92%			06%			+ 8%							
'90		00%			00%			13%			-27%							
'96		04%			00%			01%			+10%							
'01		10%			00%			21%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2399	Dec:	33%			
												'90	2599		21%			
												'96	1900		9%			
												'01	2100		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						
<i>Chrysothamnus nauseosus albicaulis</i>											
Y	84	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	66	21	22	1
	90	1	-	-	-	-	-	66	25	31	1
	96	2	-	-	-	-	-	40	38	63	2
	01	-	-	-	-	-	-	0	37	43	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'84		00%		00%		00%		+ 0%			
'90		00%		00%		00%		- 9%			
'96		00%		00%		00%					
'01		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)							'84	66	Dec:	-	
							'90	66		-	
							'96	60		-	
							'01	0		-	
<i>Gutierrezia sarothrae</i>											
S	84	5	-	-	-	-	-	333		5	
	90	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	0		0	
	01	2	-	-	-	-	-	40		2	
M	84	32	-	-	-	-	-	2133	15	14	32
	90	12	-	-	-	-	-	800	10	11	12
	96	11	-	-	-	-	-	220	14	20	11
	01	13	-	-	1	-	-	280	12	18	14
X	84	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'84		00%		00%		00%		-62%			
'90		00%		00%		00%		-73%			
'96		00%		00%		00%		+31%			
'01		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)							'84	2133	Dec:	-	
							'90	800		-	
							'96	220		-	
							'01	320		-	

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				
Juniperus osteosperma																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	2280	-	-	114
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	00%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%										
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	2280		-			
Opuntia spp.																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	19	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	12	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	00%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%										
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	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				
Quercus gambelii																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100	-	-	5
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+40%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
												'01	100		-			
Unknown browse																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	48	75	0
	01	-	-	-	2	-	-	-	-	-	2	-	-	-	40	21	68	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	40		-			

Suspended

Trend Study 3-10-96

Study site name: Hyrum Canyon.

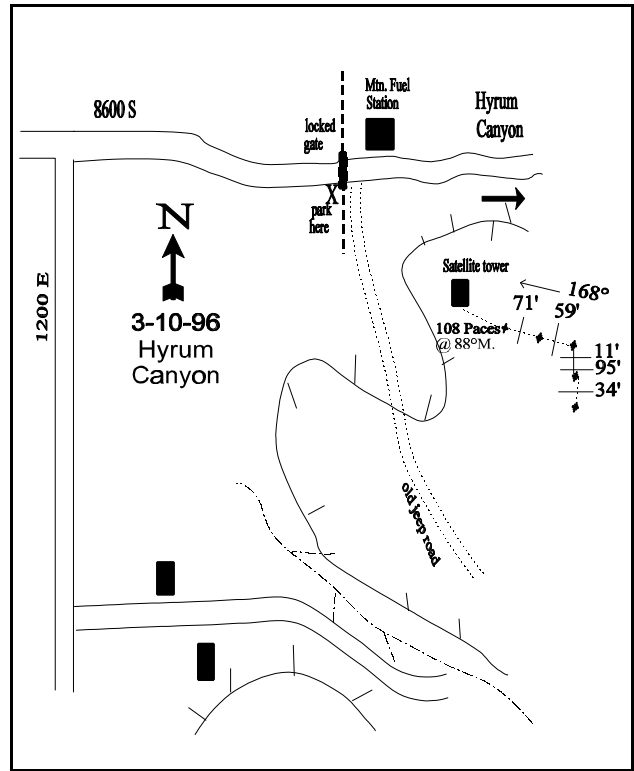
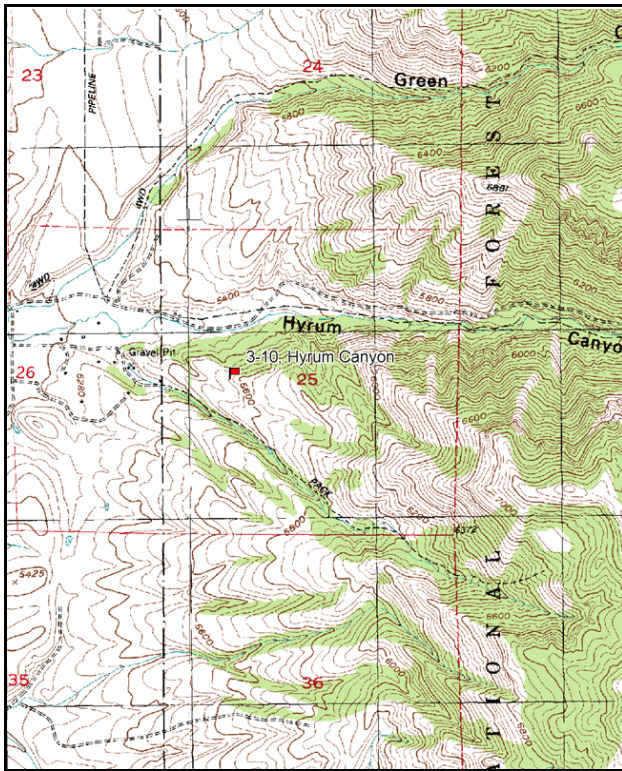
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 146 degrees magnetic.

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

LOCATION DESCRIPTION

Drive east from the town of Paradise to the intersection of 1200 East and 8600 South. Continue east towards Hyrum Canyon for 0.5 miles to a Mountain Fuel station and a locked gate. Park here and walk approximately ½ mile southeast up on the sagebrush bench to a satellite receiving tower. From this reflector walk 155 paces at a bearing of 90 degrees magnetic to the 0-foot baseline stake, located by a small maple. This stake is marked by browse tag #7981. Lines three and four are run off the 0-foot stake at a bearing of 348 degrees magnetic.



Map Name: Paradise

Diagrammatic Sketch

Township 10N, Range 1E, Section 25

UTM 4602730 N 434220 E

DISCUSSION

Trend Study No. 3-10

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This study was not read in 2001 due to access problems. Text and data tables are included from the 1996 report.

The Hyrum Canyon study samples a mountain big sagebrush-grass community located east of Paradise at an elevation of 5,560 feet. The area is considered critical deer winter range. It has a moderate slope (15%) and a southwest aspect. This area supports a dense and vigorous stand of mountain big sagebrush that has sustained moderate to heavy use from deer, domestic sheep, horses and cattle in the past. Currently ('96), there were no signs of domestic grazing or any wildlife pellet groups. Understory composition has been unfavorably influenced by past heavy grazing practices.

Soil is "Nebeker Silt Loam," an alluvially deposited, well-drained soil derived from sandstone, quartzite and shale. This soil is moderately deep and slightly acidic but becomes increasingly clayey and calcareous at depths greater than four feet. Water holding capability, permeability and erosion hazard are all moderate. Dry farmed cropland is a principal use of Nebeker soil (Erickson and Mortensen 1974). Sampled soils at the site have a clay loam texture with a slightly acid soil reaction (6.4 pH). Effective rooting depth (see methods) is estimated at nearly 16 inches. Due to the gentle slope and good plant cover, the site shows few signs of erosion. Organic matter is moderately high at over 4%.

Browse composition consists almost exclusively of mountain big sagebrush. Vigor, even of decadent plants, is good. Population density has remained fairly stable at around 3,000 plants/acre since 1984. Utilization was heavy in 1984, but mostly light in 1990 and 1996. Percent decadence was moderately low in 1996 at 15%. Seedlings were extremely abundant in 1990 (14,466 per acre) but none were encountered in 1996. Some of the difference in the number of seedlings is likely due to the greatly increased sample used in 1996 which better estimates shrub populations with clumped and/or discontinuous distributions. Also, the abundant herbaceous understory and prolonged drought have likely combined to reduce seedling establishment and survival.

The understory has been depleted as a result of past sheep, cattle and horse use. Although perennial grasses are present, they are inferior in both numbers and production to invader and increaser forbs and annual grasses. Annual grasses consisting of Japanese brome and cheatgrass provide 91% of the grass cover in 1996. Perennial grasses include Kentucky bluegrass, Sandberg bluegrass, bluebunch wheatgrass, slender wheatgrass and bulbous bluegrass. Forbs are diverse and abundant, producing nearly as much cover as the grasses. Desirable perennial and biennial forbs are rare however. Among the less desirable forbs are curlycup gumweed, autumn willowweed, ragweed, annual sunflower, dyers woad, tarweed and spreading fleabane daisy.

1984 APPARENT TREND ASSESSMENT

Soil is deep and fertile and shows few signs of serious erosion in spite of some trampling and compaction by livestock. Trend appears stable. Vegetative trend also appears stable with respect to the key browse species but slightly down for understory composition.

1990 TREND ASSESSMENT

Mountain big sagebrush has excellent vigor, good reproduction and light hedging. From a population that was classified as 44% decadent yet stable in 1984, sagebrush values for density have increased slightly. The dense and healthy understory of Kentucky bluegrass increased in frequency. However, annual and weedy increaser species are abundant. Vegetative cover increased and the percentage of bare soil decreased to 9%.

TREND ASSESSMENT

soil - slightly up (4)

browse - up for the key species, mountain big sagebrush (5)

herbaceous understory - slightly downward because of the large quantities of weedy increaser species and annuals (2)

1996 TREND ASSESSMENT

The soil trend is up due to a notable decline in bare ground (8% to 1%) and a large increase in litter cover (55% to 80%). Vegetation and litter cover are very abundant and almost completely cover the ground surface. No erosion is evident. Trend for sagebrush is stable. It appears that the sagebrush population has reached its density limit. Most plants appear unutilized and vigorous with abundant seed production. Percent decadence is moderately low at 15%. The herbaceous understory is very abundant producing nearly 50% average cover. The herbaceous cover is split nearly equal between grasses and forbs. Unfortunately, 91% of the grass cover comes from annual brome grasses (Japanese brome and cheatgrass). Sum of nested frequency for the most common perennial grass in 1990, Kentucky bluegrass, has declined by 72%. It currently has a quadrat frequency of only 15%. Forbs are diverse and productive, yet the composition is extremely poor. The most common perennial species would include willowweed, curlycup gumweed, tarweed, Louisiana sage, western yarrow, dyers woad, prickly lettuce and yellow salsify. Sum of nested frequency for perennial grasses has declined, while sum of nested frequency for perennial forbs has remained similar. Trend is considered down.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - down with an extremely poor composition (1)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron intermedium	-	12	-	-	4	-	-
G	Agropyron spicatum	11	7	9	4	3	4	.19
G	Agropyron trachycaulum	a-	a2	b15	-	2	7	.80
G	Bromus japonicus (a)	-	-	359	-	-	99	22.79
G	Bromus tectorum (a)	-	-	55	-	-	19	2.61
G	Poa bulbosa	a-	b24	a5	-	9	3	.04
G	Poa pratensis	b104	b130	a37	45	53	15	1.18
G	Poa secunda	a-	b10	b17	-	5	10	.27
Total for Annual Grasses		0	0	414	0	0	118	25.40
Total for Perennial Grasses		115	185	83	49	76	39	2.50
Total for Grasses		115	185	497	49	76	157	27.90
F	Achillea millefolium	60	71	76	21	27	30	2.12
F	Agoseris glauca	ab6	b13	a-	3	5	-	-
F	Alyssum alyssoides (a)	-	-	10	-	-	4	.02
F	Artemisia ludoviciana	17	17	11	5	5	4	1.31
F	Cirsium spp.	-	3	-	-	2	-	-
F	Collomia linearis (a)	-	-	1	-	-	1	.00
F	Collinsia parviflora (a)	-	-	8	-	-	3	.04
F	Cryptantha spp.	a-	a-	b42	-	-	17	.50
F	Descurainia pinnata (a)	-	-	5	-	-	2	.01
F	Epilobium brachycarpum (a)	-	-	225	-	-	79	8.24
F	Erigeron spp.	-	-	2	-	-	2	.33
F	Galium aparine (a)	-	-	72	-	-	30	.93
F	Gilia aggregata	-	6	-	-	4	-	-
F	Grindelia squarrosa	ab98	b125	a72	37	53	28	4.13
F	Hackelia patens	a20	b39	ab34	10	21	18	.54
F	Holosteum umbellatum (a)	-	-	3	-	-	1	.00
F	Isatis tinctoria	a-	a-	b34	-	-	17	.89
F	Lappula occidentalis (a)	-	-	14	-	-	6	.05
F	Lactuca serriola	a-	a-	b50	-	-	22	.71
F	Lupinus caudatus	-	1	-	-	1	-	-
F	Madia glomerata (a)	-	-	15	-	-	8	.09
F	Microsteris gracilis (a)	-	-	4	-	-	2	.01
F	Penstemon spp.	-	-	2	-	-	1	.00

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	Phlox longifolia	-	-	3	-	-	1	.00
F	Polygonum douglasii (a)	-	-	45	-	-	18	.21
F	Taraxacum officinale	-	4	-	-	2	-	-
F	Tragopogon dubius	40	42	37	24	23	17	.55
F	Unknown forb-perennial	-	8	-	-	6	-	-
F	Veronica biloba (a)	-	-	7	-	-	2	.03
F	Viola spp.	-	11	-	-	4	-	-
F	Zigadenus paniculatus	-	-	5	-	-	3	.01
Total for Annual Forbs		0	0	409	0	0	156	9.66
Total for Perennial Forbs		241	340	368	100	153	160	11.12
Total for Forbs		241	340	777	100	153	316	20.79

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 10

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	Acer grandidentatum	1	.03
B	Artemisia tridentata vaseyana	91	24.34
B	Gutierrezia sarothrae	1	.15
B	Juniperus scopulorum	1	.85
Total for Browse		94	25.37

BASIC COVER --

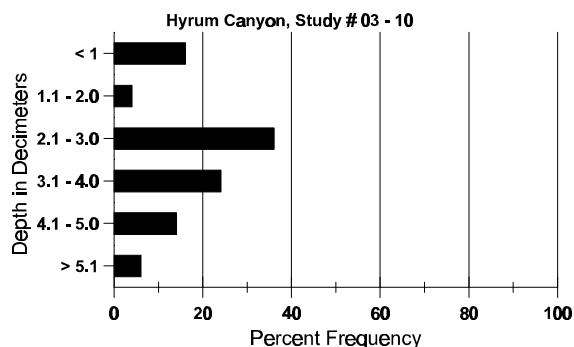
Herd unit 03 , Study no: 10

Cover Type	Nested Frequency	Average Cover %		
		'84	'90	'96
Vegetation	383	2.25	35.50	62.45
Rock	41	0	0	.20
Pavement	44	1.00	.75	.18
Litter	399	82.50	55.25	79.99
Cryptogams	3	.25	0	.00
Bare Ground	60	14.00	8.50	1.22

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 10, Hyrum Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.5	58.6 (17.4)	6.4	27.9	36.1	36.0	4.5	23.6	262.4	.6

Stoniness Index



BROWSE CHARACTERISTICS --
Herd unit 03 , 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>Acer grandidentatum</i>																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	1	-	-	-	-	-	1	-	-	-	66	34	26	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		00%			100%			00%			+ 0%						
'90		00%			100%			00%			-70%						
'96		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-		
												'90	66		-		
												'96	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				
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	187	-	-	30	-	-	-	-	-	217	-	-	-	14466		217	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	11	1	-	1	-	-	-	-	-	13	-	-	-	866		13	
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
M	84	4	8	11	-	-	-	-	-	-	23	-	-	-	1533	19	17	23
	90	28	4	2	-	-	-	-	-	-	31	1	2	-	2266	22	24	34
	96	116	-	-	-	-	-	-	-	-	116	-	-	-	2320	28	40	116
D	84	-	7	13	-	-	-	-	-	-	20	-	-	-	1333		20	
	90	2	1	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	21	2	-	-	-	-	-	-	-	23	-	-	-	460		23	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1080		54	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		38%			53%			00%			+10%							
'90		12%			04%			04%			- 8%							
'96		01%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2999	Dec:	44%			
												'90	3332		6%			
												'96	3060		15%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	27	54	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	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				
<i>Gutierrezia sarothrae</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	15	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Juniperus scopulorum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

Trend Study 3-12-01

Study site name: Threemile Canyon.

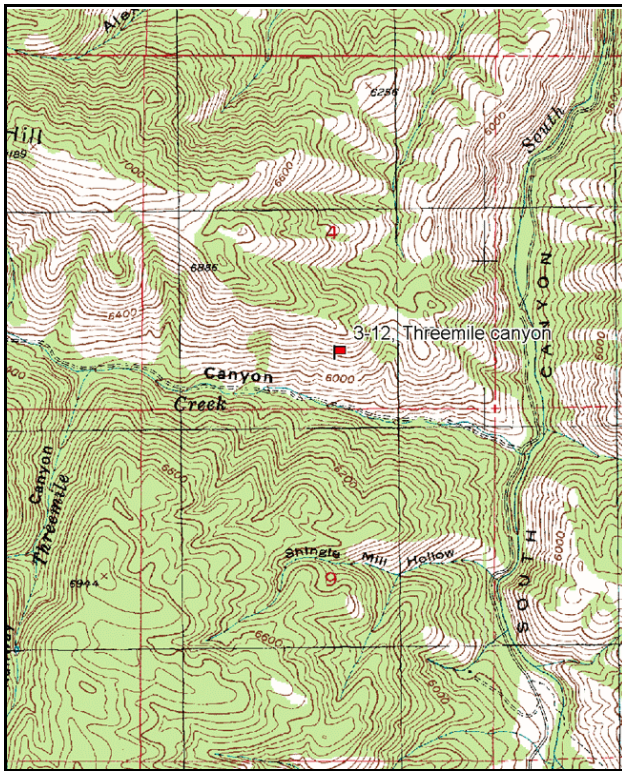
Vegetation type: Bitterbrush.

Compass bearing: frequency baseline 159 degrees magnetic.

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

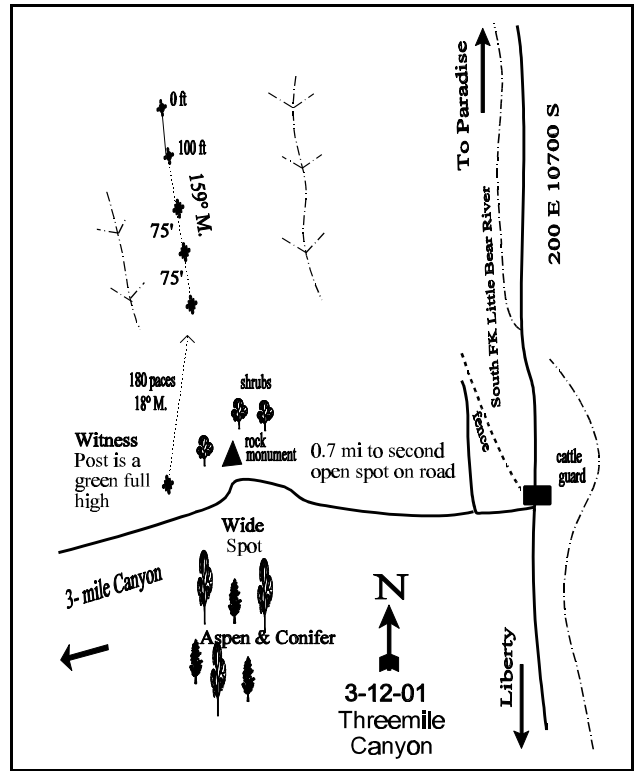
LOCATION DESCRIPTION

From 200 East and 10700 South in Avon, proceed south (towards Liberty) on a dirt road for 7.0 miles. Cross the cattle guard and turn immediately right (west). Travel 0.7 miles up Three-mile Canyon and stop adjacent to a green and white witness post on the right side of road. Walk 180 paces at 18 degrees magnetic from the witness post to the last baseline stake. From the last baseline stake to the 0-foot baseline stake walk 400 feet at an azimuth 340 degrees magnetic. The 0-foot stake is marked by browse tag #7982.



Map Name: James Peak

Township 8N, Range 1E, Section 4



Diagrammatic Sketch

UTM 4589284 N 429627 E

DISCUSSION

Trend Study No. 3-12

The Three-Mile Canyon study samples a sparse but heavily used mixed bitterbrush/sagebrush community in Three-mile Canyon, a tributary of the South Fork of the Little Bear River. The area is on a very steep (60%), south facing slope at an elevation of about 6,120 feet. Winter deer use can be heavy during average as well as severe winters. Use of the available browse was very heavy in 1984 and moderately heavy in 1990. Deer use was light in 1996 and 2001. Elk use was very light. Pellet group transect data taken in 2001 estimated 26 deer days use/acre (65 ddu/ha) and 2 elk days use/acre (5 edu/ha).

Soil is classified as "Sheep Creek Cobbly Loam", a soil series that is very cobbly throughout becoming more clayey in the subsoil. Drainage is excellent with moderate permeability and very rapid runoff potential. Although the soil has a high erosion hazard, an erosion condition class assessment done in 2001 shows the soil to be stable with little erosion shown at that time. This soil is only moderately deep (28-40 inches to fractured limestone bedrock) and often has a calcareous accumulation at approximately 22 inches depth. Surface horizons range from neutral to slightly alkaline (Erickson and Mortensen 1974). Sampled soils on the site have a clay loam texture with a neutral soil reaction (7.2 pH). Effective rooting depth (see methods) was estimated at 16 inches in 1996. Rocks are common on the surface and within the profile. Soil temperature is relatively high at 67°F at an average depth of 16 inches. Vegetation and litter cover are abundant and well dispersed.

Browse composition consists of a moderate stand of antelope bitterbrush interspersed with a low density mountain big sagebrush. Small amounts of mountain snowberry, Wood's rose and serviceberry are also present on or around the site. The key species, bitterbrush, had an estimated density of 820 plants/acre in 1996, decreasing slightly to 700 plants/acre in 2001. Density estimates are higher since 1990 due to a much better estimate given by the greatly enlarged sample used in 1996 and 2001. The entire population displayed heavy use in 1984, with use decreasing to a more moderate level since then. Percent decadence was quite high at over 40% in 1984 and 1990. However, percent decadence has declined considerably, 5% in 1996 and 17% in 2001. Recruitment from young plants was low in 2001. The average number of young in the population since site establishment has not been adequate to replace the dead within the population. Vigor remains normal throughout the population. Average leader growth on bitterbrush was about 4 inches in 2001.

Mountain big sagebrush density has steadily declined with each reading. Much of the decline is the result of the change in sample size since 1996, giving a much better estimate of shrub populations. Currently ('01), an estimated 100 mountain big sagebrush plants/acre occur on the site. Utilization was heavy in 1984, but use has steadily decreased and is currently light. Percent decadence has ranged from 40-50% in all sampling years. Recruitment by young plants into the population remains low. The average number of young plants since 1984 has not been adequate to replace the dead within the population.

The herbaceous understory is dominated by the annual grasses, cheatgrass and Japanese brome, which account for over 70% of the grass cover in 1996 and 2001. Desired perennial species such as bluebunch wheatgrass, Sandberg bluegrass and Great Basin wildrye are also present. They have maintained fairly stable frequencies between 1996 and 2001. However, these species combined only provide about one-fourth of the grass cover in 2001. As with several other studies in this unit in 2001, bulbous bluegrass a less desirable perennial, has significantly increased on this site. Forbs can be found in fairly large numbers but are mainly low growing and/or increaser species which include Louisiana sagebrush, yellow salsify and prickly lettuce. Arrowleaf balsamroot is perhaps the most desirable forb, but it occurs only occasionally.

1984 APPARENT TREND ASSESSMENT

Considering the high erosion hazard of this soil and the steep slope, soil movement is surprisingly low. Soil trend appears stable. Vegetative trend is more complicated. Although the study samples an area that is obviously important to and favored by wintering deer, the existing stand of browse seems to be declining. Current forage production is good, but certainly not outstanding. An increasing grass cover does not argue well for the future of sagebrush.

1990 TREND ASSESSMENT

Bitterbrush and mountain big sagebrush populations both decreased, 22% and 67% respectively. Together, it indicates a definite downward trend for these key browse species. A moderating factor is that, while in 1984 all the bitterbrush were classified as heavily hedged, in 1990 all form classes were represented, suggesting generally lighter utilization. Bitterbrush canopy cover was estimated at 5%. Sagebrush cover was too low to measure with the variable plot method. A significant decline in nested frequency was noted for bluebunch wheatgrass, and large increased frequency was measured for yellow salsify (*Tragopogon dubius*). Ground cover characteristics are almost unchanged.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - slightly downward, poor composition (2)

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 21% to 5% and an increase in percent cover of litter from 41% to 64%. Vegetation and litter cover are abundant and well dispersed. No erosion is evident on the site. Trend for browse is stable but limited. Density of bitterbrush is estimated at 820 plants/acre with the new, much larger sample size. Utilization is mostly moderate and percent decadence low at 5%. Recruitment appears sufficient to maintain the population. Mountain big sagebrush has a density of only 180 plants/acre, providing little forage. It only contributes 5% of the browse cover at this time. Reproduction is limited and likely hindered by the abundant herbaceous understory. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency for perennial grasses. Nested frequency for perennial forbs increased, but the increase came primarily from weedy species.

TREND ASSESSMENT

soil - up (5)

browse - stable overall (3)

herbaceous understory - down slightly and dominated by annuals and weedy perennial forbs (2)

2001 TREND ASSESSMENT

Trend for soil is stable. The abundance of herbaceous vegetation and litter cover effectively limits erosion. Trend for browse is slightly down. Bitterbrush density slightly decreased with a reduction in the number of young plants and percent decadency increased. Decadency in the mountain big sagebrush population remains at a moderately high level (40%). Those classified with poor vigor increased from 0% to 20%. These negative parameters are likely drought related and should improve with normal precipitation in the future. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs remains stable. Annual species are still abundant in the understory, but overall they did not increase in 2001.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 12

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	<i>Agropyron spicatum</i>	_b 220	_a 164	_a 120	_a 131	83	70	47	52	4.64	7.90
G	<i>Bromus japonicus</i> (a)	-	-	_b 354	_a 205	-	-	99	65	20.07	8.06
G	<i>Bromus tectorum</i> (a)	-	-	_a 209	_b 276	-	-	66	76	6.28	22.38
G	<i>Carex</i> spp.	-	-	-	3	-	-	-	1	-	.00
G	<i>Elymus cinereus</i>	_a -	_a 1	_b 22	_{ab} 13	-	1	7	4	1.63	1.83
G	<i>Poa bulbosa</i>	_a -	_b 18	_b 11	_c 75	-	9	5	27	.12	1.57
G	<i>Poa secunda</i>	_a -	_b 32	_b 18	_b 18	-	16	10	9	.20	.20
Total for Annual Grasses		0	0	563	481	0	0	165	141	26.36	30.44
Total for Perennial Grasses		220	215	171	240	83	96	69	93	6.60	11.52
Total for Grasses		220	215	734	721	83	96	234	234	32.96	41.97
F	<i>Achillea millefolium</i>	-	-	6	6	-	-	2	2	.03	.06
F	<i>Agoseris glauca</i>	_b 34	_b 19	_a 5	_a 1	19	11	2	1	.01	.01
F	<i>Allium acuminatum</i>	17	-	-	-	6	-	-	-	-	-
F	<i>Alyssum alyssoides</i> (a)	-	-	88	109	-	-	36	46	.30	1.23
F	<i>Artemisia ludoviciana</i>	_a 25	_a 30	_a 29	_b 56	10	10	11	20	.88	3.27
F	<i>Aster chilensis</i>	-	-	1	1	-	-	1	1	.06	.00
F	<i>Balsamorhiza sagittata</i>	14	16	6	14	7	9	2	6	1.75	2.82
F	<i>Camelina microcarpa</i> (a)	-	-	1	5	-	-	1	3	.00	.04
F	<i>Calochortus nuttallii</i>	_a -	_b 8	_a -	_{ab} 2	-	5	-	1	-	.00
F	<i>Cirsium</i> spp.	_a 1	_b 29	_a 13	_a 2	1	15	8	2	.37	.06
F	<i>Collomia linearis</i> (a)	-	-	_b 44	_a 10	-	-	21	4	.18	.02
F	<i>Collinsia parviflora</i> (a)	-	-	3	1	-	-	1	1	.00	.00
F	<i>Crepis acuminata</i>	_a -	_c 29	_b 21	_{ab} 6	-	13	9	3	.22	.09
F	<i>Epilobium brachycarpum</i> (a)	-	-	_b 104	_a 18	-	-	40	8	.91	.04
F	<i>Erodium cicutarium</i> (a)	-	-	-	10	-	-	-	6	-	.13
F	<i>Galium aparine</i> (a)	-	-	3	-	-	-	1	-	.03	-
F	<i>Hackelia patens</i>	-	-	-	6	-	-	-	2	-	.06
F	<i>Holosteum umbellatum</i> (a)	-	-	_a 7	_b 77	-	-	4	32	.02	.33
F	<i>Isatis tinctoria</i>	_a -	_{ab} 4	_{ab} 7	_b 16	-	2	4	7	.16	.22
F	<i>Lappula occidentalis</i> (a)	-	-	_a 2	_b 18	-	-	1	7	.00	.06

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Lactuca serriola	a-	b43	c99	c113	-	21	44	48	1.13	2.82
F	Lesquerella spp.	-	-	-	2	-	-	-	1	-	.00
F	Lithospermum ruderales	-	-	12	6	-	-	4	3	1.06	.45
F	Lomatium grayi	-	1	-	-	-	1	-	-	-	-
F	Polygonum douglasii (a)	-	-	-	1	-	-	-	1	.00	.00
F	Ranunculus testiculatus (a)	-	-	-	3	-	-	-	1	-	.00
F	Senecio multilobatus	b41	a-	a-	a2	21	-	-	1	-	.00
F	Tragopogon dubius	a32	c185	c195	b76	12	78	80	36	5.07	2.05
F	Unknown forb-perennial	-	-	-	16	-	-	-	7	-	.13
F	Veronica biloba (a)	-	-	21	45	-	-	10	19	.70	.14
Total for Annual Forbs		0	0	273	297	0	0	115	128	2.17	2.01
Total for Perennial Forbs		164	364	394	325	76	165	167	141	10.78	12.09
Total for Forbs		164	364	667	622	76	165	282	269	12.96	14.11

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 12

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	8	5	.41	-
B	Mahonia repens	2	2	.15	.03
B	Purshia tridentata	25	27	8.01	7.73
B	Rosa woodsii	5	4	.24	.03
Total for Browse		40	38	8.81	7.79

BASIC COVER --

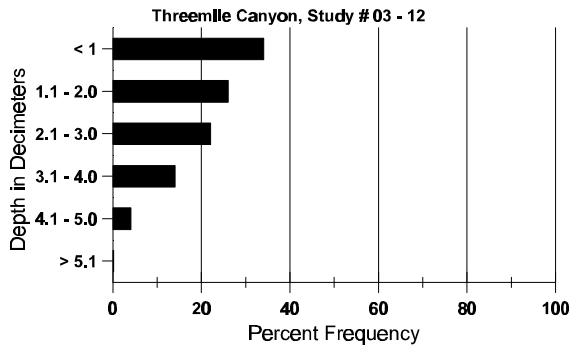
Herd unit 03 , Study no: 12

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	394	380	3.50	9.00	56.96	62.90
Rock	167	150	15.25	12.75	5.47	8.76
Pavement	72	178	10.25	17.00	.50	5.16
Litter	397	357	49.75	40.50	64.06	33.45
Cryptogams	-	-	.75	0	0	0
Bare Ground	146	146	20.50	20.75	4.86	7.33

SOIL ANALYSIS DATA --
 Herd Unit 03, Study no: 12, Threemile Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.1	67.4 (16.3)	7.2	27.3	40.7	32.0	3.1	15.8	201.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 03 , Study no: 12

Type	Quadrat Frequency	
	'96	'01
Elk	1	-
Deer	5	13
Cattle	-	1

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
26	2 (5)
340	26 (65)
-	-

BROWSE CHARACTERISTICS --

Herd unit 03 , 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>Amelanchier alnifolia</i>												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	0	29	34	0
	01	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		00%						
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	-			
						'90	0		-			
						'96	0		-			
						'01	0		-			
<i>Artemisia tridentata vaseyana</i>												
Y	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	0		0	
M	84	-	4	13	-	-	-	-	17	-	-	17
	90	1	4	-	-	-	-	-	5	-	-	5
	96	3	-	-	1	-	-	-	4	-	-	4
	01	2	-	-	-	-	1	-	3	-	-	3
D	84	-	-	13	-	-	-	-	13	-	-	13
	90	1	3	1	-	-	-	-	2	-	-	5
	96	1	2	-	1	-	-	-	4	-	-	4
	01	2	-	-	-	-	-	-	1	-	-	2
X	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	60		3	
	01	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		13%		87%		00%		-67%				
'90		70%		10%		30%		-46%				
'96		22%		00%		00%		-44%				
'01		00%		00%		20%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	999	Dec:	43%			
						'90	332		50%			
						'96	180		44%			
						'01	100		40%			

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				
Mahonia repens																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	16	-	-	-	-	-	16	-	-	-	320	6	6	16
	'01	9	-	-	12	-	-	-	-	-	21	-	-	-	420	-	-	21
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+27%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	320		-			
												'01	440		-			

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																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	10	-	-	-	-	-	-	10	-	-	-	333	30 48	10	
	90	4	2	2	-	-	-	-	-	-	8	-	-	-	266	25 48	8	
	96	9	20	5	-	-	-	-	-	-	34	-	-	-	680	32 59	34	
	01	11	12	5	-	-	-	-	-	-	28	-	-	-	560	34 57	28	
D	84	-	-	8	-	-	-	-	-	-	8	-	-	-	266		8	
	90	2	1	3	-	-	-	-	-	-	4	1	-	1	200		6	
	96	-	1	-	-	-	1	-	-	-	2	-	-	-	40		2	
	01	4	1	1	-	-	-	-	-	-	6	-	-	-	120		6	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			-22%							
'90		21%			36%			07%			+43%							
'96		51%			15%			00%			-15%							
'01		37%			17%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	599	Dec:	44%			
												'90	466		43%			
												'96	820		5%			
												'01	700		17%			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.		Total		
		1	2	3	4	5	6	7	8	9	1	2	3		4				
Rosa woodsii																			
Y	84	5	-	-	-	-	-	-	-	-	-	-	5	-	-	-	166		5
	90	33	-	-	-	-	-	-	-	-	-	-	33	-	-	-	1100		33
	96	6	2	-	-	-	-	-	-	-	-	-	8	-	-	-	160		8
	01	7	-	-	-	-	-	-	-	-	-	-	7	-	-	-	140		7
M	84	5	-	-	-	-	-	-	-	-	-	5	-	-	-	166	7	4	5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	8	5	-	-	-	-	-	-	-	-	13	-	-	-	260	12	11	13
	01	10	-	-	-	-	-	-	-	-	-	10	-	-	-	200	17	12	10
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'84		00%				00%				00%				+70%					
'90		00%				00%				00%				-62%					
'96		33%				00%				00%				-19%					
'01		00%				00%				00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	332	Dec:	-				
												'90	1100		-				
												'96	420		-				
												'01	340		-				
Symphoricarpos oreophilus																			
Y	84	3	-	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	90	2	1	-	-	-	-	-	-	-	-	2	1	-	-	100		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	1	1	-	-	-	-	-	-	-	3	-	-	-	100	18	43	3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'84		14%				29%				00%				-57%					
'90		33%				00%				00%									
'96		00%				00%				00%									
'01		00%				00%				00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	233	Dec:	14%				
												'90	100		0%				
												'96	0		0%				
												'01	0		0%				

Suspended

Trend Study 3-13-96

Study site name: Perry Basin.

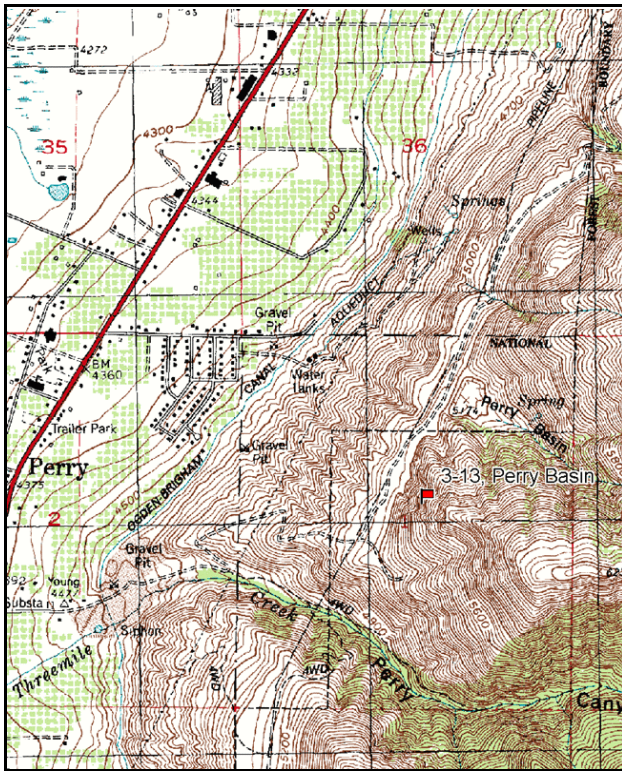
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 160 degrees magnetic.

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

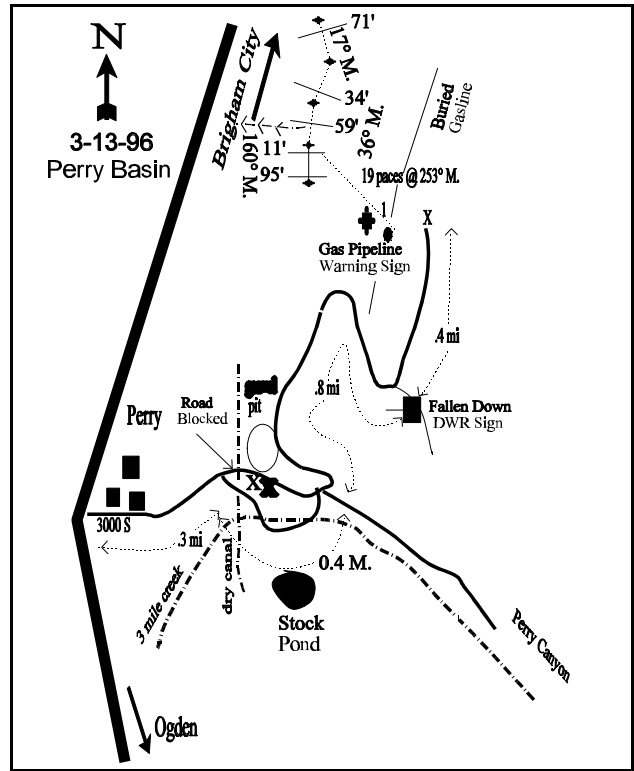
LOCATION DESCRIPTION

From 300 South and Highway 89 in Perry, proceed east towards Perry Basin driving around gravel pit for 0.7 miles and take the left fork. Travel 0.7 miles to another fork, stay to the right (on the main road) and proceed 0.4 miles to Perry Basin. Stop at this point. Perry Basin should be to the east, and a gas pipeline warning sign should be to the west. From the sign, proceed 19 paces at 253 degrees magnetic to the 100-foot stake of the baseline. The 0-foot baseline stake is 100 feet away at 340 degrees magnetic. The stake is marked with browse tag #7994. The rest of the baseline runs off the 0-baseline stake and runs in a northerly direction. Line 2 & 3 run 36 degrees magnetic. Line 4 runs 17 degrees magnetic.



Map Name: Willard

Township 8N, Range 2W, Section 1



Diagrammatic Sketch

UTM 4590804 N 415156 E

DISCUSSION

Trend Study No. 3-13

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This site was burned in 1995 and does not appear to have been rehabilitated. All of the key browse, mountain big sagebrush, was lost following the burn. The Project Leader evaluated this site in 2001 and due to the lack of browse and no sign of wildlife use on the site, it was suspended. Text and data tables are included from the 1996 report.

The Perry Basin study samples critical deer winter range located slightly west of Perry Basin on the Brigham City-Willard face. The site is near the lower edge of the upper Lake Bonneville terrace and has a moderate (15%) west- northwest slope. Elevation is approximately 5,100 feet. The range type is classified as mountain big sagebrush/grass. A fire burned the entire area during the summer of 1995 which eliminated essentially all of the browse. Deer use was light to moderate in 1984 and 1990, with no domestic livestock use evident. No big game pellet groups were found during the 1996 reading.

Soil is classed as "Kilburn Gravelly Sandy Loam," a widespread series on lake terraces in this area. All of the Kilburn soils are excessively drained and derived primarily from metamorphic rock. Permeability is rapid with low water holding capability in the upper soil layers. However, potential rooting depth extends to at least 60 inches, a depth at which water is almost always available. Soil reaction is neutral in the upper horizons and mildly alkaline in the deep subsoil. Runoff and erosion hazards range from medium to high depending upon slope steepness (Erickson and Mortensen 1974). Sampled soils at the site were moderately deep with a sandy loam texture and a slightly acid soil reaction (6.3 pH). The soil temperature is moderately high at 69°F at a depth of 18 inches. Small pea-sized gravel covers a considerable amount of the ground surface (45%). Effective rooting depth was estimated at 22 inches in 1996. The gentle terrain and the abundant vegetation cover helps limit erosion. There are some gullies west of the study area on steeper slopes, but they do not appear to be currently active.

Browse composition was previously dominated by a moderately dense and vigorous stand of mountain big sagebrush. With the exception of a small population of broom snakeweed, no other shrub species were present. The sagebrush population consisted of variable sized shrubs ranging from seedlings to larger than average mature plants. Age structure appeared stable and form class distribution suggested moderate to heavy use in 1984, but mostly light use since then. The fire which burned the area during the summer of 1995 eliminated nearly all of the browse on the site. Only a few sagebrush seedlings were sampled, along with a few rubber rabbitbrush and low rabbitbrush plants following the fire.

The herbaceous understory is dominated by forbs and annual grasses. Perennial grasses are represented by Sandberg bluegrass and occasional plants of bluebunch wheatgrass. Annual grasses were abundant enough to pose a significant fire hazard in 1990. After the fire, annual grasses, mostly cheatgrass, Japanese brome, and rattlesnake brome, accounted for 50% of the grass cover. An additional 48% of the grass cover comes from Sandberg bluegrass. The forb composition is diverse yet dominated by annuals and weeds. The most abundant forbs are dyers woad, yellow salsify, flannel mullein, and hoary aster. This site was apparently not seeded after the fire. At this time it has basically lost its usefulness as an important winter range for deer.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be down slightly because of higher than acceptable erosion resulting from an essentially annual understory, that although produces considerable litter, still allows excessive overland flows of water. Vegetative trend appears stable for the key browse species but down for understory composition and density.

1990 TREND ASSESSMENT

While this site maintains a moderate density of mountain big sagebrush, data shows a notable decline (21%) in density. The sagebrush population was classified as 59% decadent compared to 42% in 1984. Sagebrush canopy cover averages 22%. The plants are large and healthy, and have a light to moderate hedged growth form. Several herbaceous components have increased, mostly Sandberg bluegrass (80% quadrat frequency) and dyers woad (88% quadrat frequency), which are both increasers. Deer use is light. There is no evidence of recent soil erosion.

TREND ASSESSMENT

soil - stable (3)

browse - slight downward trend, increased decadency and lower densities in sagebrush (2)

herbaceous understory - up but composition is poor, can carry a destructive fire (5)

1996 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in percent bare ground and a decline in litter cover due to the fire. Erosion does not appear to be a problem however. The browse trend is down and nearly absent on the site. A few sagebrush seedlings were found, but they will likely not survive to maturity due to competition with the abundant and weedy herbaceous understory. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses remained similar to 1990 estimates, while frequency of forbs declined. The decline in forb nested frequency comes primarily from a significant decline in the frequency of dyers woad (235 to 122).

TREND ASSESSMENT

soil - down slightly (2)

browse - down, eliminated by fire (1)

herbaceous understory - stable but poor composition which is dominated by annual grasses and weedy forbs (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 13

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron spicatum	3	4	4	1	3	1	.15
G	Aristida purpurea	7	3	6	2	1	2	.41
G	Bromus brizaeformis (a)	-	-	97	-	-	49	.57
G	Bromus tectorum (a)	-	-	253	-	-	87	10.29
G	Festuca myuros (a)	-	-	19	-	-	10	.85
G	Poa bulbosa	-	-	3	-	-	1	.03
G	Poa secunda	_a 20	_b 225	_b 218	12	80	78	11.27
G	Sporobolus cryptandrus	-	3	-	-	1	-	-
Total for Annual Grasses		0	0	369	0	0	146	11.71
Total for Perennial Grasses		30	235	231	15	85	82	11.86
Total for Grasses		30	235	600	15	85	228	23.57
F	Achillea millefolium	10	15	7	4	5	3	.21
F	Agoseris glauca	_a 1	_b 16	_{ab} 7	1	9	4	.04
F	Alyssum alyssoides (a)	-	-	70	-	-	30	.40
F	Ambrosia artemisifolia	_b 50	_b 20	_a 4	19	9	2	.03
F	Artemisia ludoviciana	1	4	3	1	1	1	.38
F	Astragalus spp.	-	5	-	-	3	-	-
F	Astragalus utahensis	-	-	3	-	-	2	.01
F	Calochortus nuttallii	_a -	_b 31	_a 1	-	12	1	.00
F	Collomia linearis (a)	-	-	2	-	-	2	.03
F	Collinsia parviflora (a)	-	-	4	-	-	2	.06
F	Crepis acuminata	_a -	_b 18	_b 29	-	9	14	.44
F	Epilobium brachycarpum (a)	-	-	8	-	-	5	.03
F	Euphorbia spp.	-	-	1	-	-	1	.00
F	Galium aparine (a)	-	-	5	-	-	2	.03
F	Hackelia patens	-	-	-	-	-	-	.03
F	Helianthus annuus (a)	-	_a 1	_b 11	-	1	6	.63
F	Heterotheca villosa	1	1	1	1	1	1	.21
F	Holosteum umbellatum (a)	-	-	35	-	-	18	.19
F	Isatis tinctoria	_a 153	_b 235	_a 122	74	88	50	5.34
F	Lactuca serriola	_b 44	_a 4	_a 10	18	2	6	.37
F	Lithospermum ruderae	2	3	3	2	1	1	.33
F	Lupinus argenteus	1	-	-	1	-	-	-
F	Lygodesmia grandiflora	1	2	4	1	1	2	.33

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	<i>Machaeranthera canescens</i>	a ⁻	b ¹⁵	b ¹⁸	-	5	8	.89
F	<i>Microsteris gracilis</i> (a)	5	-	6	4	-	3	.09
F	<i>Oenothera pallida</i>	6	-	7	2	-	3	.21
F	<i>Phacelia</i> spp.	3	-	6	1	-	4	.09
F	<i>Phlox longifolia</i>	a ⁸	a ¹⁴	b ²⁹	3	5	12	.33
F	<i>Plantago patagonica</i> (a)	-	-	20	-	-	9	.04
F	<i>Polygonum douglasii</i> (a)	-	-	49	-	-	25	.40
F	<i>Tragopogon dubius</i>	b ¹⁴⁶	ab ¹²²	a ⁸⁵	65	49	41	1.55
F	<i>Verbascum thapsus</i>	a ⁻	a ⁻	b ⁵¹	-	-	19	1.81
Total for Annual Forbs		5	1	210	4	1	102	1.93
Total for Perennial Forbs		427	505	391	193	200	175	12.64
Total for Forbs		432	506	601	197	201	277	14.58

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 13

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	<i>Artemisia tridentata vaseyana</i>	0	.02
B	<i>Chrysothamnus nauseosus consimilis</i>	1	.38
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	2	-
Total for Browse		3	0.40

BASIC COVER --

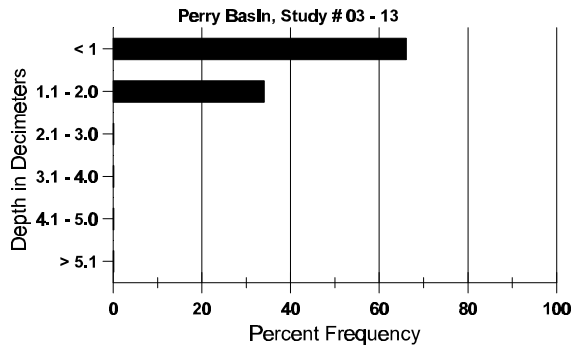
Herd unit 03 , Study no: 13

Cover Type	Nested Frequency	Average Cover %		
	'96	'84	'90	'96
Vegetation	335	1.00	15.75	38.44
Rock	66	.25	0	.90
Pavement	375	26.00	25.25	45.22
Litter	173	72.00	55.75	2.09
Cryptogams	6	.50	0	.01
Bare Ground	181	.25	3.25	8.69

SOIL ANALYSIS DATA --
 Herd Unit 03, Study no: 13, Perry Basin

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
22.0	69.0 (18.1)	6.3	66.2	17.4	16.4	2.6	20.7	256.0	.4

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 03 , Study no: 13

Type	Quadrat Frequency '96
Rabbit	2

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 13

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 vaseyana</i>																		
S	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	4	-	-	-	-	-	-	-	4	-	-	-	266		4		
	96	10	-	-	-	-	-	-	-	10	-	-	-	200		10		
Y	84	8	-	-	-	-	-	-	-	8	-	-	-	533		8		
	90	2	-	-	1	-	-	-	-	3	-	-	-	200		3		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	84	5	7	10	-	-	-	-	-	20	-	1	1	1466	33	31	22	
	90	13	1	-	-	-	-	-	-	14	-	-	-	933	30	29	14	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
D	84	-	6	16	-	-	-	-	-	15	-	4	3	1466		22		
	90	18	6	-	-	-	-	-	-	18	-	1	5	1600		24		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	900		45		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		25%			50%			17%			-21%							
'90		17%			00%			15%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	3465	Dec:	42%				
											'90	2733		59%				
											'96	0		0%				
<i>Chrysothamnus nauseosus consimilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	-	-	-	-	-	-	-	1	-	-	-	20	19	35	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	14	24	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
<i>Gutierrezia sarothrae</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	466	10	11	7
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	799		42%			
												'96	0		0%			

*****Suspended*****

Trend Study 3-14-96

Study site name: Uintah Junction.

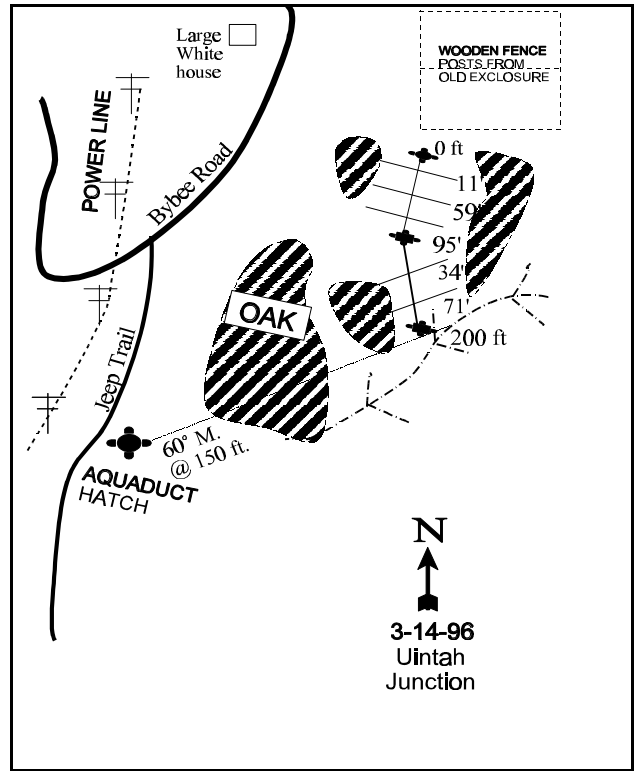
Vegetation type: Mixed Oak-Sage.

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

Beginning at the point above Uintah Junction where the railroad crosses U-89 (two tracks 300 yards apart), travel northwest on U-89 for approximately 100 yards then turn right on Combe Road. Proceed northeast on Combe Road for 0.5 miles to Woodland Drive. Turn right, go 100 yards up Woodland Drive and turn right on Bybee Road. Proceed on Bybee for approximately 1 mile, past new (1990) homes and building lots to where the new road passes under a powerline. At the mouth of the small draw to the east, there is a concrete aqueduct hatch. The beginning of the baseline is on the skyline to the northeast, 250 feet bearing 24 degrees from the concrete hatch. The 0-foot baseline stake is marked by a browse tag.



Map Name: Ogden

Diagrammatic Sketch

Township 5N, Range 1W, Section 25

UTM 4554810 N 424010 E

DISCUSSION

Trend Study No. 3-14

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This is a poor site as it lies in close proximity to homes and is dominated by Gambel oak brush. Very little sagebrush remains on the site. Deer pellets were found only on game trails transecting the slope. This site was evaluated by the Assistant Project Leader's and suspended due to very little wildlife use and lack of key browse. Text and data tables are included from the 1996 report.

The Uintah Junction study is located on the foothills of the Wasatch Face just north of the mouth of Weber Canyon. The site initially sampled critical and very limited winter range on the front. These low elevation slopes (4,880 feet at the study site) were used heavily by deer in the early 1980's. The steep west facing slopes are covered by a mixture of Gambel oak and sagebrush. The transect is on private land. Land to the north is managed as a protected watershed by the Forest Service and part of the section is owned by the DWR. Development is progressing on the more suitable sites, but as this area is so steep and on an aqueduct, it will probably not be converted to a subdivision. Houses occur 300 yards from the site, and off road vehicle use is a possible threat to soil stability.

The soil is a moderately deep, well-drained clay loam with a neutral soil reaction (7.2 pH). Limestone rock that occurs on the surface is covered by litter. Phosphorus and potassium could both be a limiting factor with only 4.1 and 20.7 ppm where values of 10 and 70 ppm respectively, have been shown to limit plant growth and/or development. Soil temperature is very high (80° F at 16") due to the aspect and slope. The potential for severe erosion is high unless a more permanent cover is maintained. Currently erosion is not severe, although some soil movement is inevitable and evidenced by pedestaling and terracing of plants.

A moderately dense stand of Gambel oak provides 93% of the browse cover and most of the forage production on the site. The oak numbered 9,733 stems per acre in 1984, with 36% classified as young and biotic potential (proportion of seedlings) was 12%. The available twigs had been moderately browsed. Since then, the population has become increasingly mature. Currently ('96), mature plants account for 79% of the population. Decadent plants are few and young oak are common. Utilization is mostly light.

Basin big sagebrush currently comprises only 7% of the browse cover, with 880 plants/acre estimated in 1996. The population has become more mature (68% currently) with few young and no seedlings encountered during any year sampled. Use is mostly light, yet vigor is poor on 20% of the population. Broom snakeweed has declined from 1,533 plants/acre in 1985 to only 380 by 1996.

Grasses provide some erosion control and forage. The most abundant perennial species include bulbous bluegrass and bluebunch wheatgrass. They grow best in the interspaces and appear to be suppressed by shade from the dense oak clones. Annual grasses, consisting of cheatgrass and Japanese brome, are abundant and account for 43% of the grass cover. A variety of forbs are represented and many are valuable for forage and/or watershed protection. Common perennial forbs would include bastard toadflax, yellow sweet clover and yellow salsify.

1985 APPARENT TREND ASSESSMENT

An increasing density of Gambel oak will further exclude grasses and sagebrush and could cause a downward vegetative trend. Currently, the area provides a variety of browse and herbaceous forage, but a dense stand of oak would be much like the rest of the front, which would encourage the deer to go even lower to find browse. The soil is stable at low levels of erosion, unless it is disturbed by off road vehicular activity.

1990 TREND ASSESSMENT

The density of sagebrush on this mixed oak/sage range has declined slightly. There is a higher percentage of decadent plants in the light to moderately hedged population. Although the Gambel oak provides competition to the sagebrush, the biggest threat to this winter range is the continued housing and road development just below the site. The oak has been moderately hedged by deer and its vigor has been impacted by insects and drought. Grasses, mainly bluebunch wheatgrass and bulbous bluegrass, are vigorous and abundant. Bluebunch wheatgrass is stable, but there was a loss in the density of bulbous bluegrass which can be useful in early spring. There is evidence of slight erosion and pedestaling, but overall the vegetative and litter cover is adequate to prevent serious erosion.

TREND ASSESSMENT

soil - stable (3)

browse - downward, 50% of the sagebrush was lost (1)

herbaceous understory - slightly downward (2)

1996 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground from 14% to 2%. Some soil movement is inevitable but erosion is not currently a problem. Trend for sagebrush is stable. The sagebrush density is similar to 1990 estimates. Percent decadence declined from 45% to 13%, but vigor is poor on 20% of the shrubs. Utilization is mostly light. Trend for Gambel oak appears stable with similar densities in 1985 and 1990. Trend for the herbaceous understory is stable with similar sum of nested frequency values for perennial grasses and forbs. Nested frequency of bluebunch wheatgrass increased while frequency of bulbous bluegrass declined significantly.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 14

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
G	Agropyron intermedium	_b 13	_a -	_{ab} 11	5	-	4	.93
G	Agropyron spicatum	115	111	125	44	43	47	5.51
G	Aristida purpurea	-	-	1	-	-	1	.03
G	Bromus japonicus (a)	-	-	79	-	-	28	1.13
G	Bromus spp.	3	-	-	1	-	-	-
G	Bromus tectorum (a)	-	-	204	-	-	60	8.21
G	Poa bulbosa	_c 298	_b 226	_a 131	83	79	41	5.52
G	Poa pratensis	_{ab} 5	_b 13	_a -	2	5	-	-
G	Poa secunda	_a 3	_b 17	_{ab} 7	1	7	2	.06
G	Sporobolus cryptandrus	1	4	2	1	1	1	.00
Total for Annual Grasses		0	0	283	0	0	88	9.35
Total for Perennial Grasses		438	371	277	137	135	96	12.07
Total for Grasses		438	371	560	137	135	184	21.42
F	Agoseris glauca	1	-	4	1	-	1	.00
F	Allium spp.	-	3	-	-	1	-	-
F	Ambrosia psilostachya	_b 11	_a -	_a -	5	-	-	-
F	Arenaria spp.	_b 14	_a -	_a -	7	-	-	-
F	Artemisia ludoviciana	30	11	15	11	4	6	.28
F	Astragalus convallarius	3	5	15	3	2	6	.37
F	Aster spp.	3	-	-	1	-	-	-
F	Calochortus nuttallii	3	-	2	1	-	1	.03
F	Cirsium vulgare	2	-	-	1	-	-	-
F	Comandra pallida	_b 69	_a 18	_{ab} 40	26	9	16	1.54
F	Crepis acuminata	_b 15	_c 17	_a -	6	9	-	-
F	Cryptantha spp.	-	3	-	-	1	-	-
F	Erodium cicutarium (a)	3	-	2	1	-	1	.00
F	Hackelia patens	-	-	-	-	-	-	.00
F	Hedysarum boreale	_b 25	_{ab} 10	_a 3	12	6	2	.18
F	Helianthus spp.	2	-	-	1	-	-	-
F	Lactuca serriola	-	-	13	-	-	5	.02
F	Lithospermum ruderales	-	2	-	-	1	-	-
F	Lomatium spp.	-	8	-	-	3	-	-
F	Lygodesmia grandiflora	_c 40	_a -	_b 13	16	-	6	.17
F	Melilotus officinalis	_a -	_a -	_b 92	-	-	39	7.34

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
F	Medicago sativa	6	1	1	3	1	1	.03
F	Oenothera caespitosa	2	-	-	1	-	-	-
F	Penstemon spp.	3	-	-	2	-	-	-
F	Phlox longifolia	_a 3	_b 71	_a 26	3	29	11	.10
F	Sphaeralcea coccinea	_b 56	_{ab} 49	_a 18	21	18	7	.26
F	Tragopogon dubius	_b 89	_a 45	_c 111	41	22	50	1.43
F	Unknown forb-perennial	-	10	2	-	4	2	.06
F	Zigadenus paniculatus	15	3	11	6	2	4	.07
Total for Annual Forbs		3	0	2	1	0	1	0.00
Total for Perennial Forbs		392	256	366	168	112	157	11.92
Total for Forbs		395	256	368	169	112	158	11.93

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 14

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia tridentata tridentata	28	2.65
B	Gutierrezia sarothrae	12	.08
B	Quercus gambelii	82	34.46
Total for Browse		122	37.19

BASIC COVER --

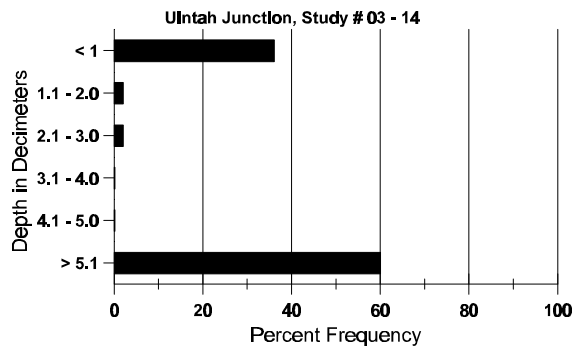
Herd unit 03 , Study no: 14

Cover Type	Nested Frequency	Average Cover %		
		'85	'90	'96
Vegetation	371	18.00	6.50	63.57
Rock	57	0	.25	3.25
Pavement	14	0	.25	.03
Litter	396	63.25	78.75	72.08
Cryptogams	2	0	.75	.00
Bare Ground	43	18.75	13.50	1.61

SOIL ANALYSIS DATA --
 Herd Unit 03, Study no: 14, Uintah Junction

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.1	80.3 (15.7)	7.2	42.6	33.1	24.4	1.2	4.1	16.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 03 , Study no: 14

Type	Quadrat Frequency '96
Deer	3

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 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		1	2							
<i>Artemisia tridentata tridentata</i>															
Y	85	4	-	-	-	-	-	-	-	4	-	-	266		4
	90	-	-	-	2	-	-	-	-	2	-	-	133		2
	96	2	-	-	6	-	-	-	-	4	-	4	160		8
M	85	7	4	-	-	-	-	-	-	11	-	-	733	22 17	11
	90	2	2	-	-	-	-	-	-	4	-	-	266	22 26	4
	96	24	5	-	1	-	-	-	-	26	-	4	600	25 33	30
D	85	3	4	-	-	-	-	-	-	6	-	1	466		7
	90	2	2	-	1	-	-	-	-	4	-	-	333		5
	96	4	1	-	1	-	-	-	-	5	-	1	120		6
X	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	260		13
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>				
'85		36%			00%			05%			-50%				
'90		36%			00%			09%			+17%				
'96		14%			00%			20%							
Total Plants/Acre (excluding Dead & Seedlings)										'85	1465	Dec:	32%		
										'90	732		45%		
										'96	880		14%		
<i>Gutierrezia sarothrae</i>															
S	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	1	-	-	-	-	-	-	-	1	-	-	20		1
Y	85	6	-	-	-	-	-	-	-	6	-	-	400		6
	90	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	6	-	-	-	-	-	-	-	6	-	-	120		6
M	85	15	-	-	-	-	-	-	-	15	-	-	1000	9 10	15
	90	4	-	-	-	-	-	-	-	4	-	-	266	14 13	4
	96	12	-	-	1	-	-	-	-	13	-	-	260	17 22	13
D	85	2	-	-	-	-	-	-	-	1	-	-	133		2
	90	7	-	-	-	-	-	-	-	1	-	-	466		7
	96	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>				
'85		00%			00%			04%			-52%				
'90		00%			00%			55%			-48%				
'96		00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)										'85	1533	Dec:	9%		
										'90	732		64%		
										'96	380		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				
Opuntia spp.																		
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	3	-	-	5	-	-	-	333		5	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400	8	9	6
	90	6	-	-	-	-	-	2	-	-	7	-	1	-	533	6	11	8
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+46%							
'90		00%			00%			08%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	466	Dec:	-			
												'90	866		-			
												'96	0		-			
Quercus gambelii																		
S	85	18	-	-	-	-	-	-	-	-	17	1	-	-	1200		18	
	90	6	-	-	-	-	-	-	-	-	5	1	-	-	400		6	
	96	53	-	-	-	-	-	-	-	-	53	-	-	-	1060		53	
Y	85	51	2	-	-	-	-	-	-	-	53	-	-	-	3533		53	
	90	38	21	3	2	-	-	1	-	-	45	14	6	-	4333		65	
	96	66	-	-	4	-	-	-	-	-	70	-	-	-	1400		70	
M	85	10	74	-	-	-	-	-	-	-	84	-	-	-	5600	32	21	84
	90	14	10	-	6	-	-	-	-	-	9	21	-	-	2000	44	30	30
	96	279	11	-	26	-	-	-	-	-	316	-	-	-	6320	36	35	316
D	85	2	7	-	-	-	-	-	-	-	9	-	-	-	600		9	
	90	15	10	1	3	-	-	-	-	-	7	17	5	-	1933		29	
	96	8	1	2	2	-	-	-	-	-	11	-	-	2	260		13	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	580		29	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		57%			00%			00%			-15%							
'90		33%			03%			09%			- 3%							
'96		03%			.50%			.50%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	9733	Dec:	6%			
												'90	8266		23%			
												'96	7980		3%			

*****Suspended*****

Trend Study 3-15-96

Study site name: Ogden Canyon.

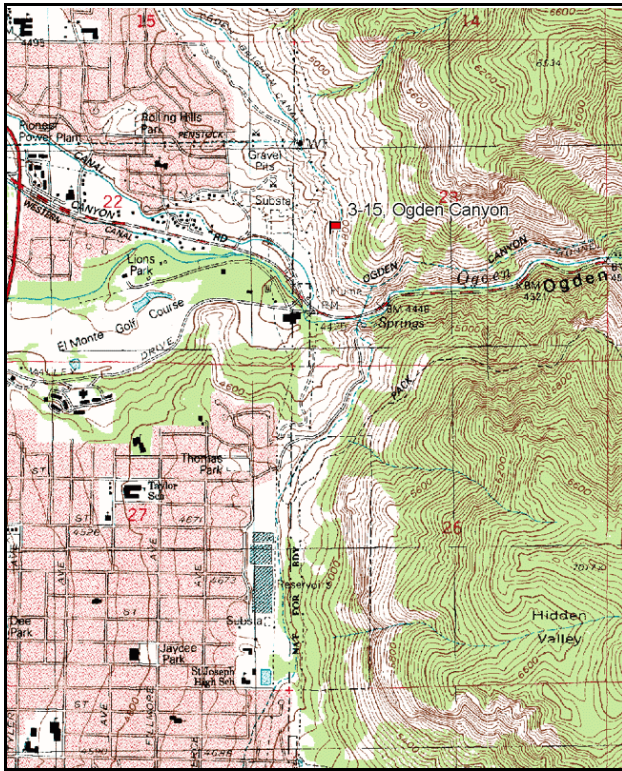
Vegetation type: Rubber Rabbitbrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

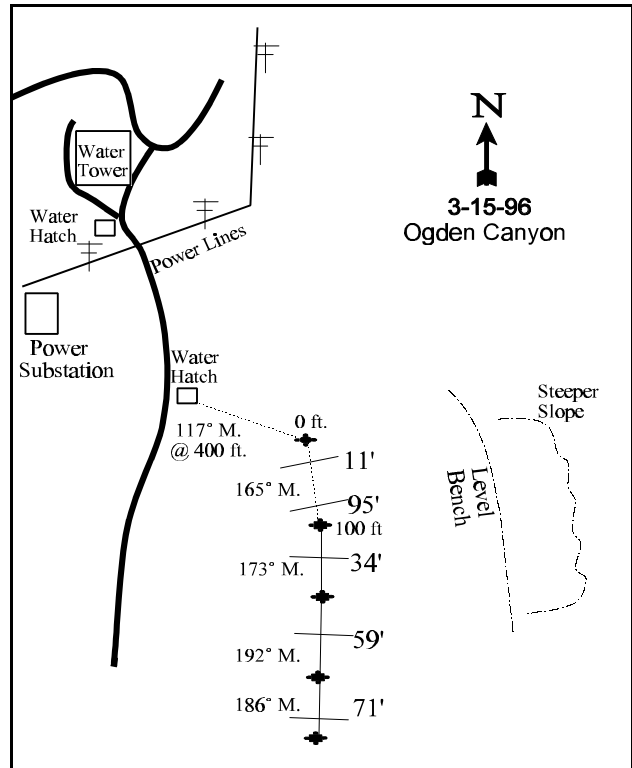
LOCATION DESCRIPTION

The transect is located just north of the mouth of Ogden Canyon. From Ogden, drive east on Canyon Road to 1600 East; north on 1600 East to 1350 South; east on 1350 South to Maxfield Drive (1700 E); north on Maxfield to Hislop Dr. and turn right onto Hislop. You should see a water tower east of you on the hillside. Drive past the water tower, under the power lines and stop where there is one water hatch on the west side of the road and then another one on the east side of the road (with a wood top). From the water hatch, the study begins 400 feet southeast (117 degrees magnetic) on the edge of a small bench. Walk to the top of the slope above the patch of oak. The baseline stake is 5 to 10 yards south along the rim. The baseline runs 165 degrees magnetic.



Map Name: Ogden

Township 6N, Range 1W, Section 23



Diagrammatic Sketch

UTM 4655540 N 422410 E

DISCUSSION

Trend Study No. 3-15

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This site was evaluated by the Project Leader and suspended due to no sign of wildlife use and the lack of important browse on the site. Text and data tables are included from the 1996 report.

The Ogden Canyon transect, like 3-14, is located in the foothills just above major housing, road and water developments on the Wasatch Front. It is just north of the mouth of Ogden Canyon at an elevation of 4,840 feet. The study samples a rubber rabbitbrush/grass range type situated on a narrow level bench surrounded by steeper oak-covered slopes. It is only representative of this bench which is about 100 feet wide and 500 feet long. The steeper slopes to the north are more open with greater amounts of Wyoming big sagebrush. In the past, the area was used moderately heavy by wintering deer and occasionally elk.

The soil is classified as the Kilburn-Francis association. The soil is moderately deep with an estimated effective rooting depth (see methods) of nearly 13 inches. Texture is a sandy loam with a slightly alkaline soil reaction (7.4 pH). Soil temperature, like the Uintah Junction site, is very high averaging over 81°F at a depth of about 15 inches. However, neither phosphorus or potassium are limiting. There is a fair buildup of litter under the vegetation, which helps prevent erosion. According to the USDA Davis-Weber soil survey (1968), the climax vegetation on this soil type and location is 80% perennial grasses, 10% forbs and 10% shrubs. However, annual grasses and weedy annual and perennial forbs dominate the site.

The principal browse species on the site consist of white rubber rabbitbrush and basin big sagebrush. Rabbitbrush currently numbers 700 plants/acre and accounts for 46% of the browse cover, while basin big sagebrush numbers 620 plants/acre and makes up 18% of the shrub cover. The rabbitbrush plants are large, vigorous and lightly hedged. The population appears stable. Basin big sagebrush increased in density between 1990 and 1996 from 266 plants/acre to 620. Comparing the age structure with the previous readings, it appears that the increase in density is primarily due to the much larger sample size used in 1996 giving a more accurate estimate of shrub densities. Use of the sagebrush was light in the past and is currently ;mostly light.

A few tall Utah serviceberry are found on the site. They have been high-lined to the height that deer can reach and now the shrubs average over 10 feet in height with all new growth unavailable. Some of the nearby oaks are tall and have also have been high-lined. Oak is not abundant on the site yet it dominates surrounding areas. The most numerous browse species is broom snakeweed, a low value invader, but it only contributes to 1% of the browse cover. Large clumps of pricklypear cactus are also present under the rabbitbrush.

The herbaceous understory is abundant. However, composition is poor. The grass component is dominated by cheatgrass which accounts for 54% of the grass cover. The next most abundant grass is bulbous bluegrass which makes up an additional 22% of the grass cover. Another undesirable grass found on the site is red three-awn, a warm season perennial increaser. Preferred perennial grasses that exist on the site, but in lower abundance, include bluebunch wheatgrass, Sandberg bluegrass, and sand dropseed. The bluebunch wheatgrass is large and especially valuable for watershed protection and forage.

Forbs are diverse but not particularly abundant. The most abundant perennial forbs include fleabane, Utah sweetvetch, and hairy goldaster.

1985 APPARENT TREND ASSESSMENT

As with most of the low elevation foothill winter range along the front, the biggest threat is development, roads and ORV use. If left undisturbed, the soil trend should remain stable. However, the vegetative trend appears to be downward. The preferred browse species are heavily hedged and becoming unavailable to deer. Broom snakeweed and other invaders appear to be increasing. Management options are limited due to land ownership and watershed concerns.

1990 TREND ASSESSMENT

The vegetative trend has not been as rapidly downward as thought in 1985. Desirable browse remains limited, but the diversity and frequency are unchanged. There is some reproduction of basin big sagebrush with the plants appearing vigorous. The shrubs are lightly to moderately hedged, except the heavily browsed serviceberry which occur in very low densities. Broom snakeweed declined in density. Prickly-pear cactus remains common. Perennial grasses dominate the understory. There were shifts in forb species composition, most notably with increases in hairy goldaster and Dyers woad, and decreases in other species. There is minimal erosion on the 20% slope of the lake terrace, but the steeper slopes have less vegetation and detectable erosion with a surface covered with rock and pavement.

TREND ASSESSMENT

soil - stable (3)

browse - slight decline (2)

herbaceous understory - slight decline (2), grasses are fairly stable, but the forbs are mostly decreasing with dyers woad increasing greatly

1996 TREND ASSESSMENT

Trend for soil is slightly up. Percent bare ground has declined and is currently at only 1%. Herbaceous vegetation is abundant, well dispersed and limits erosion. Trend for browse appears stable at this time. The density for white rubber rabbitbrush is comparable to 1985 estimates. The sharp decline in 1990 appears questionable due to the general lack of dead rabbitbrush plants (20 plants/acre). There may have been a sampling or identification problem that year. Reproduction of the rabbitbrush is limited but use is light, vigor normal and percent decadence low at 11%. Basin big sagebrush shows an increase in density (up 57%) since 1990. However, this change appears to be the result of the much larger sample used in 1996 giving better population estimates for shrubs. Density of mature plants has remained similar since 1990. Reproduction is adequate yet vigor is poor on 23% of the population. Percent decadence has risen to 19%. The appearance of oak brush in the sample in 1996 is also the result of the larger sample. Overall trend for the browse appears stable. Trend for the herbaceous understory is also stable. Sum of nested frequency for perennial grasses increased slightly, yet the composition appears to be deteriorating further toward annuals and weedy species. The largest increase in sum of nested frequency came from bulbous bluegrass. Sandberg bluegrass and sand dropseed have declined significantly in sum of nested frequency with each reading. Bluebunch wheatgrass has shown an increase in its nested frequency values, but still only contributes to 5% of the grass cover. Sum of nested frequency for perennial forbs has increased, although overall forbs are not abundant as they only contribute to 18% of the herbaceous cover.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - stable, but dominated by cheatgrass and weedy forbs (3)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
G	Agropyron spicatum	72	59	77	26	28	27	2.87
G	Aristida purpurea	_b 91	_a 55	_a 27	36	26	13	1.17
G	Bromus japonicus (a)	-	-	11	-	-	4	.07
G	Bromus tectorum (a)	-	-	309	-	-	89	17.21
G	Poa bulbosa	_a 34	_b 87	_c 158	14	35	51	6.95
G	Poa secunda	_b 120	_a 50	_a 47	47	25	19	.85
G	Sporobolus cryptandrus	_b 111	_{ab} 93	_a 60	48	49	29	2.50
Total for Annual Grasses		0	0	320	0	0	93	17.28
Total for Perennial Grasses		428	344	369	171	163	139	14.36
Total for Grasses		428	344	689	171	163	232	31.64
F	Alyssum alyssoides (a)	-	-	15	-	-	8	.06
F	Allium spp.	_a 2	_b 17	_a -	1	7	-	-
F	Ambrosia psilostachya	_b 36	_a -	_a 3	16	-	3	.19
F	Artemisia ludoviciana	_a 63	_b 35	_b 21	23	15	9	.41
F	Cynoglossum officinale	_a -	_a -	_b 45	-	-	23	.41
F	Erigeron bellidiastm (a)	-	-	37	-	-	16	1.68
F	Erodium cicutarium (a)	_b 18	_a -	_b 28	8	-	9	.76
F	Erigeron spp.	_b 37	_a -	_a -	18	-	-	-
F	Galium aparine (a)	-	-	2	-	-	1	.00
F	Gayophytum ramosissimum (a)	-	-	9	-	-	4	.02
F	Hackelia patens	-	-	2	-	-	1	.00
F	Hedysarum boreale	25	10	22	14	6	9	1.49
F	Heterotheca villosa	_a -	_c 20	_b 10	-	9	5	.98
F	Holosteum umbellatum (a)	-	-	9	-	-	4	.02
F	Isatis tinctoria	_a 3	_b 33	_b 30	1	16	15	.55
F	Lactuca serriola	-	1	-	-	1	-	-
F	Machaeranthera canescens	-	-	6	-	-	3	.01
F	Oenothera caespitosa	2	-	-	1	-	-	-
F	Phlox longifolia	-	-	6	-	-	2	.01
F	Polygonum douglasii (a)	-	-	13	-	-	7	.03
F	Tragopogon dubius	_b 11	_a -	_b 10	5	-	7	.09
F	Unknown forb-perennial	_b 42	_a -	_a 5	16	-	3	.06

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
	Total for Annual Forbs	18	0	113	8	0	49	2.59
	Total for Perennial Forbs	221	116	160	95	54	80	4.22
	Total for Forbs	239	116	273	103	54	129	6.81

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 15

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier utahensis	1	.63
B	Artemisia tridentata tridentata	24	2.71
B	Celtis reticulata	-	.38
B	Chrysothamnus nauseosus albicaulis	22	6.72
B	Chrysothamnus viscidiflorus viscidiflorus	1	.15
B	Gutierrezia sarothrae	15	.22
B	Opuntia spp.	25	1.66
B	Quercus gambelii	5	2.19
	Total for Browse	93	14.68

BASIC COVER --

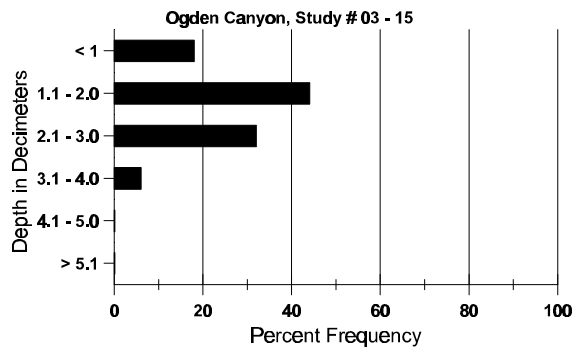
Herd unit 03 , Study no: 15

Cover Type	Nested Frequency	Average Cover %		
		'85	'90	'96
Vegetation	377	14.25	5.75	53.93
Rock	158	6.00	9.25	9.73
Pavement	132	2.00	14.50	3.67
Litter	383	54.25	66.00	53.44
Cryptogams	25	0	.25	.33
Bare Ground	75	23.50	4.25	.96

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 15, Ogden Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.8	81.2 (14.5)	7.4	73.9	12.1	14.0	1.3	12.7	86.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 15

Type	Quadrat Frequency '96
Rabbit	4
Elk	1
Deer	21

BROWSE CHARACTERISTICS --

Herd unit 03 , 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	'85	-	-	-	-	-	1	-	-	-	1	-	-	-	66	69	157	1
	'90	-	-	1	-	-	-	-	-	-	1	-	-	-	66	108	197	1
	'96	-	-	-	-	-	-	1	-	-	1	-	-	20	128	154	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'85		00%			100%			00%				+ 0%						
'90		00%			100%			00%				-70%						
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	-			
												'90	66		-			
												'96	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				
<i>Artemisia tridentata tridentata</i>																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	3	-	-	-	-	-	-	-	3	-	-	-	200	12	14	
	96	10	3	-	1	-	-	-	-	-	9	-	5	-	280	21	32	
D	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	3	1	1	-	-	-	-	-	4	-	2	-	120		6	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+ 0%							
'90		75%			00%			00%			+57%							
'96		19%			03%			23%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	266	Dec:	25%			
												'90	266		0%			
												'96	620		19%			
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666	23	31	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	30	41	
	96	30	-	-	-	-	-	-	-	-	30	-	-	-	600	31	58	
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			-30%							
'90		00%			00%			00%			+34%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	666	Dec:	0%			
												'90	465		29%			
												'96	700		11%			

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 viscidiflorus viscidiflorus																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	20	19	38	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'85	00%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	20		-			
Gutierrezia sarothrae																		
S	85	2	-	-	-	-	-	-	-	-	-	-	-	133			2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	6	-	-	-	-	-	-	-	-	-	-	-	120			6	
Y	85	9	-	-	-	-	-	-	-	-	-	-	-	600			9	
	90	2	-	-	-	-	-	-	-	-	-	-	-	133			2	
	96	38	-	-	-	-	-	-	-	-	-	-	-	760			38	
M	85	33	-	-	-	-	-	-	-	-	-	-	-	2200	8	6	33	
	90	5	-	-	1	-	-	-	-	-	-	-	-	400	13	16	6	
	96	25	-	-	-	-	-	-	-	-	-	-	-	500	9	9	25	
D	85	7	-	-	-	-	-	-	-	-	-	-	-	466			7	
	90	2	-	-	-	-	-	-	-	-	-	-	-	133			2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'85	00%			00%			06%			-80%							
	'90	00%			00%			10%			+47%							
	'96	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	3266	Dec:	14%			
												'90	666		20%			
												'96	1260		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				
Opuntia spp.																		
Y	85	8	-	-	-	-	-	-	-	-	7	-	-	1	533			8
	90	3	-	-	-	-	-	-	-	-	2	1	-	-	200			3
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	85	7	1	-	-	-	-	-	-	-	7	-	1	-	533	7	7	8
	90	6	-	-	-	-	-	-	-	-	3	1	2	-	400	5	9	6
	96	55	-	-	1	-	-	-	-	-	56	-	-	-	1120	8	18	56
D	85	8	-	-	-	-	-	-	-	-	5	-	1	2	533			8
	90	9	-	-	-	-	-	-	-	-	4	-	-	5	600			9
	96	5	-	-	-	-	-	-	-	-	-	-	-	5	100			5
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		04%			00%			21%			-25%							
'90		00%			00%			39%			+ 5%							
'96		00%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1599	Dec:	33%			
												'90	1200		50%			
												'96	1260		8%			
Quercus gambelii																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	24	-	-	-	-	-	-	-	-	24	-	-	-	480	38	44	24
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	580		-			

*****Suspended*****

Trend Study 3-16-96

Study site name: Maple Canyon.

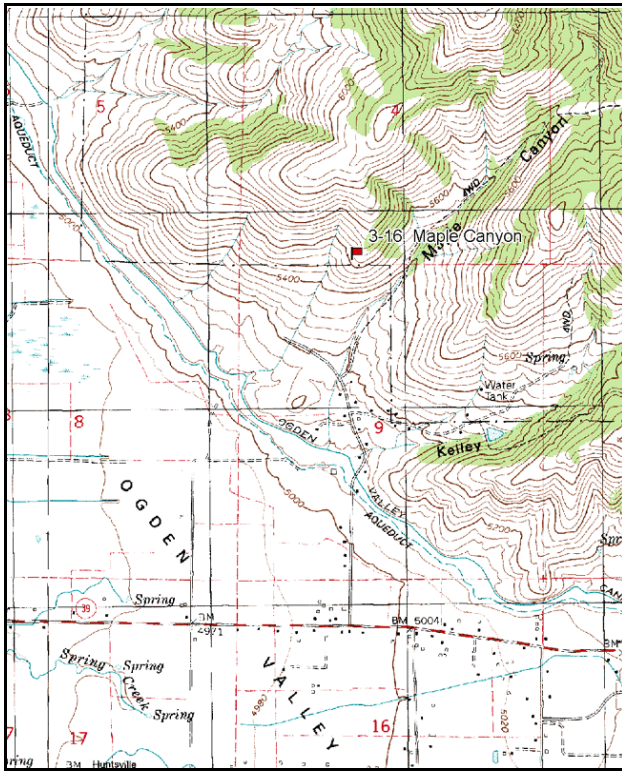
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 165 degrees magnetic.

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

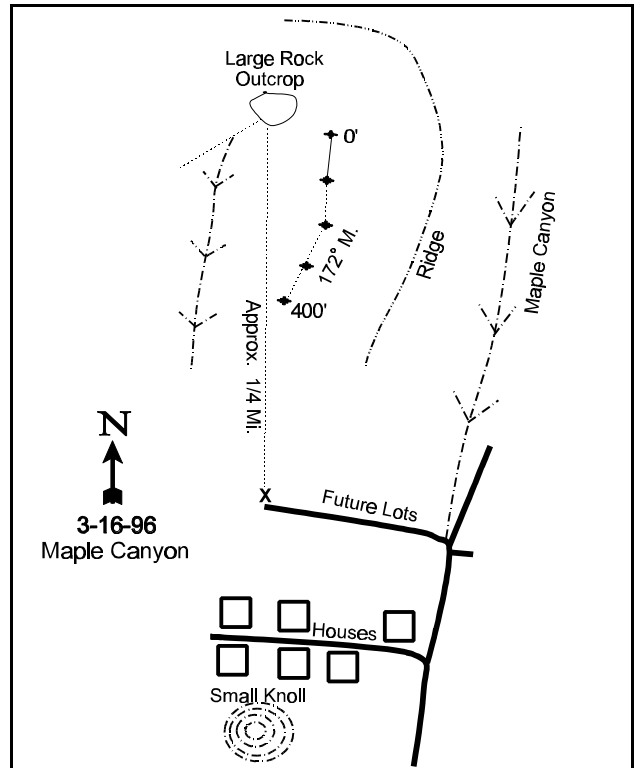
LOCATION DESCRIPTION

From the intersection where Highway U-39 turns 90 degrees and heads east towards Monte Cristo, continue 1.5 miles to mile marker 21 (9000 East). Turn left and proceed 1.1 miles to the mouth of the bowl-shaped draw adjacent to Maple Canyon. Walk up the draw to a 20 foot wide large flat rock located on the east side of the draw approximately half way to the top. From the rock go 35 feet at 135 degrees magnetic to the starting point of the baseline. The stake has a red browse tag #7033 attached. Stakes are three feet high rebar stakes. Rock outcrop is on the east side of the drainage about 1 ft. from the bottom of the draw. Most of this area is now being developed. In the future, access to the area may be restricted by homes being built.



Map Name: Brown's Hole

Township 6N, Range 2E, Section 4



Diagrammatic Sketch

UTM 4570667 N 438664 E

DISCUSSION

Trend Study No. 3-16

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. Development in the area is restricting access and decreasing the importance of this site as big game winter range. Also, the site burned prior to the 1996 reading and most of the key browse was lost. After consulting with the local biologist this site was not read in 2001. Text and data tables are included from the 1996 report.

The Maple Canyon study is on a privately-owned southwest facing slope within a small draw above Ogden Valley. It has a 40% slope and an elevation of 5,500 feet. The vegetation was originally dominated by mountain big sagebrush and grass. However, due to a fire that occurred sometime after 1990, it is now mostly cheatgrass, annual and perennial weeds. The ridge top has some big tooth maple. Land at the base of the hills is being developed for houses, except development on the site itself is doubtful due to the slope. The pellet group transect in nearby Maple Canyon showed a varying trend, with generally moderate deer use in the past (Jense et al. 1985). Use from grazing cattle also appeared moderate during the 1985 reading. Currently ('96), only a few deer pellet groups were found on the site.

The soil is fairly shallow and extremely rocky with an effective rooting depth (see methods) estimated at just over 10 inches. Rock are common on the surface (31% cover) and throughout the profile. Soil texture is a sandy clay loam with a neutral soil reaction (6.8 pH). A calcium carbonate layer is present at a depth of about 12 inches. Soil temperature is moderately high at 70.4°F at a depth of 10 inches. There are currently no erosion problems due to abundant protective ground cover.

The dominant species on this site used to be mountain big sagebrush and antelope bitterbrush. The sagebrush plants were vigorous and lightly browsed. Thirty-two percent of the population were seedling and young plants in 1985, but the majority were mature plants under two feet tall. The most preferred browse plant was bitterbrush. Most bitterbrush were heavily hedged with little reproduction noted. Many plants were decadent because of past heavy use (67%) during the early 1980's. A fire burned through the area some time after the 1990 reading. Only a few maple, chokecherry and Wood's rose remain. These species occur in very small numbers. Some seedling, young and one mature sagebrush were found on the site. The nearest existing mature sagebrush stand is about 300 feet down slope.

Escape and thermal cover are nonexistent on the study site, but the rather dense stand of bigtooth maple (*Acer grandidentatum*) over the ridge can provide good cover during the warm season. The available parts of these large trees have been heavily utilized in the past. Point-center quarter data from 1996 estimate 8 trees/acre with an average diameter of 4.2 inches.

The herbaceous understory was previously dominated by perennial forbs. Large arrowleaf balsamroot and Louisiana sagebrush plants were abundant. After the fire, the site is now dominated by annuals and weeds, with perennial grasses being nearly absent. Cheatgrass and Japanese brome account for 98% of the grass cover, while weedy forbs, whitetop, mustard, dyers woad and flannel mullein, make up almost 40% of the forb cover. Some of the more desirable forbs found in 1985 and 1990 still occur but with reduced frequency.

1985 APPARENT TREND ASSESSMENT

The soil trend appears stable because of good litter and vegetative cover. The lack of reproduction and heavy hedging on the bitterbrush could be a downward trend indicator. However, the sagebrush along with the various forbs will continue to provide adequate forage. Cattle may be responsible for the damage to the bitterbrush. They should be removed from the area when they start feeding heavily on it.

1990 TREND ASSESSMENT

There is good vigor and reproduction of big sagebrush on this privately owned winter range. Sagebrush density slightly increased. Sagebrush receives continued moderate use. The bitterbrush is heavily hedged. These large plants appear increasingly decadent with no signs of reproduction at this time. Grasses are still limited, but several species of valuable forbs remain common. Dyers woad has invaded the area. Rocks comprise 25% of the ground surface, yet vegetative and litter cover is generally adequate to hold the soil.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly downward (2)

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 12% to 3%. Although litter cover has declined, protective ground cover remains adequate to prevent erosion. Unfortunately, most of the herbaceous ground cover comes from annual grasses which provided abundant fine fuels for another destructive fire. The browse trend is down and the preferred browse, mountain big sagebrush, has been nearly eliminated from the immediate site. Currently, only small numbers of Wood's rose, maple, and chokecherry remain on the site. Some seedling and young sagebrush were inventoried, but it remains a question if these small plants can effectively compete with the overly abundant herbaceous understory, dominated by annuals and weeds. Trend for the herbaceous understory is also down. Sum of nested frequency for perennial grasses has declined and the remaining species produce less than 1% cover. Sum of nested frequency for perennial forbs has increased primarily due to a very large increase in the sum of nested frequency for prickly lettuce and hoary aster. The previously dominant perennial forbs, Louisiana sagebrush and arrowleaf balsamroot, are still abundant yet with significantly reduced frequency values. Sites like this one and the site at Perry Basin should have been rehabilitated immediately after burning to help avoid the invasion of cheatgrass, noxious weeds and weedy forbs.

TREND ASSESSMENT

soil - up (5)

browse - down and nearly eliminated by fire (1)

herbaceous understory - down and dominated by annual grasses and weedy forbs (1)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 16

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
G	Agropyron smithii	2	-	-	1	-	-	-
G	Agropyron spicatum	ab23	b33	a16	10	15	8	.29
G	Bromus japonicus (a)	-	-	287	-	-	92	6.04
G	Bromus tectorum (a)	-	-	352	-	-	99	20.11
G	Poa bulbosa	-	-	2	-	-	1	.00
G	Poa fendleriana	c84	b62	a1	33	27	1	.00
G	Poa secunda	-	-	10	-	-	3	.30
Total for Annual Grasses		0	0	639	0	0	191	26.15
Total for Perennial Grasses		109	95	29	44	42	13	0.60
Total for Grasses		109	95	668	44	42	204	26.76
F	Achillea millefolium	5	5	3	3	3	3	.04
F	Agoseris glauca	-	8	-	-	4	-	-
F	Allium spp.	b15	a-	ab6	8	-	4	.02
F	Ambrosia psilostachya	-	-	7	-	-	3	.45
F	Artemisia ludoviciana	b89	ab66	a47	32	26	21	2.04
F	Astragalus beckwithii	-	-	2	-	-	1	.00
F	Balsamorhiza sagittata	b84	b70	a28	36	32	13	7.83
F	Cardaria draba	a-	a-	b54	-	-	20	3.86
F	Calochortus nuttallii	-	-	6	-	-	2	.01
F	Cirsium spp.	-	3	-	-	1	-	-
F	Collomia linearis (a)	-	-	35	-	-	17	.11
F	Collinsia parviflora (a)	-	-	10	-	-	4	.02
F	Crepis acuminata	-	-	2	-	-	1	.15
F	Cryptantha spp.	a-	a-	b79	-	-	32	.26
F	Descurainia pinnata (a)	-	-	100	-	-	38	1.33
F	Draba spp. (a)	-	-	77	-	-	27	.31
F	Erodium cicutarium (a)	-	-	40	-	-	17	.38
F	Erigeron strigosus	-	-	-	-	-	-	.04
F	Galium aparine (a)	-	-	2	-	-	1	.00
F	Gayophytum ramosissimum (a)	-	-	6	-	-	2	.01
F	Holosteum umbellatum (a)	-	-	73	-	-	27	.26
F	Isatis tinctoria	a-	b11	b17	-	6	8	1.31
F	Lactuca serriola	a-	a2	b176	-	1	68	1.59
F	Lepidium spp. (a)	-	-	7	-	-	3	.01

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
F	Lithospermum spp.	-	-	4	-	-	1	.03
F	Lupinus argenteus	6	1	3	2	1	1	.15
F	Machaeranthera spp	-	-	105	-	-	45	.96
F	Microsteris gracilis (a)	-	-	3	-	-	1	.00
F	Phlox longifolia	_b 14	_a 3	_{ab} 7	6	1	3	.04
F	Polygonum douglasii (a)	-	-	4	-	-	1	.00
F	Rumex spp.	3	-	-	1	-	-	-
F	Sisymbrium altissimum (a)	_b 44	_a 2	_c 72	17	2	32	.60
F	Stanleya viridiflora	4	3	-	2	1	-	-
F	Tragopogon dubius	_a 11	_b 27	_a 9	4	16	3	.02
F	Unknown forb-perennial	_b 17	_a 3	_a -	6	1	-	-
F	Verbascum thapsus	-	-	7	-	-	3	1.18
F	Vicia americana	_a -	_a -	_b 13	-	-	6	.13
Total for Annual Forbs		44	2	429	17	2	170	3.05
Total for Perennial Forbs		248	202	575	100	93	238	20.14
Total for Forbs		292	204	1004	117	95	408	23.20

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 16

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Acer grandidentatum	1	.38
B	Artemisia tridentata vaseyana	9	.09
B	Gutierrezia sarothrae	1	-
B	Prunus virginiana	3	.93
B	Purshia tridentata	0	-
B	Rosa woodsii	1	.15
Total for Browse		15	1.55

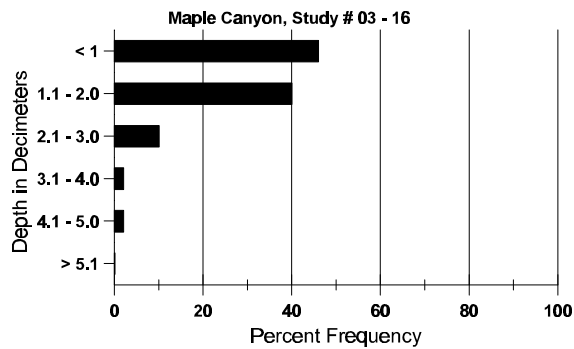
BASIC COVER --
Herd unit 03 , Study no: 16

Cover Type	Nested Frequency '96	Average Cover %		
		'85	'90	'96
Vegetation	380	6.50	6.25	50.18
Rock	321	20.75	23.75	30.76
Pavement	115	1.00	1.00	.65
Litter	384	54.25	57.00	42.73
Cryptogams	3	.50	0	.03
Bare Ground	145	17.00	12.00	2.88

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 16, Maple Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.1	70.4 (10.2)	6.8	52.6	23.4	24.0	2.9	27.6	272.0	.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 16

Type	Quadrat Frequency '96
Deer	6

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 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>Acer grandidentatum</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Artemisia tridentata vaseyana</i>																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
Y	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	90	4	3	-	-	-	-	-	-	-	7	-	-	-	466		7	
	96	9	-	-	2	-	-	-	-	-	11	-	-	-	220		11	
M	85	18	3	-	-	-	-	-	-	-	21	-	-	-	1400	19	19	21
	90	-	24	-	-	-	-	-	-	-	24	-	-	-	1600	22	26	24
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
D	85	2	1	-	-	-	-	-	-	-	1	2	-	-	200		3	
	90	1	6	-	-	-	-	-	-	-	6	-	1	-	466		7	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	540		27	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		12%			00%			00%			+11%							
'90		87%			00%			03%			-91%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	2266	Dec:	9%			
												'90	2532		18%			
												'96	240		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				
<i>Gutierrezia sarothrae</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9	16	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Prunus virginiana</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'90		00%			00%			00%										
'96		25%			00%			25%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'90	0		0%			
												'96	80		25%			

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	85	-	2	2	-	-	-	-	-	-	4	-	-	-	266	28	48	4
	90	-	1	1	-	-	-	-	-	-	2	-	-	-	133	35	46	2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	85	-	-	2	-	-	-	-	-	-	1	-	1	-	133			2
	90	-	1	3	-	-	-	-	-	-	4	-	-	-	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		33%			67%			17%			+ 0%							
'90		33%			67%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	399	Dec:	33%				
											'90	399		67%				
											'96	0		0%				
Rosa woodsii																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	21	47	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-				
											'90	0		-				
											'96	20		-				

Trend Study 3-17-01

Study site name: Middle Fork.

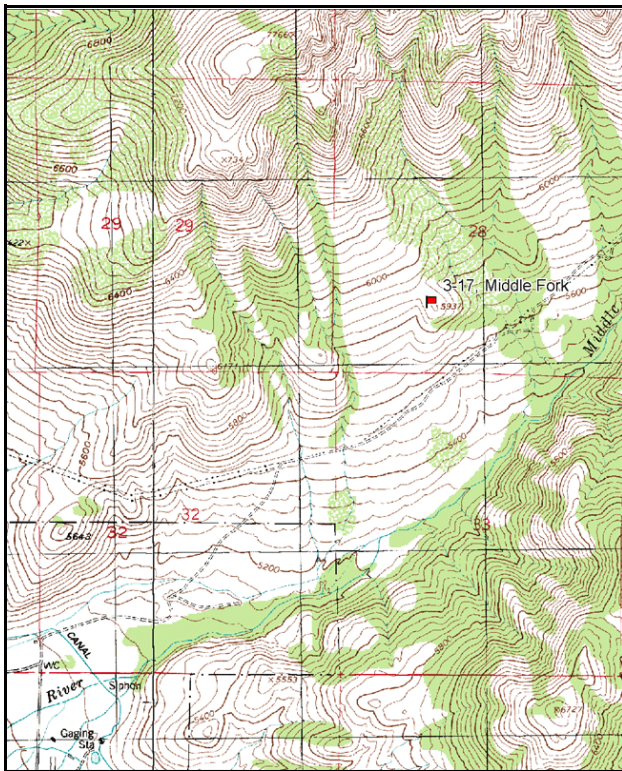
Vegetation type: Low Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

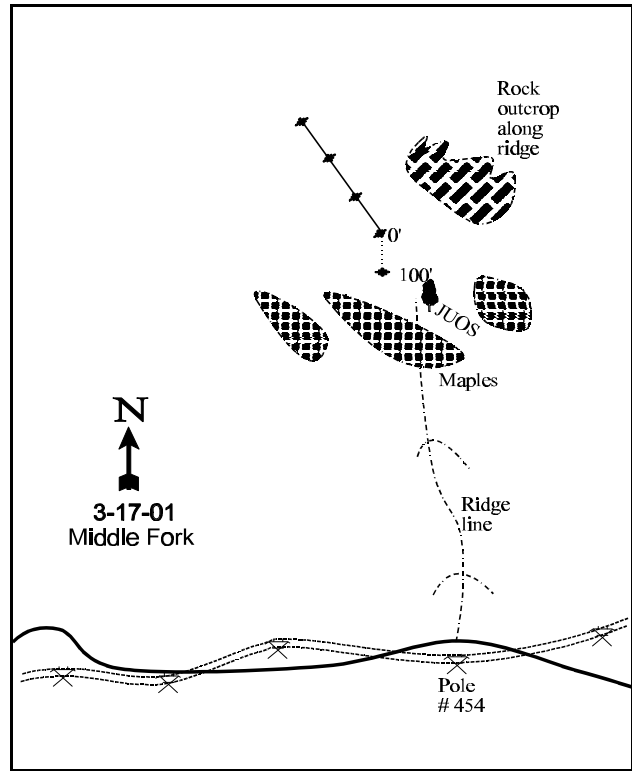
LOCATION DESCRIPTION

From 5500 East and 2200 North in Eden, proceed 0.4 miles to a bend. Continue east, 1.9 miles further, to where the main road bends to the southeast. Continue straight for 1.9 miles to the state land (middle fork wildlife management area). From the sign, drive 0.1 miles to a three way intersection. Stay left and go through the gate. Continue east 0.05 miles to a fork. Stay left. From the fork continue 0.05 miles to a creek. Cross the creek and continue down a ripped rough road which is now a horse trail for 0.8 miles, going under power lines, to pole #454. Park here and walk up the ridge line beyond the maples to a lone juniper. The 100-foot stake of the frequency baseline is 30 paces away at a bearing of 337 degrees magnetic.



Map Name: Brown's Hole

Township 7N, Range 2E, Section 28



Diagrammatic Sketch

UTM 4573300 N 438694 E

DISCUSSION

Trend Study No. 3-17

The Middle Fork study samples a low sagebrush/grass community overlooking the Middle Fork of the Ogden River. The study lies on a rocky, 20% slope with a southwest aspect. Elevation of the study site is 5,900 feet. The site lies within the Middle Fork Wildlife Management Area owned by the DWR. Although it was heavily grazed to some extent in the past, there are no recent signs of livestock use. In 1996, quadrat frequency of elk pellet groups was moderate with that of deer being light. Quadrat frequency of both elk and deer pellets declined in 2001. Pellet group transect data taken in 2001 estimated 7 elk days use/acre (18 edu/ha) and 15 deer days use/acre (36 ddu/ha). Moose and grouse pellets were also identified on the site in 2001.

The soil is shallow and very rocky with large rocks and rock outcrops abundant on the surface. Soil texture is a clay loam, with a slightly acidic soil reaction (pH of 6.4). Estimated effective rooting depth (see methods) is shallow at less than 9 inches. Due to the rocky nature of the site, average soil temperature was high at 76°F as the soil could only be probed to about 9 inches in depth. An erosion condition class conducted in 2001 determined soils to be stable with minimal erosion.

The most abundant browse is low sagebrush (*Artemisia arbuscula*) which accounted for about 80% of the shrub cover in 1996 and 2001. Mature plants average about one foot in height and show mostly light with some moderate utilization. In 1996 and 2001, recruitment from young plants was high, averaging 20%. Average leader growth is just over 1 inch in 2001.

Other more valuable species in terms of preference are mountain big sagebrush, antelope bitterbrush and serviceberry. However, these species are found in small numbers and are not abundant enough to be considered key species. High competition from a dense weedy understory makes reproduction of these species very difficult, especially with the current drought. They have been moderately to heavily hedged in the past, yet current use is light to moderate. A spreading, but still open stand of bigtooth maple provides fair resting cover, but thermal cover would be limited on the site in winter.

Grasses are moderately abundant and diverse. The most common species is bulbous bluegrass, providing 50% of the grass cover in 1996, increasing to 58% in 2001. Bulbous bluegrass significantly increased in nested frequency and doubled in cover in 2001. Bluebunch wheatgrass also increased in nested frequency and cover in 2001. Cheatgrass and Japanese brome are found on the site and produced 15% of the grass cover in 1996. However, due to drought for the past 2 years these species decreased significantly in nested frequency in 2001. Other somewhat common perennial grasses include Sandberg bluegrass and subalpine needlegrass. Forbs are also fairly abundant and diverse. Yet, the composition is poor with pacific aster, western yarrow, yellow salsify, and mulesears wyethia providing the majority of the forb cover.

1985 APPARENT TREND ASSESSMENT

Overall range trend appears stable. There is a variety of browse and herbaceous forage available. The lack of reproduction of the sagebrush and bitterbrush is the one troubling factor.

1990 TREND ASSESSMENT

Sagebrush canopy cover on this study, comprised of low sagebrush and a smaller amount of mountain big sagebrush, averages almost 15%. The low sagebrush population is relatively stable in terms of numbers, but the percentage of decadent plants has increased to 53%. This could be explained by the very high densities in conjunction with the extended drought. Some areas have an abundance of seedlings. No young mountain big

sagebrush could be identified, as the population also shows an increase in the percentage of decadent shrubs. The sagebrush display average vigor and generally moderate hedging. Bitterbrush is uncommon, but several young plants were encountered. The oaks on top of the hill are kept short by heavy use. Grasses are dense, including several species of annual bromes. Sixteen species of perennial forbs were encountered. There is no sign of soil erosion.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous - stable, but poor composition (3)

1996 TREND ASSESSMENT

Trend for soil is up with a decline in percent bare ground from 6% to <1%. Vegetation and litter cover are abundant, well dispersed, and adequately protect the soil from erosion. Trend for low sagebrush is up slightly. However, density has declined slightly along with percent decadence which has also declined from 53% to 11%. Recruitment is currently excellent with a biotic potential (proportion of seedlings) of 19%, and 21% of the population consists of young plants. Utilization is light to moderate. The more preferred mountain big sagebrush and antelope bitterbrush occur in very small numbers. Some of the change in density in these species is the result of the much larger, more representative sample used in 1996. The lack of dead plants for bitterbrush suggest that the previous samples overestimated its density. This also appears to be the case for mountain big sagebrush which declined by over 200 plants/acre, but only 40 dead plants/acre were estimated. Both of these species seem to be just hanging on at this site and without better reproduction in the future may further decline in their respective densities. The herbaceous understory is abundant but composition is very poor. Sum of nested frequency for perennial grasses has remained similar to 1990, yet the preferred bluebunch wheatgrass has declined significantly in sum of nested frequency. Sandberg bluegrass has also declined significantly in nested frequency, while bulbous bluegrass has increased dramatically from a quadrat frequency of only 14% in 1990 to 81% in 1996. Cheatgrass and Japanese brome are also common. Sum of nested frequency for perennial forbs has increased since 1990. However, most of the increase comes from a significant 15-fold increase in sum of nested frequency for yellow salsify (11 to 169). Currently, western yarrow, pacific aster, yellow salsify and mulesears wyethia provide 72% of the forb cover. Trend for the herbaceous understory is considered slightly down do to the undesirable compositional changes.

TREND ASSESSMENT

soil - up (5)

browse - up slightly for low sagebrush (4)

herbaceous - down slightly with a poor composition of annuals and weeds (2)

2001 TREND ASSESSMENT

Trend for soil is stable. Soils are stable with minimal erosion due to abundant protective cover from vegetation and litter. Trend for browse is stable. The most abundant species, low sagebrush, has a high but stable proportion of young plants in the population. Percent decadency remains stable, vigor is generally good, and use remains light to moderate. More preferred species such as mountain big sagebrush and bitterbrush remain in very low densities without much of a chance of expanding in the future. High competition from the abundant and weedy understory makes reproduction of these preferred, low density species very difficult, especially in the current drought. Trend for the herbaceous understory is stable. Sum of nested frequency for herbaceous perennials remained identical to 1996 levels. Sum of nested frequency for perennial grasses significantly increased with the increase in bulbous bluegrass and Sandberg bluegrass. Sum of nested frequency for perennial forbs decreased. Annual species, especially grasses, decreased in sum of

nested frequency due to drought. The composition remains less than desirable with a high proportion of weedy species being present.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 17

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	-	-	10	8	-	-	4	5	.09	.07
G	Agropyron spicatum	bc233	c254	a173	ab216	79	88	68	82	4.50	9.06
G	Agropyron trachycaulum	-	-	-	6	-	-	-	3	-	.13
G	Bromus japonicus (a)	-	-	b211	a42	-	-	70	20	1.26	.17
G	Bromus tectorum (a)	-	-	b132	a53	-	-	41	23	1.42	.60
G	Danthonia californica	-	-	-	1	-	-	-	1	-	.03
G	Dactylis glomerata	a-	a-	a-	b15	-	-	-	5	-	1.55
G	Koeleria cristata	-	-	2	-	-	-	1	-	.00	-
G	Melica bulbosa	b42	ab26	ab28	a8	18	11	11	4	.20	.07
G	Poa bulbosa	a4	a30	b265	c315	1	14	81	92	9.23	20.61
G	Poa pratensis	-	-	-	-	-	-	-	-	-	.00
G	Poa secunda	155	239	32	143	58	85	14	59	.53	3.48
G	Stipa columbiana	a1	a1	b43	a-	1	1	16	-	1.00	-
Total for Annual Grasses		0	0	343	95	0	0	111	43	2.69	0.77
Total for Perennial Grasses		435	550	553	712	157	199	195	251	15.58	35.03
Total for Grasses		435	550	896	807	157	199	306	294	18.27	35.81
F	Achillea millefolium	ab9	a3	b19	ab9	5	1	9	4	.31	.16
F	Agoseris glauca	ab20	b33	ab21	a11	11	19	11	7	.13	.07
F	Allium spp.	b38	a-	a-	a3	20	-	-	1	-	.00
F	Arabis spp.	-	-	1	-	-	-	1	-	.00	-
F	Artemisia ludoviciana	b71	b45	a5	a11	25	20	2	5	.06	.33
F	Astragalus beckwithii	-	-	3	-	-	-	1	-	.03	-
F	Aster chilensis	b69	b70	a21	b46	23	24	8	18	.92	2.21
F	Balsamorhiza sagittata	b18	a6	a1	a4	9	4	1	2	.21	.45
F	Borago officinalis	8	-	-	-	3	-	-	-	-	-
F	Calochortus nuttallii	5	2	-	-	4	1	-	-	-	-
F	Castilleja spp.	-	4	1	2	-	1	1	2	.03	.06
F	Cirsium spp.	10	10	5	3	6	5	3	1	.04	.03

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
F	<i>Collomia linearis</i> (a)	-	-	_b 23	_a 10	-	-	10	5	.71	.05
F	<i>Comandra pallida</i>	7	4	7	-	3	4	3	-	.18	-
F	<i>Collinsia parviflora</i> (a)	-	-	1	5	-	-	1	4	.00	.02
F	<i>Crepis acuminata</i>	3	-	-	-	1	-	-	-	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Draba</i> spp. (a)	-	-	41	45	-	-	14	19	.12	.14
F	<i>Eriogonum cernuum</i> (a)	-	-	-	-	-	-	-	-	-	-
F	<i>Erodium cicutarium</i> (a)	-	-	_a 1	_b 21	-	-	1	11	.00	.34
F	<i>Erigeron strigosus</i>	-	-	11	5	-	-	5	3	.22	.01
F	<i>Galium aparine</i> (a)	-	-	1	-	-	-	1	-	.00	.00
F	<i>Grindelia squarrosa</i>	-	-	4	-	-	-	1	-	.03	-
F	<i>Hackelia patens</i>	_a -	_b 26	_{ab} 7	_a 4	-	9	4	3	.19	.06
F	<i>Holosteum umbellatum</i> (a)	-	-	14	-	-	-	4	-	.16	-
F	<i>Lappula occidentalis</i> (a)	-	-	-	2	-	-	-	1	-	.03
F	<i>Lactuca serriola</i>	-	9	2	1	-	3	1	1	.00	.00
F	<i>Lomatium dissectum</i>	_a -	_a 2	_b 33	_b 31	-	1	15	16	.37	1.47
F	<i>Lupinus argenteus</i>	1	5	3	4	1	3	1	2	.15	.63
F	<i>Machaeranthera</i> spp	-	-	57	-	-	-	22	-	.23	-
F	<i>Microsteris gracilis</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Phlox longifolia</i>	-	-	-	1	-	-	-	1	-	.00
F	<i>Polygonum douglasii</i> (a)	-	-	14	-	-	-	7	-	.03	-
F	<i>Senecio integerrimus</i>	3	3	-	-	1	1	-	-	-	-
F	<i>Taraxacum officinale</i>	_a -	_a -	_{ab} 8	_b 12	-	-	4	5	.08	.02
F	<i>Tragopogon dubius</i>	_a 4	_a 11	_c 169	_b 81	2	7	71	36	2.69	1.62
F	Unknown forb-perennial	_b 29	_a -	_a -	_a -	15	-	-	-	-	-
F	<i>Viola</i> spp.	-	-	-	1	-	-	-	1	-	.00
F	<i>Wyethia amplexicaulis</i>	_a 14	_a 10	_b 44	_b 35	5	5	18	18	3.80	3.68
Total for Annual Forbs		0	0	95	87	0	0	38	42	1.04	0.61
Total for Perennial Forbs		309	243	422	264	134	108	182	126	9.72	10.86
Total for Forbs		309	243	517	351	134	108	220	168	10.77	11.47

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 17

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Acer grandidentatum	2	1	1.25	1.70
B	Artemisia arbuscula	92	88	11.80	13.00
B	Artemisia tridentata vaseyana	7	1	1.49	.38
B	Gutierrezia sarothrae	9	17	.26	.53
B	Purshia tridentata	1	1	-	-
Total for Browse		111	108	14.81	15.62

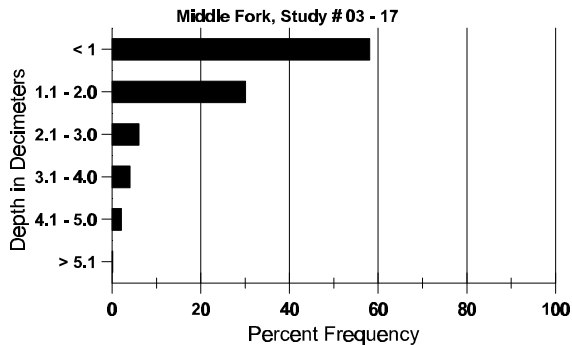
BASIC COVER --
Herd unit 03 , Study no: 17

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'85	'90	'96	'01
Vegetation	382	365	9.25	12.00	48.04	56.20
Rock	264	224	14.50	15.75	19.16	19.40
Pavement	136	127	2.75	9.50	2.04	2.82
Litter	389	357	55.50	56.50	57.15	45.01
Cryptogams	83	82	1.00	.50	.52	1.67
Bare Ground	46	90	17.00	5.75	.34	2.26

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 17, Middle Fork

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.8	7602 (9.1)	6.4	38.6	32.4	29.0	3.6	13.8	105.6	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 17

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	1	-	-	-
Elk	25	9	96	7 (18)
Deer	8	4	191	15 (36)
Cattle	-	1	-	-

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 17

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>Acer grandidentatum</i>									
S	85	3	-	-	-	-	-	3	3
	90	-	-	-	-	-	-	0	0
	96	-	-	-	-	-	-	0	0
	01	-	-	-	-	-	-	0	0
Y	85	14	-	-	-	-	-	933	14
	90	6	-	2	-	2	-	666	10
	96	1	-	-	-	-	-	20	1
	01	-	-	-	-	-	-	0	0
M	85	1	-	-	-	-	-	66	14 10
	90	-	-	-	-	-	-	0	-
	96	1	-	-	-	-	-	20	-
	01	1	-	-	-	-	-	20	-
X	85	-	-	-	-	-	-	0	0
	90	-	-	-	-	-	-	0	0
	96	-	-	-	-	-	-	0	0
	01	-	-	-	-	-	-	20	1
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>				
'85		00%	00%	00%	-33%				
'90		00%	00%	00%	-94%				
'96		00%	00%	00%	-50%				
'01		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'85	999	Dec:	-	
					'90	666		-	
					'96	40		-	
					'01	20			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3				4
Amelanchier utahensis																	
Y	85	-	4	3	-	-	-	-	-	-	7	-	-	-	466		7
	90	-	8	-	-	-	-	-	-	-	8	-	-	-	533		8
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
D	85	-	-	1	-	-	1	-	-	-	1	-	-	1	133		2
	90	-	3	-	1	-	-	-	-	-	3	-	-	1	266		4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'85		44%				56%				11%				+25%			
'90		92%				00%				08%							
'96		00%				00%				00%							
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'85	599	Dec:	22%		
												'90	799		33%		
												'96	0		0%		
												'01	0		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				
Artemisia arbuscula																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	63	-	-	-	-	-	-	-	-	63	-	-	-	1260		63	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	16	-	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	70	1	-	-	-	-	-	-	-	66	-	5	-	1420		71	
	01	80	-	-	-	-	-	-	-	-	80	-	-	-	1600		80	
M	85	77	-	-	-	-	-	-	-	-	67	-	10	-	5133	10 14	77	
	90	21	25	4	-	-	-	-	-	-	50	-	-	-	3333	12 18	50	
	96	132	88	2	-	-	-	-	-	-	203	-	19	-	4440	13 21	222	
	01	239	49	2	3	-	-	-	-	-	287	1	5	-	5860	12 26	293	
D	85	10	-	-	-	-	-	-	-	-	6	-	4	-	666		10	
	90	29	25	3	-	-	-	-	-	-	35	-	-	22	3800		57	
	96	15	23	-	-	-	-	-	-	-	24	-	8	6	760		38	
	01	42	12	-	1	-	-	-	-	-	38	-	3	14	1100		55	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	780		39	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	500		25	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			14%			+ 5%							
'90		47%			06%			20%			- 8%							
'96		34%			.60%			11%			+23%							
'01		14%			.46%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	6865	Dec:	10%			
												'90	7199		53%			
												'96	6620		11%			
												'01	8560		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				
Artemisia tridentata vaseyana																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400	26	19	6
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	29	41	4
	96	6	3	-	-	-	-	-	-	-	9	-	-	-	180	26	47	9
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	-	4
D	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	2	1	-	-	-	-	-	-	-	2	-	-	1	200			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			-13%							
'90		14%			00%			14%			-57%							
'96		30%			00%			00%			-40%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	533	Dec:	25%			
												'90	466		43%			
												'96	200		0%			
												'01	120		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>Gutierrezia sarothrae</i>																			
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	96	46	-	-	-	-	-	-	-	46	-	-	-	920		46			
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	96	10	-	-	-	-	-	-	-	10	-	-	-	200		10			
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
M	85	2	-	-	-	-	-	-	-	2	-	-	-	133	12	9	2		
	90	1	-	-	-	-	-	-	-	1	-	-	-	66	9	11	1		
	96	10	-	-	-	-	-	-	-	10	-	-	-	200	9	11	10		
	01	38	-	-	-	-	-	-	-	37	1	-	-	760	9	25	38		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'85		00%		00%		00%		-50%											
'90		00%		00%		00%		+84%											
'96		00%		00%		00%		+47%											
'01		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'85	133	Dec:	-						
										'90	66		-						
										'96	400		-						
										'01	760		-						
<i>Purshia tridentata</i>																			
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	90	1	1	-	-	-	-	-	-	2	-	-	-	133		2			
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
M	85	-	-	1	-	-	-	-	-	1	-	-	-	66	8	24	1		
	90	1	-	-	-	-	-	-	-	1	-	-	-	66	11	31	1		
	96	-	2	-	-	-	-	-	-	2	-	-	-	40	20	54	2		
	01	-	-	-	-	1	-	-	-	1	-	-	-	20	14	55	1		
D	85	-	-	-	-	1	-	-	-	1	-	-	-	66		1			
	90	1	1	-	-	-	-	-	-	1	-	-	1	133		2			
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'85		00%		100%		00%		+60%											
'90		40%		00%		20%		-88%											
'96		100%		00%		00%		-50%											
'01		100%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'85	132	Dec:	50%						
										'90	332		40%						
										'96	40		0%						
										'01	20		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			
Quercus gambelii																	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
	'85	00%			00%			00%									
	'90	00%			00%			00%									
	'96	00%			00%			00%									
	'01	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'90	0		-		
												'96	0		-		
												'01	0		-		

Trend Study 3-18-01

Study site name: Geertsen Canyon.

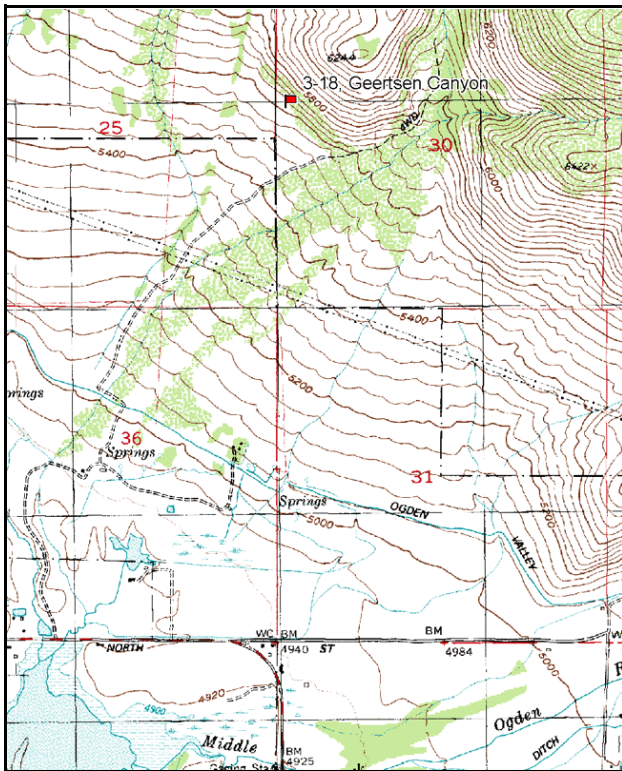
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 161 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (71ft), line 4 (59ft). Rebar: belt 1 on 1 ft., belt 2 on 0 ft., belt 3 on 2 ft., no rebar on belt 4, belt 5 on 3 ft.

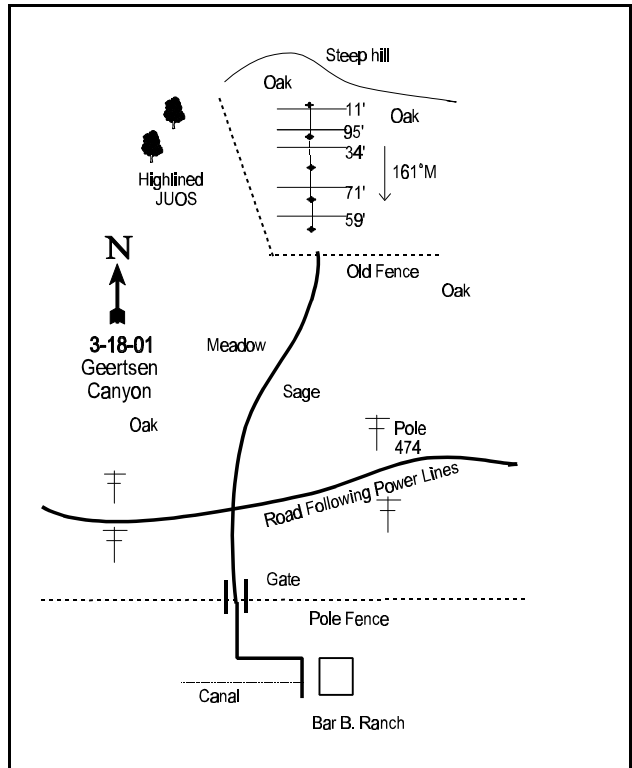
LOCATION DESCRIPTION

Contact Bill Hadlock before doing this site. From the intersection of 5500 East and 2200 North in Eden, go south for 0.35 miles, then turn left and go 0.75 miles east to the Huntsville Stake Center. Continue east 0.2 miles to the gate of Bar B Ranch. Turn left through the gate and go 0.9 miles north up the ranch road past a farm house on the left to another gate. Park here and walk through this gate 0.2 miles to a road along a canal. Turn left and walk 0.1 miles north to a dirt road, then turn right and go 0.55 miles to the high tension power lines. Just to the east is power pole # 474. From pole 474, walk 1/3 of a mile at 11 degrees magnetic to the 0-foot baseline stake. The 0-foot baseline is marked by a 4-foot rebar stake (tagged #7026) located 100 feet down from the oak edge and 100 feet southwest of a large maple. The baseline runs 161 degrees magnetic.



Map Name: Huntsville

Township 7N, Range 2E, Section 30



Diagrammatic Sketch

UTM 4573966 N 435053 E

DISCUSSION

Trend Study No. 3-18

The Geertsen Canyon study samples a mountain big sagebrush/grass community located on a hillside north of the mouth of Geertsen Canyon. This study is on the Wolf Creek conservation easement that is managed by the DWR for wildlife and recreation. The site lies on a moderately steep, 25% slope with a southwest aspect. Elevation is approximately 5,500 feet. The area has been heavily grazed by horses and cattle in the past, but current livestock use is light. Livestock use was estimated at 3 cow days use/acre (7 cdu/ha) from pellet group transect data taken in 2001. The Geertsen Hollow area is known for wintering concentrations of deer. The permanent nearby pellet group transect has measured high levels of use in the past. The average from 1980-85 was 39 deer days use/acre (97 ddu/ha) the highest on the herd unit (Jense et al. 1985). Two deer antlers and one large elk antler were found on the site during the 1985 reading. In 1996, elk pellets were sampled in moderate amounts (27% quadrat frequency), while that of deer showed low quadrat frequencies (4%). In 2001, pellet group transect data estimated 13 elk days use/acre (31 edu/ha) and 15 deer days use/acre (36 ddu/ha). Wild turkeys were sited on the hike into the study in 2001.

Soils in the area are formed from a weathered conglomerate of sandstone and quartzite. The soil is deep and well-drained but permeability is slow due to clay in the subsoil (USDA 1980). Soils at the site are extremely rocky on the surface and throughout the profile. Due to the rocky nature of the soil, effective rooting depth (see methods) was estimated at less than 6 inches. Soil on the site has a sandy clay loam to clay loam texture and is slightly acidic in reactivity (pH of 6.2). The hazard of erosion is high if unprotected, but the area has an adequate covering of vegetation and litter. An erosion condition classification determined soils to be in stable condition in 2001. Rocks and pavement make up 14% of the surface cover. Due to the shallow, rocky nature of the soil profile, soil temperature was extremely high at nearly 80°F in 1996. Temperatures this high often indicate vulnerability to weed invasion as well as difficulty in shrub reproduction. This site suffers from both of these problems.

Mountain big sagebrush is the only important browse species present on this site. Density of mountain big sagebrush was estimated at 1,860 plants/acre in 1996, which is relatively sparse for mountain big sagebrush. In 2001, density decreased to an estimated 1,020 plants/acre. Most of this decrease is due to the loss of young plants in the population since 1996. Young sagebrush plants were very abundant in 1996 (1,140 plants/acre) but no young plants were sampled in 2001. Sagebrush reproduction will be difficult on this site in the future due to the shallow, rocky soils with high temperatures and drought conditions. Percent decadency, also influenced by drought, increased from 6% in 1996 to 16% in 2001. However, this is still low for sagebrush. Use is light to moderate as vigor has been generally normal throughout most of the population in 1996 and 2001. Mountain big sagebrush exhibits a rather low growth form at this site, most likely due to the shallow, rocky soils. Mature sagebrush average 1½ feet tall by 2 feet wide. Between 1996 and 2001, sagebrush also decreased in strip frequency from 41 to 30. Average leader growth was 2.5 inches in 2001.

Oak and maple are found further up the slope and along the creek. Some of the oak and junipers nearby have been high-lined. Broom snakeweed was picked up in the larger sample used in 1996. Density was estimated at 740 plants/acre in 1996, but no snakeweed plants were sampled in 2001. Snakeweed densities can fluctuate with changes in precipitation which appears to be the case at this site with drought conditions of the past 2 years (2000-2001).

The herbaceous vegetation accounts for most of the cover on the site. However, composition is extremely poor. Bulbous bluegrass has been the most abundant perennial grass in all sampling years. This species accounted for 77% of the grass cover in 1996, increasing to 90% in 2001. This species was sampled in nearly every quadrat in all readings. Currently ('01) it provides over 42% average cover. Bulbous bluegrass can

provide early spring forage and fair erosion control. However, like cheatgrass, it dries up early in the season and can become a fire hazard. It also forms a dense mat when abundant and becomes highly competitive with desirable perennials, including shrubs. Other, more high-yielding, long-lived perennial species are present in very low numbers. These species include bluebunch wheatgrass, thickspike wheatgrass, Kentucky bluegrass and Letterman needlegrass. Annual brome grasses, especially Japanese brome, were very abundant in 1996. Japanese brome significantly decreased in nested frequency in 2001, providing less than half of the cover it did in 1996.

Forb composition is extremely poor. Many of the more common forbs are considered weeds, although they may provide some big game forage in the spring. Weedy increasers include ragweed, pacific aster, tarweed, curlycup gumweed, yellow salsify and moth Mullen. These species accounted for 81% of the forb cover in 1996. The noxious weed, Dyers woad, is also present in small numbers. Sum of nested frequency for perennial forbs decreased by nearly half between 1996 and 2001. Annual forbs are very abundant, especially storksbill, which increased 10-fold in nested frequency and provides 16% average cover in 2001. Other annual species, most notably tarweed, were abundant in 1996, but significantly decreased in 2001. It was reported in the 1985 that caterpillars and grasshoppers did considerable damage to the herbaceous vegetation that summer. In 1996, some of the yellow salsify had been utilized, most likely by elk.

1985 APPARENT TREND ASSESSMENT

The vegetative trend appears to be upward in terms of deer winter range. The sagebrush is increasing and there is a dense stand of bulbous bluegrass. Livestock grazing should be restricted as dense grasses are abundant and interfere with sagebrush seedling establishment. A rest from grazing will allow the more palatable and desirable species to recover and compete with the invader species that are present.

1990 TREND ASSESSMENT

Mountain big sagebrush displays characteristics of a downward trend on this winter range. Compared to 1985, there are significantly fewer young sagebrush and a large increase in the percentage of decadent plants which has gone from 10% to 77%. Increased decadency, reduced vigor, and low growth is due mostly to moisture stress. Bulbous bluegrass forms an almost complete ground cover. Other grasses are relatively uncommon.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - down, poor condition because of the very high densities for the increaser, bulbous bluegrass (1)

1996 TREND ASSESSMENT

Trend for soil is up due to a large decline in percent bare ground from 12% to 1%. Litter cover declined but this is likely due to misidentification of dried up bulbous bluegrass as litter cover instead of vegetation cover. There is currently no erosion problem on the site due to abundant vegetation and litter cover. Trend for mountain big sagebrush is up due to an increase in density, a decline in decadence, and an improvement in vigor. The stand contains an adequate number of seedlings and abundant young plants. Utilization is currently light to moderate. The herbaceous understory trend is stable. However, composition is extremely poor. The grass component is dominated by bulbous bluegrass and annual brome grasses which combine to produce 97% of the grass cover. Sum of nested frequency for perennial grasses is similar to 1990 estimates. The forb composition is also poor with undesirable weeds being dominate. It appears that tarweed was

present in 1985, but was identified as an unknown forb. In 1990, tarweed was likely present but not counted because it is an annual. Sum of nested frequency of perennial forbs has increased dramatically. However, due to the poor composition, trend is considered down slightly.

TREND ASSESSMENT

soil - up (5)

browse - up (5)

herbaceous - down slightly due to increasingly poor composition (2)

2001 TREND ASSESSMENT

Trend for soil is stable. Erosion remains minimal with a dense mat of bulbous bluegrass protecting the ground surface. Very little bare ground exists on the site. Trend for the key browse, mountain big sagebrush, is slightly down. Recruitment from young plants decreased from 61% in 1996 to 0% in 2001. Strip frequency of sagebrush decreased from 41% to 30%, and percent decadency increased slightly to 16%. A decline in strip frequency is due most likely to the loss of young plants in the population which is a result of drought and high competition from the abundant and weedy understory. Better precipitation in the future may help increase the number of young plants somewhat, but the young plants will likely have a difficult time persisting at the site due to the dominance of bulbous bluegrass. Trend for the herbaceous understory is stable, but remains in poor condition as bulbous bluegrass continues to dominate the site. Desired perennial grasses are present in low abundance, but will likely not increase. Forbs are dominated by annuals and weedy perennials. Annual grasses and perennial forbs did decrease in sum of nested frequency, but the dominance of bulbous bluegrass counteracts this.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable, but remains in poor condition (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 18

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	3	-	1	-	1	-	1	-	.00	-
G	Agropyron spicatum	a-	b11	ab2	ab5	-	5	2	2	.18	.44
G	Bromus japonicus (a)	-	-	b328	a211	-	-	96	80	8.00	3.34
G	Bromus tectorum (a)	-	-	b29	a9	-	-	10	5	.29	.07
G	Danthonia californica	-	-	-	4	-	-	-	2	-	.06
G	Poa bulbosa	b366	a355	ab365	ab361	98	100	98	99	32.20	42.65
G	Poa pratensis	a-	a-	a5	b15	-	-	2	6	.03	.08
G	Poa secunda	a5	b14	b14	b18	2	6	5	7	.02	.40
G	Stipa lettermani	a-	a-	b28	a11	-	-	12	4	.96	.42
Total for Annual Grasses		0	0	357	220	0	0	106	85	8.29	3.42
Total for Perennial Grasses		374	380	415	414	101	111	120	120	33.41	44.06
Total for Grasses		374	380	772	634	101	111	226	205	41.71	47.48
F	Achillea millefolium	a12	ab13	b32	ab14	5	6	13	8	.38	.31
F	Agoseris glauca	1	5	3	1	1	2	1	1	.00	.00
F	Allium spp.	12	-	-	-	5	-	-	-	-	-
F	Ambrosia psilostachya	b97	a11	b125	b102	34	6	46	42	2.45	1.58
F	Artemisia ludoviciana	39	24	35	41	16	12	15	18	.79	1.74
F	Aster chilensis	a-	b121	c199	b170	-	49	69	64	4.63	3.09
F	Calochortus nuttallii	-	-	-	-	-	-	-	-	-	.00
F	Cirsium spp.	-	-	2	-	-	-	1	-	.00	-
F	Collomia linearis (a)	-	-	10	6	-	-	3	3	.21	.04
F	Comandra pallida	-	-	-	3	-	-	-	1	-	.03
F	Crepis acuminata	-	-	-	-	-	-	-	-	-	.03
F	Epilobium brachycarpum (a)	-	-	a-	b41	-	-	-	16	-	.10
F	Erodium cicutarium (a)	b19	a-	b29	c301	8	-	12	92	.23	16.00
F	Erigeron strigosus	b10	a-	ab3	b10	4	-	2	6	.03	.05
F	Eriogonum umbellatum	-	1	-	-	-	1	-	-	-	-
F	Grindelia squarrosa	a-	a1	b30	a-	-	1	12	-	.50	-
F	Isatis tinctoria	-	-	1	-	-	-	1	-	.06	-
F	Lappula occidentalis (a)	-	-	b19	a-	-	-	9	-	.21	-
F	Lactuca serriola	a-	a-	b45	b66	-	-	21	30	.20	1.44
F	Lomatium spp.	-	5	1	6	-	3	1	3	.00	.18
F	Machaeranthera canescens	a-	a-	b190	a-	-	-	71	-	1.07	-
F	Madia glomerata (a)	-	-	b269	a55	-	-	91	24	3.99	.24

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
F	Melilotus alba	-	-	-	3	-	-	-	1	-	.03
F	Phlox longifolia	-	-	-	2	-	-	-	1	-	.00
F	Polygonum douglasii (a)	-	-	2	-	-	-	1	-	.00	-
F	Ranunculus testiculatus (a)	-	-	-	2	-	-	-	1	-	.00
F	Rumex crispus	-	-	2	1	-	-	1	1	.03	.04
F	Taraxacum officinale	-	-	-	4	-	-	-	2	-	.01
F	Tragopogon dubius	_b 26	_a 5	_c 126	_b 12	15	2	57	7	1.43	.11
F	Unknown forb-perennial	_b 337	_a -	_a -	_a -	120	-	-	-	-	-
F	Verbascum blattaria	_a 3	_a -	_b 33	_{ab} 16	1	-	16	7	.79	.20
Total for Annual Forbs		19	0	329	405	8	0	116	136	4.65	16.39
Total for Perennial Forbs		537	186	827	451	201	82	327	192	12.40	8.88
Total for Forbs		556	186	1156	856	209	82	443	328	17.06	25.28

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 18

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	41	30	2.25	2.86
B	Gutierrezia sarothrae	12	0	.24	-
Total for Browse		53	30	2.49	2.86

BASIC COVER --

Herd unit 03 , Study no: 18

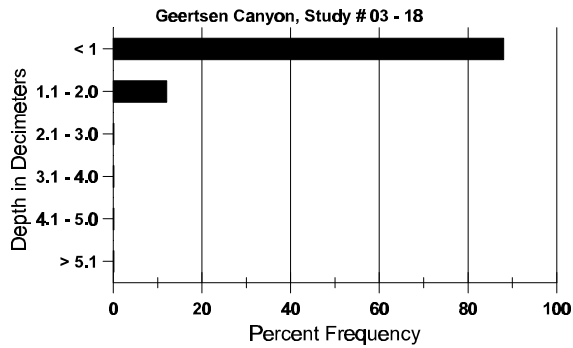
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'85	'90	'96	'01
Vegetation	389	380	16.75	7.75	62.06	70.66
Rock	218	210	11.25	10.25	11.92	13.47
Pavement	146	108	4.25	4.25	.96	.93
Litter	384	341	48.50	65.50	35.29	32.29
Cryptogams	7	-	1.00	.25	.04	0
Bare Ground	139	103	18.25	12.00	1.08	1.07

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 18, Geertsen Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
5.6	79.8 (4.22)	6.2	44.7	27.0	28.3	3.0	14.5	153.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 18

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Elk	27	2	165	13 (31)
Deer	4	11	191	15 (36)
Cattle	4	7	35	3 (7)

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 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			
Artemisia tridentata vaseyana								
S	85	1	-	-	-	-	-	1
	90	-	-	-	-	-	-	0
	96	7	-	-	-	-	-	7
	01	-	-	-	-	-	-	0
Y	85	7	1	-	-	-	-	8
	90	1	1	-	-	-	-	2
	96	51	-	-	6	-	-	57
	01	-	-	-	-	-	-	0
M	85	19	-	-	-	-	-	19
	90	1	1	-	-	-	-	2
	96	9	18	3	-	-	-	30
	01	15	28	-	-	-	-	43
D	85	3	-	-	-	-	-	3
	90	11	2	-	-	-	-	13
	96	4	2	-	-	-	-	6
	01	6	1	1	-	-	-	8
X	85	-	-	-	-	-	-	0
	90	-	-	-	-	-	-	0
	96	-	-	-	-	-	-	13
	01	-	-	-	-	-	-	5
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
	'85	03%	00%	03%	-43%			
	'90	24%	00%	71%	+39%			
	'96	22%	03%	06%	-45%			
	'01	57%	02%	06%				
Total Plants/Acre (excluding Dead & Seedlings)				'85	1999	Dec:	10%	
				'90	1132		77%	
				'96	1860		6%	
				'01	1020		16%	

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3			
Gutierrezia sarothrae																
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	3	-	-	-	-	-	-	-	-	-	-	-	60		3
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	9	-	-	-	-	-	-	-	-	-	-	-	180		9
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	28	-	-	-	-	-	-	-	-	-	-	-	560	11	16
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>		
'85		00%				00%				00%						
'90		00%				00%				00%						
'96		00%				00%				00%						
'01		00%				00%				00%						
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-	
												'90	0		-	
												'96	740		-	
												'01	0		-	

Suspended

Trend Study 3-19-96

Study site name: Brigham Face.

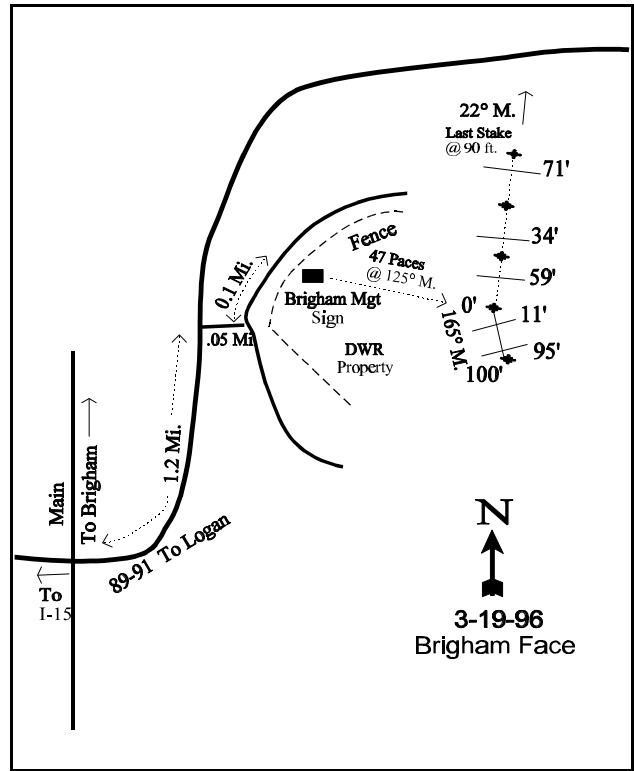
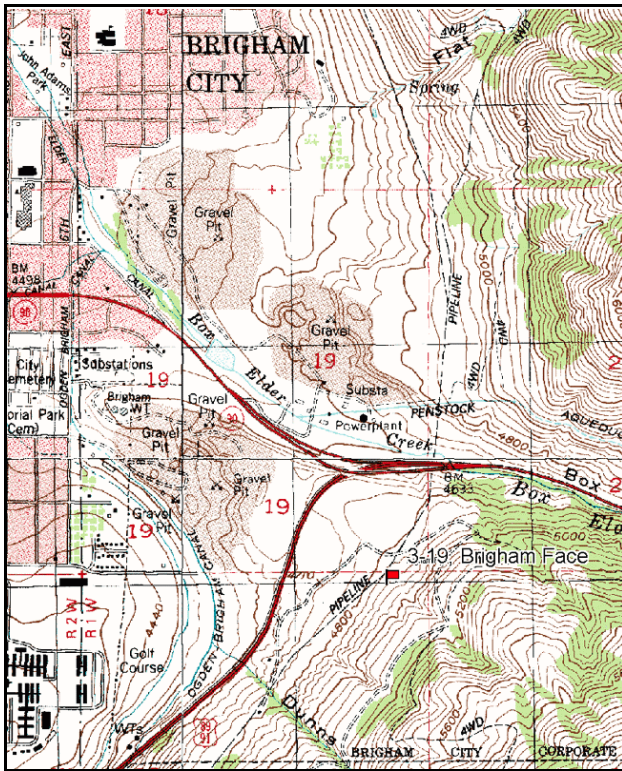
Vegetation type: Bitterbrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From 1100 South and Main Street in Brigham City, proceed northeast for 1.2 miles and turn right (east) at 1250 East. Turn left after 0.05 miles and enter DWR property. Travel 0.1 miles to the Brigham Management Area sign on the south side of the road. From the sign, walk 56 paces bearing 125 degrees magnetic to the 0-foot baseline stake. The 0-foot baseline stake is marked by browse tag # 87. The first 100 feet of the baseline runs 165 degrees magnetic. The remaining 300 feet run off the 0-foot baseline stake and run 22 degrees magnetic.



Map Name: Mantua

Diagrammatic Sketch

Township 9N, Range 1W, Section 19

UTM 4594140 N 417014 E

DISCUSSION

Trend Study No. 3-19 (2-11)

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. The transect samples an old patch of bitterbrush that was seeded in the 1960's. This study was evaluated by the Project Leader and determined that very little or no wildlife use was present on the site due to the tall, thick nature of the bitterbrush patch that now is present. Text and data tables are included from the 1996 report.

The Brigham Face study samples what in the past was considered critical deer winter range located on Division of Wildlife Resources property on the old lake terrace immediately east of the Intermountain Indian School. The lake terrace has a gently (10%), northwest facing slope occupied by a dense stand of seeded grass interspersed by an antelope bitterbrush seeding and a persistent stand of mountain big sagebrush. Deer use was classified as moderately heavy in 1984, but current ('96) use is light and deer pellet groups were infrequently encountered. The major impact to this area is associated with proximity to residential development and off-road vehicle use.

Soil on the site is typical of the "Wasatch" series. These are gravelly, sandy loams that most often have a gravelly subsoil. They are alluvially deposited and derived from quartzite, gneiss and schist. Wasatch soils are highly permeable and have low water-holding capacity. The erosion hazard ranges from moderate to high (Chadwick et al. 1975). At the site, effective rooting depth (see methods) was estimated at just over 12 inches in 1996. However, due to the rocky nature of the soil this estimate was limited because of the rocky subsoils, and rooting depth does not appear to be physically inhibited. Soil reaction is slightly acidic (6.2 pH). Soil texture is a sandy loam and erosion is controlled by a dense stand of seeded grass. Several roads and ORV trails in the area are the major source of soil disturbance and movement.

Browse composition consists of two species. Most conspicuous is an irregularly distributed population of a tall form of antelope bitterbrush. These were established with the aid of a "browse seeder" in the early 1960's and have since become large shrubs averaging 5 and more feet in height with a crown diameter of almost 9 feet. Total cover for bitterbrush is nearly 17%. Overall density is rather low at 580 plants/acre and the age structure suggests that bitterbrush is maintaining itself but is not apparently expanding. Utilization was heavy in 1984, when 60% of the shrubs displayed moderately heavy browsing (>60% of twigs browsed). Since then use has been classified as light.

Mountain big sagebrush also occurs on the site. Density estimates have increased from 199 plants/acre in 1984 to 1,700 in 1996. The increase in density is mostly due to the much larger sample size used in 1996, which better estimates densities of shrubs that often have aggregated and/or discontinuous distributions. However, a large proportion of the sagebrush (65%) consists of small young plants. Mature shrubs number 600 plants/acre. Total cover for sagebrush is only 4%. Utilization was heavy in 1984 and percent decadence was relatively high at 50%. Since then use has been classified as light. Vigor has improved and no decadent plants were encountered on the site.

The seeded perennial grass, intermediate wheatgrass, is the principal vegetative component. It provides 31% cover or 93% of the grass cover, which accounts for over half of the total vegetative cover (56%). The only other common perennial grass is Sandberg bluegrass. Annual brome grasses which are so dominant on most sites in the unit accounts for less than 1% cover because of the competition with perennial grasses.

Perennial forbs are rare and difficult to find within the dense grass cover. All forbs combined produced less than 1% cover in 1996, only 2% of the total herbaceous cover. The tallest and most conspicuous forbs are yellow salsify and dyers woad.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable because of high quadrat frequencies for intermediate wheatgrass. Vegetative reconnaissance appears to indicate that mountain big sagebrush is probably declining in number while bitterbrush is just maintaining itself. A dense stand of intermediate wheatgrass dominates the site and will continue to do so. With the exception of mountain big sagebrush, vegetative trend is apparently stable.

1990 TREND ASSESSMENT

Browse remains limited on this DWR winter range, but both mountain big sagebrush and bitterbrush show meaningful increases. The increase in bitterbrush density is due to the high number of seedling and young plants. The sagebrush stand also has a high percentage of young plants. These shrubs have excellent vigor and show surprisingly low utilization along with very little sign of deer. Nested and quadrat frequency values for crested wheatgrass have increased a small amount, while values for intermediate wheatgrass have decreased slightly. This change would be expected because of the extended drought we are experiencing, as crested wheatgrass is more drought tolerant than intermediate wheatgrass. Still, quadrat frequency for intermediate wheatgrass is over 90%. Weedy increasers should be monitored closely, especially dyers woad, which did not appear on the 1984 survey, but had a quadrat frequency of 17% in 1990. There is still more than adequate ground cover for soil protection.

TREND ASSESSMENT

soil - stable (3)

browse - upward for key browse species (5)

herbaceous understory - stable, but weedy species should be closely monitored (3)

1996 TREND ASSESSMENT

Protective ground cover remains abundant and erosion is not apparent. Trend for soil continues to be stable. Trend for browse is stable for mountain big sagebrush and antelope bitterbrush. The respective changes in density of these two shrubs is more a reflection of the increased sample size used in 1996 than an actual increase or decrease in density. Both species are only lightly utilized, have good vigor and no decadent plants. However, the age class composition of the sagebrush would indicate an expanding population. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses increased slightly, while frequency of forbs declined slightly. Nested frequency of intermediate wheatgrass increased significantly since 1990 with the frequency of Sandberg bluegrass declining significantly.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 19

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron cristatum	a3	b19	a1	1	8	1	.06
G	Agropyron intermedium	b326	a265	b341	99	93	96	30.77
G	Bromus brizaeformis (a)	-	-	44	-	-	17	.21
G	Bromus japonicus (a)	-	-	34	-	-	14	.17
G	Bromus tectorum (a)	-	-	36	-	-	15	.32
G	Poa bulbosa	a6	b31	b28	2	13	12	.24
G	Poa pratensis	-	4	-	-	2	-	-
G	Poa secunda	a22	b80	b55	12	33	21	1.24
Total for Annual Grasses		0	0	114	0	0	46	0.71
Total for Perennial Grasses		357	399	425	114	149	130	32.32
Total for Grasses		357	399	539	114	149	176	33.03
F	Agoseris glauca	-	2	-	-	1	-	-
F	Alyssum alyssoides (a)	-	-	2	-	-	1	.00
F	Ambrosia psilostachya	-	-	3	-	-	1	.03
F	Collomia linearis (a)	-	-	1	-	-	1	.00
F	Cryptantha spp.	-	-	3	-	-	1	.00
F	Draba spp. (a)	-	-	10	-	-	3	.04
F	Epilobium brachycarpum (a)	-	-	4	-	-	3	.01
F	Galium aparine (a)	-	-	7	-	-	3	.16
F	Hackelia patens	-	-	4	-	-	2	.03
F	Helianthus annuus (a)	-	7	-	-	4	-	-
F	Holosteum umbellatum (a)	-	-	13	-	-	6	.03
F	Isatis tinctoria	a-	c42	b19	-	17	9	.45
F	Lappula occidentalis (a)	-	-	1	-	-	1	.00
F	Lactuca serriola	a-	b9	a-	-	5	-	-
F	Phlox longifolia	-	-	1	-	-	1	.00
F	Plantago patagonica (a)	-	-	7	-	-	3	.01
F	Polygonum douglasii (a)	-	-	40	-	-	18	.09
F	Taraxacum officinale	1	-	-	1	-	-	-
F	Tragopogon dubius	a2	b20	a-	1	12	-	-
F	Unknown forb-perennial	-	1	-	-	1	-	-
Total for Annual Forbs		0	7	85	0	4	39	0.36
Total for Perennial Forbs		3	74	30	2	36	14	0.53
Total for Forbs		3	81	115	2	40	53	0.89

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 03 , Study no: 19

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia tridentata vaseyana	20	3.94
B	Atriplex canescens	2	.38
B	Chrysothamnus nauseosus albicaulis	2	.30
B	Opuntia fragilis	2	-
B	Purshia tridentata	21	16.61
Total for Browse		47	21.23

BASIC COVER --

Herd unit 03 , Study no: 19

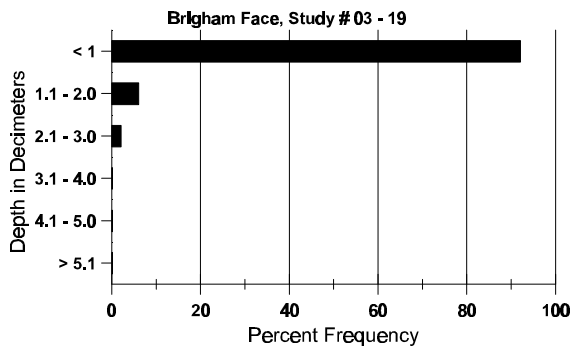
Cover Type	Nested Frequency	Average Cover %		
	'96	'84	'90	'96
Vegetation	363	.75	10.50	55.27
Rock	83	1.50	3.25	2.13
Pavement	84	7.00	9.75	.82
Litter	399	88.75	73.00	77.75
Cryptogams	17	0	0	.30
Bare Ground	64	2.00	3.50	.63

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 19, Brigham Face

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.3	62.8 (16.0)	6.2	58.7	22.0	19.3	3.2	21.4	208.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 19

Type	Quadrat Frequency '96
Rabbit	5
Deer	4

BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 19

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 tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300			15
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	96	55	-	-	-	-	-	-	-	-	55	-	-	-	1100			55
M	84	1	-	1	-	-	-	-	-	-	2	-	-	-	66	15	10	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	30	31	1
	96	28	1	-	1	-	-	-	-	-	30	-	-	-	600	26	39	30
D	84	-	2	1	-	-	-	-	-	-	-	-	3	-	100			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		50%			33%			50%			+33%							
'90		00%			00%			00%			+82%							
'96		01%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	50%			
												'90	299		0%			
												'96	1700		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>Atriplex canescens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	1	-	-	-	-	-	-	-	4	-	-	-	80	54	41	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	80		-			
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	11	-	-	-	-	-	-	-	-	11	-	-	-	366			11
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	21	28	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%			-89%							
'96		50%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	366		0%			
												'96	40		50%			
<i>Juniperus osteosperma</i>																		
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66	69	94	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	0		-			
												'96	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				
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	8	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
<i>Purshia tridentata</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	13	-	-	3	-	-	-	-	-	16	-	-	-	533		16	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	9	-	-	-	-	-	-	-	-	9	-	-	-	300		9	
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	2	3	-	-	-	-	-	-	5	-	-	-	166	58	68	5
	90	9	-	-	6	-	-	-	-	-	15	-	-	-	500	61	72	15
	96	17	1	-	-	7	-	-	-	-	25	-	-	-	500	59	105	25
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	1	-	-	-	-	2	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		40%			60%			00%			+79%							
'90		00%			00%			00%			-28%							
'96		34%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	166	Dec:	0%			
												'90	800		0%			
												'96	580		7%			

SUMMARY

MANAGEMENT UNIT - 3 - OGDEN

Unit 3 contains a total of 17 trend studies. Twelve of these studies were established in 1984, the other five in 1985. All of the studies were reread in 1990 and 1996. In 2001, 8 studies were reread, while 9 studies were suspended. Studies were suspended for several reasons. These reasons included little to no wildlife use, urban development, and sites not being rehabilitated following wildfires resulting in the loss of key browse, primarily sagebrush. Suspended sites will be reevaluated during the next rotation to determine whether they will be reread or permanently deleted.

Unit Wide Trends

In 2001, a common finding on range trend studies in Unit 3 was the increase in nested frequency of bulbous bluegrass. This species significantly increased in nested frequency on 6 of the 8 trend studies that were read in 2001. This species is a low value perennial that has many characteristics of annual species. It is highly competitive, has low forage value after spring, and can increase the fire hazard when overly abundant. Studies in this unit have the added problem of poor forb composition. Weedy increasers, both annual and perennial species, are widespread and make up the majority of the forb component on most of the sites in the Ogden unit. These species include ragweed, prickly lettuce, yellow salsify, western yarrow, pacific aster, tarweed, curlycup gumweed, thistle, storksbill, and Dyers woad. Dyers woad is a noxious weed and is spreading rapidly in some areas of the unit.

A common finding on the unit in 1996 was the high average soil temperature. This is usually the result of abundant rock on the surface and in the profile or the result of a steep slope combined with a west or south aspect. This causes excessive drying of the surface soil horizons by early summer and gives winter annuals like cheatgrass a competitive advantage over more desirable perennial species. Extra care must be used when grazing these ranges during the spring as they can easily be pushed toward an annual grass dominated system.

A major factor influencing vegetative trends is drought. Precipitation data from several weather stations within management unit 3 show alternating wet and dry cycles since range trend study sites were first established in 1984. For the most part, the early to mid-1980's were above normal in precipitation, the late-1980's were drier than normal and the early to mid-1990's were again wetter than normal. From 1999 to the present, a trend of at or below normal precipitation has again emerged. Low snowpack during the winters and/or dry spring and summers in 2000 and 2001 occurred throughout many areas of Utah. Lower than normal precipitation, especially in consecutive years, likely plays a primary role in increased decadency and decreased reproduction in shrub populations, primarily big sagebrush. In 2001, low precipitation also resulted in the decrease in perennial forbs in unit 3. This same trend was observed in the northeast region during the summer 2000. In unit 3, sum of nested frequency for perennial forbs decreased on half of the trend studies read in 2001. In 2001, perennial grasses actually increased in sum of nested frequency on 7 of the 8 studies in unit 3, mostly due to the increase in bulbous bluegrass discussed above.

As a result of the high soil temperatures, the abundance of weedy species, extended drought and past heavy use, many sites now support limited browse densities. Wildfires burned through three sites prior to the 1996 rotation, effectively eliminating the browse component. Apparently, none of these burns were rehabilitated, leaving them vulnerable to future fires and further site deterioration. Overall use of the browse on sites which still support sufficient densities, is currently mostly light to some moderate.

Trend Summary

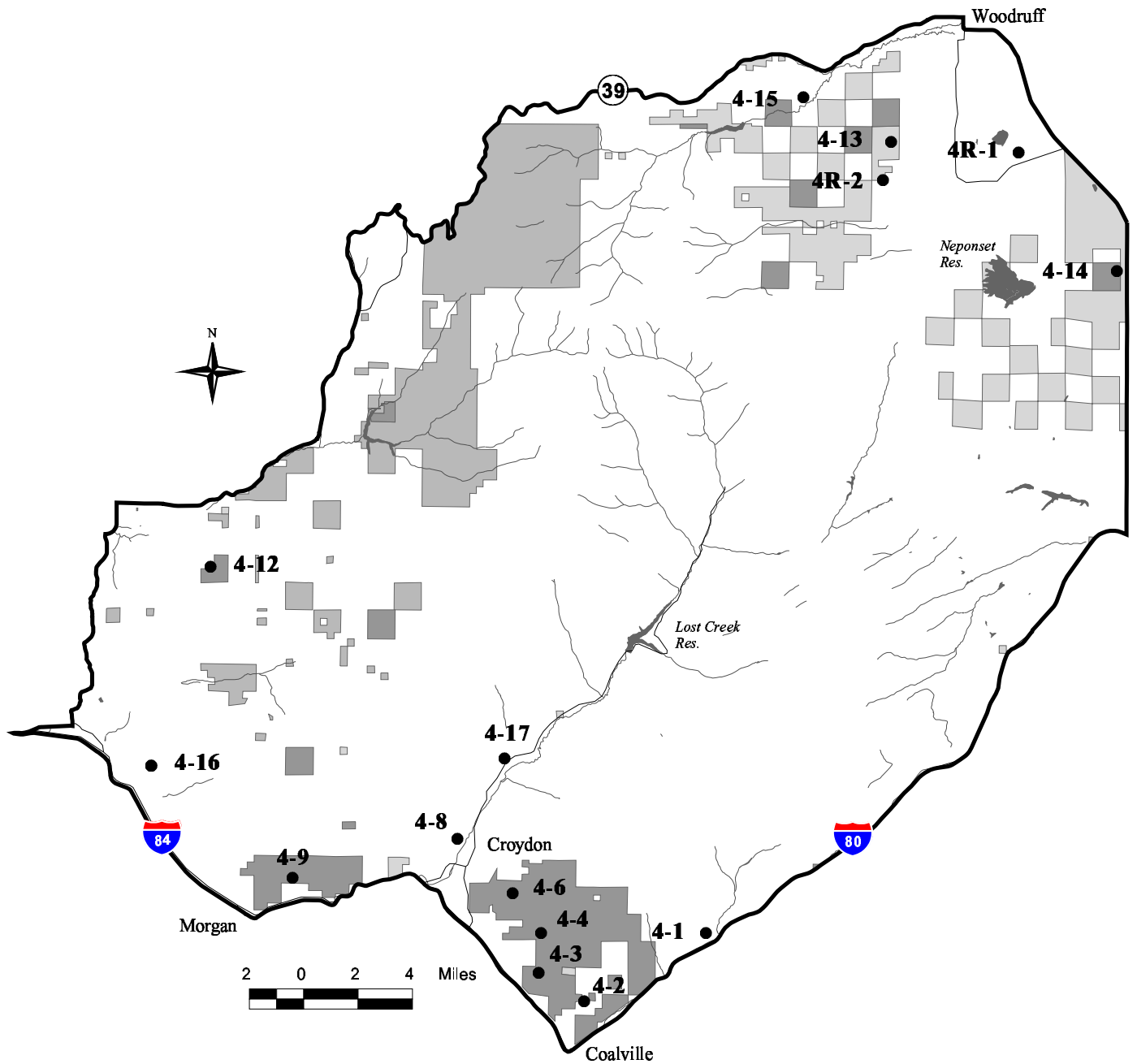
	Category	1984	1990	1996	2001
3-2 Northeast Mantua Reservoir	soil	est	3	5	3
	browse	est	5	3	3
	herbaceous understory	est	3	1	5
3-3 Clay Basin	soil	est	3	5	3
	browse	est	3	3	3
	herbaceous understory	est	4	2	4
3-4 Anderson Ranch	soil	est	3	5	3
	browse	est	5	3	3
	herbaceous understory	est	4	2	4
3-5 Mathias Canyon	soil	est	3	5	susp
	browse	est	3	3	susp
	herbaceous understory	est	3	1	susp
3-6 White's Orchard	soil	est	3	4	3
	browse	est	4	3	2
	herbaceous understory	est	3	2	2
3-7 Mouth of Pearson's Canyon	soil	est	3	5	susp
	browse	est	5	3	susp
	herbaceous understory	est	1	1	susp
3-8 Facer Canyon	soil	est	3	3	susp
	browse	est	5	1	susp
	herbaceous understory	est	1	1	susp
3-9 Cook Canyon	soil	est	3	5	3
	browse	est	3	3	2
	herbaceous understory	est	4	1	4
3-10 Hyrum Canyon	soil	est	4	5	susp
	browse	est	5	3	susp
	herbaceous understory	est	2	1	susp

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
 (est) = site established, (susp) = suspended

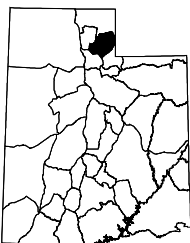
	Category	1984	1990	1996	2001
3-12 Three-Mile Canyon	soil	est	3	5	3
	browse	est	1	3	2
	herbaceous understory	est	2	2	3
3-13 Perry Basin	soil	est	3	2	susp
	browse	est	2	1	susp
	herbaceous understory	est	5	3	susp
	Category	1985	1990	1996	2001
3-14 Uintah Junction	soil	est	3	5	susp
	browse	est	1	3	susp
	herbaceous understory	est	2	3	susp
3-15 Ogden Canyon	soil	est	3	4	susp
	browse	est	2	3	susp
	herbaceous understory	est	2	3	susp
3-16 Maple Canyon	soil	est	3	5	susp
	browse	est	3	1	susp
	herbaceous understory	est	2	1	susp
3-17 Middle Fork	soil	est	3	5	3
	browse	est	3	4	3
	herbaceous understory	est	3	2	3
3-18 Geertsen Canyon	soil	est	3	5	3
	browse	est	1	5	2
	herbaceous understory	est	1	2	3
	Category	1984	1990	1996	2001
3-19 Brigham Face	soil	est	3	3	susp
	browse	est	5	3	susp
	herbaceous understory	est	3	3	susp

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = site established, (susp) = suspended

Management Unit 4



Unit Location



- Transect Location
- ∩ Roads
- ∩ Water Courses
- Forest Service
- BLM
- State of Utah
- Private Land
- Water Body

MANAGEMENT UNIT - 4 - MORGAN RICH

Boundary Description

Morgan, Rich, Summit, and Weber counties - Boundary begins at the junction of I-80 and I-84 near Echo, Utah; northeast on I-80 to the Utah-Wyoming state line; north along this state line to SR-16; north on SR-16 to SR-39 near Woodruff; west along SR-39 to SR-167 (Trappers Loop road); south on SR-167 to SR-30 at Mountain Green; west on SR-30 to I-84; east on I-84 to I-80 and beginning point.

Unit Description

Management unit 4 prior to 1993, referred to the Wellsville mountains in Cache and Box elder counties. In 1993, unit boundaries were changed and unit 4 was created from parts of units 5, 6 and 7. Unit 4 incorporates the southeastern part of Weber county southeast of Huntsville, the northern half of Morgan county and Summit county and the southern portion of Rich county southwest of Woodruff. Municipalities along the unit boundaries include Woodruff, Huntsville, Mountain Green, Croydon and Echo.

Twelve of the 17 study sites in the unit occur along the I-84 corridor on critical winter range. Most winter range is located in the major drainages and on the slopes north of the Weber River. A detached, smaller wintering area is found on the south-facing slopes above Cottonwood Creek. These are the areas most highly developed by people. Highway I-80 and I-80N which run through Echo Canyon and along the Weber River, form the unit's southern boundary. There are several towns along the highways. Croydon is the only town in the unit not on I-80. Surrounding Croydon, the majority of the Lost Creek bottoms have been converted to alfalfa fields. Lost Creek Reservoir, managed by the Division of Parks and Recreation, is primitively developed and the road is not maintained in winter. However, approximately 1,320 snowmobilers, winter fishermen and other recreationists used the facilities during the 1985 winter months. Two areas of land in the unit are managed by the Division of Wildlife Resources. One area is north of I-84, just east of Morgan, and the other is north of I-84, between Henefer and Echo. The Henefer-Echo area is managed primarily as a big game habitat. Controlled grazing, vehicle restrictions and re-vegetation projects are major management tools.

The earlier inventory studies described six vegetation types. The sagebrush type is most common and is found over the whole area. It forms part of a continuum, based on moisture conditions, with the browse/sagebrush and browse types. The lower elevation sagebrush and browse/sagebrush types are productive and utilized heavily by deer, while the browse type mostly provides cover and is unavailable in many winters. The other types occupy comparatively little area, but have the potential to increase. Burns occur frequently in the unit, and unless seeded, production of desirable species is very low. Deer use the burned areas infrequently, possibly because of lack of cover. Although a very small area, the mahogany type is important to deer wintering in Cottonwood Canyon. The scattered juniper areas also are important in providing thermal cover, but produce little forage.

In severe winters, winter range is greatly reduced from the normal winter range. The upper limit is 6,500 feet on most of the unit. Acreage of all vegetation types, except agricultural land is reduced during severe winters. Range trend studies done in the unit occur on winter range. Most studies sample critical and/or heavily used areas.

The Lost Creek, Weber River, and Echo Canyon area are traditional deer wintering areas. There is considerable migration both from higher elevations in the unit and from other herd units to this area, especially during severe winters. The largest number of deer probably come from the East Canyon unit, where deer summer on the east side of the Wasatch Mountains. Development in Morgan Valley is disrupting this migration route. Deer also come from the Ogden and Coalville units which also have adequate summer range, but limited winter range.

Big Game Trends

The Lost Creek area provides critical habitat for wintering big game. The abundance of summer range, high productivity of the herds, and generally increasing numbers of big game animals leads to heavy use on the limited winter range in this part of the state. Development, the predominance of private land, and heavy impact from both livestock and big game has led to problems every winter. Approximately 86% of the deer summer range and 80% of the winter range is privately owned.

The current management objective is to maintain a winter herd population of approximately 12,500 deer with a post season minimum classification of 20 bucks per 100 does. Of those bucks, 30% will be 3-point or better. The management objective for elk is to achieve a target winter herd of 3,500 elk with a minimum of 40 bulls per 100 cows. Of those bulls, 50% will be 2 ½ years of age or older.

Study Site Description

Twelve trend study sites were read in 2001. Eight of these sites were originally established in 1984. Two sites were established in 1990, and 3 additional sites were added in 1996. All trend studies monitor big game winter range. Maps, trend assessments, and data for each study site follow. It should be noted that precipitation was above normal prior to the establishment of trend studies in 1984. Precipitation data from Morgan show above normal annual precipitation from 1982-1984. Precipitation was below normal during the 1990 readings and dry conditions prevailed from 1987 to 1994 at Morgan. Above normal precipitation was received during 1996 when the studies were reread. Dry conditions returned in 1999 and continued until 2001. Spring precipitation was poor in both 2000 and 2001 (Utah climate summaries 2001).

Trend Study 4-1-01

Study site name: Heiner's Creek.

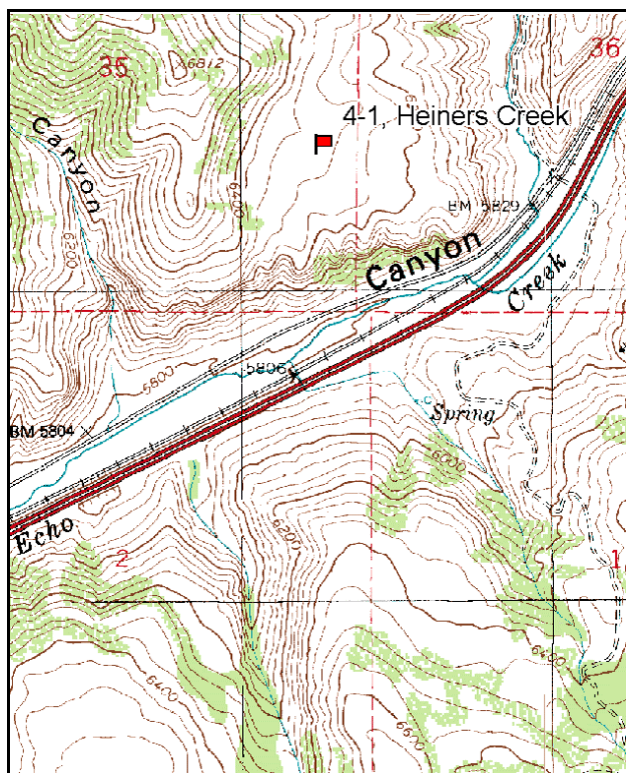
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 164 degrees magnetic

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

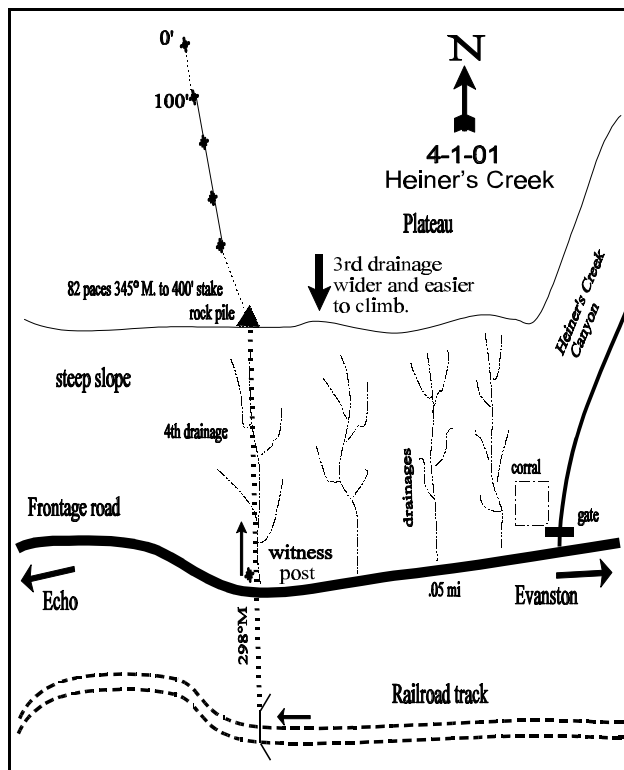
LOCATION DESCRIPTION

From exit 169 on I-80, travel 6.2 miles northeast on the frontage road to a witness post on the north side of the road next to a large rock. Hike up the third drainage west of Heiner's Creek. This drainage is wider and easier to hike up. Once on the top of the bench walk west to the head of the next drainage to the west. The 400-foot stake is located at the head of this gully. The 0-foot baseline stake is 400 feet to the north at a bearing of 326 degrees magnetic.



Map Name: Heiner's Creek

Township 4N, Range 5E, Section 35



Diagrammatic Sketch

UTM 4542443 N 471242 E

DISCUSSION

Trend Study No. 4-1

The Heiner's Creek study samples critical deer winter range on the north side of Echo Canyon, just west of Heiner's Creek. The site is located on a 10% south facing slope at 6,240 feet in elevation. This places the study above the steep bluffs or cliffs so prevalent in Echo Canyon. The range type is mixed mountain brush which appears to have been burned prior to the 1984 reading. As a result, fire tolerant shrubs and increaser species currently dominate the site. The area is considered important winter range for deer and to a lesser extent, elk. The site is also used by cattle during the summer. Pellet group data from the site in 2001, estimate 41 deer and 5 cow days use/acre (101 ddu/ha and 13 cdu/acre). Only two elk pellet groups were encountered. Most of the deer pellet groups appear to be from winter or early spring use.

Soil on the site is moderately deep and almost rock and pavement free on the surface. It has a clay loam texture with a neutral soil reaction (pH of 6.6). Effective rooting depth was estimated at only 10 inches due to a compacted clay horizon. The soil is derived from a limestone-sandstone conglomerate. There are abundant signs of soil movement including, soil pedestalling around shrubs, rills, and an active gully near the end of the base line. However, much of the exposed bare ground is not connected due to the moderately abundant herbaceous cover which has increased since 1996. The soil erosion condition class was determined to be moderate in 2001.

The key browse species is mountain big sagebrush with lesser amounts of preferred antelope bitterbrush and serviceberry. Mountain big sagebrush numbered only about 300 plants/acre during the 1984 and 1990 readings. Most of these shrubs were classified as mature. Due to the larger sample size used in 1996, accuracy for estimating shrub densities with clumped or discontinuous distributions was greatly improved. As a result, estimated density of sagebrush increased to 1,060 plants/acre in 1996. Nearly 80% were classified as mature plants, which displayed low percent decadence, mostly light to some moderate use, and good vigor. Seedlings and young were present in good numbers. Density increased 74% by 2001, to 4,120 plants/acre. Seedlings and young are abundant indicating an expanding population. Use continues to be mostly light, vigor normal, and percent decadence low at only 3%.

Bitterbrush are scarce with only 33 plants/acre estimated in 1990, and 100 plants/acre in 1996 and 2001. These shrubs were very heavily utilized in 1990. During the 1996 reading no bitterbrush were producing seed and 40% were heavily hedged. Due to the heavy use and dry conditions in the late 1980's and early 1990's, 20% displayed poor vigor. Use of bitterbrush was moderate to heavy in 2001, but vigor has improved. Most plants did not appear to be producing seed.

Serviceberry also occurs in limited numbers with an estimated density of 80 plants/acre in 1996, increasing to 320 plants/acre in 2001. Most plants show light use but some are moderately to heavily hedged.

The most abundant shrubs are increaser species, Woods rose and stickyleaf low rabbitbrush. These shrubs provided the bulk of browse forage by providing nearly 80% of the total shrub cover in 1996 and 67% in 2001. Stickyleaf low rabbitbrush provided 73% of the shrub cover in 1996, with an estimated population density of 14,240 plants/acre. The population displayed a 61% increase since 1990, partly due to the increased sample size. Density remained stable in 2001 at 14,840 plants/acre. Age class analysis indicates a stable to slightly expanding population.

Wood's rose is also abundant, yet provided only 6% of the browse cover in 1996 and 5% in 2001. Population density has ranged from 8,565 plants/acre in 1990 to 3,780 plants/acre in 1996. Currently ('01) density is estimated at 5,960 plants/acre. Most are young plants.

Herbaceous understory vegetation is patchy and includes several low growing weedy species. Grasses are diverse and fairly abundant, but do not produce much forage. Common grasses include bluebunch wheatgrass, Sandberg bluegrass, mutton bluegrass, and Kentucky bluegrass. Forbs are almost absent on the site. The most abundant perennial forbs include weedy species such as western yarrow, pacific aster, thistle, and longleaf phlox. The site had been heavily utilized by cattle prior to the 1996 reading (7/1/96).

1984 APPARENT TREND ASSESSMENT

Soil condition is marginal. This soil is potentially erodible and has undergone some soil loss. As this site continues to recover from fire, some improvement in dispersion of ground cover can be expected and perhaps a lessening of erosion problems. Vegetative trend appears stable, but current range condition, especially with regard to plant composition is well below optimum. The key browse species are going to have a difficult time increasing their numbers and productivity.

1990 TREND ASSESSMENT

Basal vegetative cover increased since 1984, but percent bare ground also increased slightly while litter cover declined. The large amount of bare soil allows for active gullies and increased plant pedestalling. Trend for soil is considered down slightly. Mountain big sagebrush has remained at a similar density compared to 1984. The mature sagebrush are vigorous and moderately to heavily hedged. Sagebrush canopy cover averages 3%. No seedling or young sagebrush were encountered. The few bitterbrush sampled on the site were all heavily hedged. Increaser species, stickyleaf low rabbitbrush, has declined slightly in density, while wood's rose increased. Both populations appear to be stable to slightly increasing. Trend for browse is slightly down and in poor condition. Trend for the herbaceous understory is stable. Nested frequency of bluebunch wheatgrass shows a significant decrease, while mutton grass and Sandberg bluegrass have both increased significantly. Sum of nested frequency for perennial forbs declined but the combined sum of nested frequency for grasses and forbs remained stable.

TREND ASSESSMENT

soil - down slightly (2)

browse - slightly downward and in poor condition (2)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare ground. However, erosion is still occurring. Trend for browse is up slightly for mountain big sagebrush. Density has increased 72% since 1990, but this is primarily due to the larger sample size used in 1996. Age class analysis indicates a stable to slightly increasing population. Utilization is mostly light, vigor normal, and percent decadence low at only 2%. The other preferred browse, antelope bitterbrush and serviceberry, occur in small numbers and have received continued heavy use. The increaser, stickyleaf low rabbitbrush, still dominates the site by providing 73% of the browse cover. Some of the large increase in its population could be the result of the larger sample size. Trend for the herbaceous understory is up. Sum of nested frequency for perennial grasses increased, while sum of nested frequency for forbs remained similar to 1990 estimates. Sum of nested frequency for thickspike and bluebunch wheatgrass increased while that for mutton bluegrass declined. Forb composition is still poor.

TREND ASSESSMENT

soil - up slightly (4)

browse - up slightly but poor composition(4)

herbaceous understory - up (5)

2001 TREND ASSESSMENT

Trend for soil is stable. Percent cover of bare ground increased slightly while cover of litter declined slightly. However, vegetation cover increased and more importantly, cover for perennial grasses and forbs increased 39%. However, soil condition is poor with erosion occurring and the erosion condition class determined to be moderate. Trend for browse is up for the key species, mountain big sagebrush. Density has increased 74% from 1,060 plants/acre in 1996, to 4,120 plants/acre in 2001. In addition, young plants currently account for 67% of the population and seedlings are also numerous. This would indicate an expanding population. Serviceberry and bitterbrush still occur in limited numbers but they do provide some additional preferred browse forage. Serviceberry has increased in density while bitterbrush has remained stable. The increaser, stickyleaf low rabbitbrush is still the most abundant species with a stable population of 14,840 plants/acre. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses did decline, but sum of nested frequency for perennial forbs increased. The most abundant grass, Sandberg bluegrass, remained at a similar frequency compared to 1996, while bluebunch wheatgrass declined significantly. The annual, cheatgrass, declined significantly in nested frequency. Forb composition is poor with increaser species and annuals. The forbs would mostly include western yarrow, Pacific aster, blue-eyed Mary, longleaf phlox, and bur buttercup, providing 74% of the forb cover.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - up (5)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 1

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	_b 41	_a 2	_c 92	_{bc} 68	14	1	35	26	.55	.71
G	Agropyron spicatum	_b 169	_a 69	_b 130	_a 80	71	32	55	29	2.67	3.33
G	Bromus tectorum (a)	-	-	_b 140	_a 61	-	-	46	27	1.60	.80
G	Carex spp.	-	-	3	-	-	-	2	-	.03	-
G	Elymus cinereus	3	1	9	6	2	1	4	2	.21	.18
G	Koeleria cristata	1	3	3	9	1	1	1	4	.03	.10
G	Melica bulbosa	-	-	3	-	-	-	2	-	.01	-
G	Poa fendleriana	_a 14	_c 152	_b 88	_a 19	8	65	36	10	1.73	.98
G	Poa pratensis	_a 6	_a 7	_b 42	_b 64	3	2	14	24	1.00	4.11
G	Poa secunda	_a 82	_b 208	_b 209	_b 249	43	74	74	82	5.17	10.55
G	Sitanion hystrix	_b 14	_a 3	_a 1	_a 1	8	2	1	1	.00	.00
G	Stipa comata	9	12	-	-	4	4	-	-	-	-
G	Stipa lettermani	_a -	_a -	_b 30	_a 6	-	-	13	2	.66	.41
Total for Annual Grasses		0	0	140	61	0	0	46	27	1.60	0.80
Total for Perennial Grasses		339	457	610	502	154	182	237	180	12.09	20.38
Total for Grasses		339	457	750	563	154	182	283	207	13.69	21.19

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Achillea millefolium</i>	c137	a40	b71	ab61	57	17	31	29	.80	.96
F	<i>Allium acuminatum</i>	b54	a-	a2	b32	26	-	2	16	.01	.18
F	<i>Antennaria rosea</i>	4	2	1	5	2	1	1	2	.00	.03
F	<i>Arabis</i> spp.	A5	a2	a4	b45	2	2	2	16	.03	.18
F	<i>Artemisia ludoviciana</i>	3	4	-	-	1	1	-	-	-	-
F	<i>Aster chilensis</i>	a87	a67	ab100	b128	32	32	42	50	1.87	2.64
F	<i>Astragalus convallarius</i>	12	7	4	11	7	4	2	5	.01	.22
F	<i>Astragalus</i> spp.	-	2	-	6	-	1	-	3	-	.09
F	<i>Cirsium</i> spp.	ab13	b31	ab18	a3	7	13	10	3	.52	.09
F	<i>Collomia linearis</i> (a)	-	-	-	10	-	-	-	5	-	.02
F	<i>Comandra pallida</i>	b68	b51	a4	a18	34	23	3	9	.01	.09
F	<i>Collinsia parviflora</i> (a)	-	-	a5	b118	-	-	2	44	.01	.46
F	<i>Draba verna</i> (a)	-	-	a-	b11	-	-	-	5	-	.19
F	<i>Eriogonum umbellatum</i>	b19	ab14	ab10	a5	11	7	4	3	.23	.09
F	<i>Hackelia patens</i>	-	-	7	-	-	-	3	-	.06	-
F	<i>Helianthella uniflora</i>	b28	b32	a-	a-	14	15	-	-	-	-
F	<i>Heterotheca villosa</i>	-	-	3	-	-	-	1	-	.00	-
F	<i>Lappula occidentalis</i> (a)	-	-	-	4	-	-	-	1	-	.03
F	<i>Lithospermum ruderales</i>	-	-	1	1	-	-	1	1	.03	.15
F	<i>Lupinus argenteus</i>	a3	a3	ab11	b39	1	1	6	16	.10	.78
F	<i>Machaeranthera canescens</i>	-	-	5	-	-	-	3	-	.01	-
F	<i>Microsteris gracilis</i> (a)	-	-	a-	b16	-	-	-	6	-	.03
F	<i>Phlox longifolia</i>	a-	b33	bc52	c65	-	14	23	24	.14	.32
F	<i>Polygonum douglasii</i> (a)	-	-	b39	a-	-	-	20	-	.12	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	a105	b194	-	-	40	68	.37	1.91
F	<i>Sphaeralcea coccinea</i>	-	-	-	-	-	-	-	-	-	.03
F	<i>Taraxacum officinale</i>	-	-	-	1	-	-	-	1	-	.00
F	<i>Tragopogon dubius</i>	-	-	-	3	-	-	-	1	-	.00
Total for Annual Forbs		0	0	149	353	0	0	62	129	0.50	2.67
Total for Perennial Forbs		433	288	293	423	194	131	134	179	3.88	5.88
Total for Forbs		433	288	442	776	194	131	196	308	4.39	8.55

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 04 , Study no: 1

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	4	7	.41	.71
B	Artemisia tridentata vaseyana	34	62	4.92	8.73
B	Chrysothamnus nauseosus albicaulis	1	1	.38	.38
B	Chrysothamnus viscidiflorus viscidiflorus	99	100	22.09	19.86
B	Purshia tridentata	5	4	.00	.00
B	Rosa woodsii	29	30	1.77	1.62
B	Symphoricarpos oreophilus	8	8	.67	.53
Total for Browse		180	212	30.26	31.85

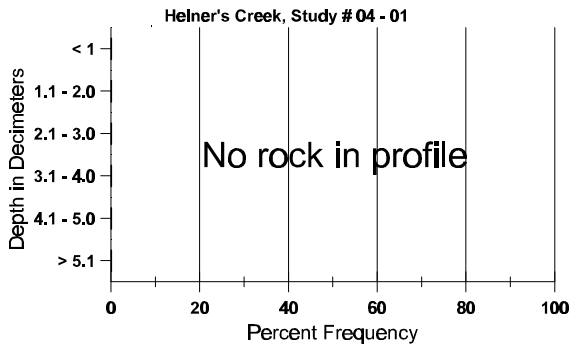
BASIC COVER --
Herd unit 04 , Study no: 1

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	363	364	6.75	10.25	48.59	55.00
Rock	40	8	0	0	.14	.64
Pavement	134	98	3.00	1.25	.72	.59
Litter	396	362	58.75	51.75	45.24	38.59
Cryptogams	37	26	.75	.75	.34	.31
Bare Ground	289	265	30.75	36.00	22.39	26.87

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 01, Heiner's Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.1	66.2 (14.1)	6.6	31.9	32.1	36.0	3.2	19.9	144.0	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 04 , Study no: 1

Type	Quadrat Frequency	
	'96	'01
Rabbit	-	2
Horse	3	-
Elk	-	2
Deer	15	17
Cattle	1	2

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
-	-
17	1 (3)
530	41 (101)
61	5 (13)

BROWSE CHARACTERISTICS --

Herd unit 04 , Study no: 1

A G R E	Y 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				
Amelanchier alnifolia																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'01	2	2	-	3	-	-	-	-	-	7	-	-	-	140			7
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	14	20	1
	'96	-	-	-	2	-	1	-	-	-	3	-	-	-	60	18	30	3
	'01	5	3	1	-	-	-	-	-	-	9	-	-	-	180	20	27	9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%			+59%							
'96		00%			25%			00%			+75%							
'01		31%			06%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	33		-			
												'96	80		-			
												'01	320		-			

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 tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	01	50	-	-	-	-	-	-	-	-	50	-	-	-	1000		50	
Y	84	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
	01	133	3	-	1	-	-	-	-	-	136	-	1	-	2740		137	
M	84	6	-	-	-	-	-	-	-	-	6	-	-	-	200	19	17	6
	90	3	2	3	-	-	-	-	-	-	8	-	-	-	266	24	23	8
	96	30	12	-	-	-	-	-	-	-	42	-	-	-	840	26	35	42
	01	57	6	-	-	-	-	-	-	-	57	1	5	-	1260	29	39	63
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	01	6	-	-	-	-	-	-	-	-	1	-	-	5	120		6	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-10%							
'90		22%			33%			00%			+72%							
'96		23%			00%			02%			+74%							
'01		04%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%			
												'90	299		11%			
												'96	1060		2%			
												'01	4120		3%			

A Y G R E	Form Class (No. of Plants)	1				2				3				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	'84	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	33	20	31	1
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	25	35	0
	'01	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	20	18	24	1
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	'90	1	-	-	-	-	-	-	-	-	-	1	-	-	-	33			1	
	'96	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20			1	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>						
'84		00%				00%				00%				+ 0%						
'90		00%				00%				00%				-39%						
'96		00%				00%				00%				+ 0%						
'01		00%				00%				00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	0%					
												'90	33		100%					
												'96	20		100%					
												'01	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							
Chrysothamnus viscidiflorus viscidiflorus												
S	84	2	-	-	-	-	-	-	2	2		
	90	-	-	-	-	-	-	-	0	0		
	96	8	-	-	-	-	-	-	160	8		
	01	6	-	-	-	-	-	-	120	6		
Y	84	31	-	-	-	-	-	-	1033	31		
	90	33	-	-	-	-	-	-	1100	33		
	96	103	-	-	-	-	-	-	2060	103		
	01	60	2	-	-	-	-	-	1240	62		
M	84	159	-	-	-	-	-	-	5300	15	24	159
	90	93	11	-	1	-	-	-	3500	11	15	105
	96	565	15	-	8	-	-	-	11760	14	23	588
	01	628	8	-	17	-	-	-	13060	11	19	653
D	84	17	-	-	-	-	-	-	566			17
	90	29	-	-	-	-	-	-	966			29
	96	13	7	-	1	-	-	-	420			21
	01	27	-	-	-	-	-	-	540			27
X	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	160			8
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%		-19%				
'90		07%		00%		00%		+61%				
'96		03%		00%		.28%		+ 4%				
'01		01%		00%		.67%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	6899	Dec:	8%
									'90	5566		17%
									'96	14240		3%
									'01	14840		4%

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	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'84	-	2	-	-	-	-	-	-	-	2	-	-	-	66	8	21	2
	'90	-	-	1	-	-	-	-	-	-	1	-	-	-	33	13	39	1
	'96	-	-	-	-	1	1	-	-	1	2	-	1	-	60	14	41	3
	'01	-	1	-	-	-	3	-	-	-	4	-	-	-	80	13	38	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		100%			00%			00%			-50%							
'90		00%			100%			00%			+67%							
'96		20%			40%			20%			+ 0%							
'01		20%			60%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	33		-			
												'96	100		-			
												'01	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				
Rosa woodsii																		
S	84	23	-	-	-	-	-	-	-	-	23	-	-	-	766		23	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	25	-	-	-	-	-	-	-	-	25	-	-	-	500		25	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	220	-	-	-	-	-	-	-	-	220	-	-	-	7333		220	
	90	242	-	-	-	-	-	-	-	-	242	-	-	-	8066		242	
	96	59	-	-	-	-	-	-	-	-	59	-	-	-	1180		59	
	01	122	159	-	-	-	-	-	-	-	281	-	-	-	5620		281	
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166	14	11	5
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	233	12	8	7
	96	130	-	-	-	-	-	-	-	-	130	-	-	-	2600	14	16	130
	01	7	6	-	-	-	-	4	-	-	17	-	-	-	340	15	9	17
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	266		8	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+12%							
'90		00%			00%			00%			-56%							
'96		00%			00%			00%			+37%							
'01		55%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	7499	Dec:	0%			
												'90	8565		3%			
												'96	3780		0%			
												'01	5960		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																		
Y	'84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	4	6	1	-	-	-	-	-	-	11	-	-	-	366	14 29	11	
	'90	3	1	2	-	-	-	-	-	-	6	-	-	-	200	17 27	6	
	'96	6	2	-	1	-	-	-	-	-	9	-	-	-	180	17 36	9	
	'01	5	5	-	2	-	-	-	-	-	12	-	-	-	240	14 29	12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		50%			08%			00%			-50%							
'90		17%			33%			00%			+ 0%							
'96		30%			00%			00%			+17%							
'01		42%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec:	-			
												'90	200		-			
												'96	200		-			
												'01	240		-			

Trend Study 4-2-01

Study site name: Echo Canyon.

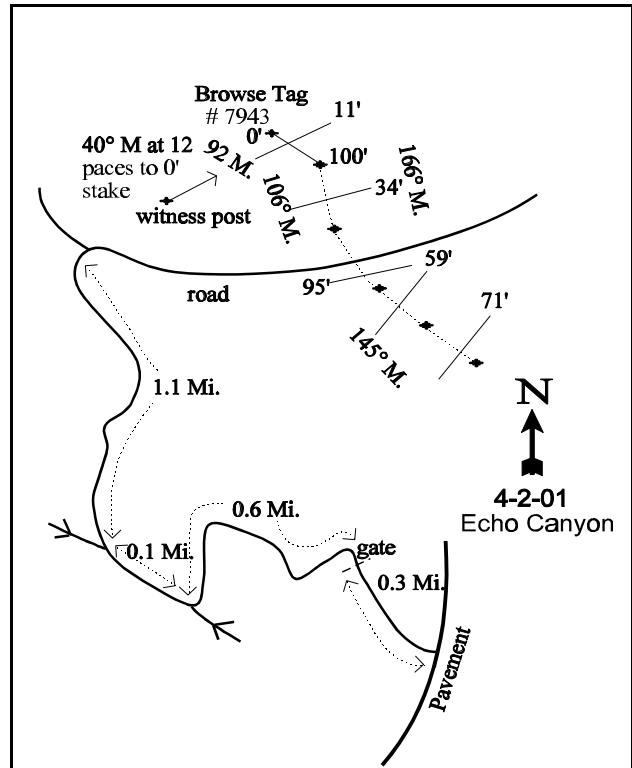
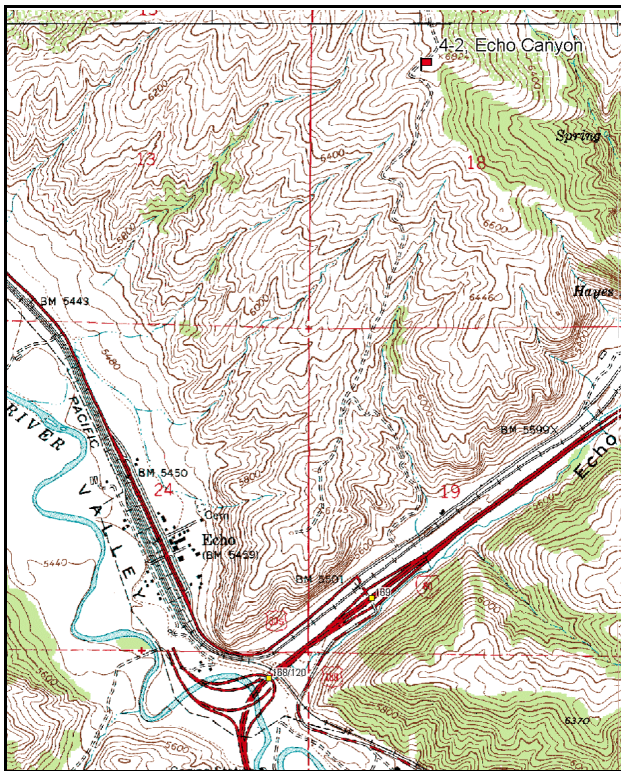
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 92 degrees magnetic.

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

LOCATION DESCRIPTION

From I-80 exit 169, just east of the I-80/I-84 junction, travel northeast towards Emery 0.1 miles, and turn left onto a dirt road. Proceed up the mountain 0.7 miles (passing through locked DWR gate) to a fork, and turn right. Proceed north 1.1 miles to a fork in the road and stop. From this point, walk 12 paces at 40 degrees magnetic to the witness post. The 0-foot baseline stake is 18 paces at 40 degrees magnetic from the witness post. The 0-foot baseline stake is marked by browse tag #7943. The baseline doglegs along the hillside. Line 1 runs 92 degrees magnetic. Line 2 runs 106 degrees magnetic. Line three runs 166 degrees magnetic. Lines 4 and 5 run 145 degrees magnetic.



Map Name: Coalville

Diagrammatic Sketch

Township 3N, Range 5E, Section 18

UTM 4538406 N 464007 E

DISCUSSION

Trend Study No. 4-2 (6-2)

The Echo Canyon study samples critical deer winter range located approximately one mile north of Echo Junction. The study site is dominated by a moderately dense but heavily browsed stand of mountain big sagebrush. Elk do not normally use this site, but did during 1983-84 because of the severe winter conditions. Physically, the study site is on a steep (40%) southwest slope with an elevation of 6,560 feet. Pellet group quadrat frequency was equal for deer and elk in 1996 at 17%. Sign of cattle use was also found on the area during the 1996 reading. Pellet group data from the site in 2001, estimated 50 deer days use/acre (124 ddu/ha). Elk and cattle use was low at 6 elk days use/acre (15 edu/ha) and 5 cow days use/acre (13 cdu/ha).

Soil parent material is a conglomerate, which breaks down into a gravelly soil of moderately shallow depth. Rock cobble is abundant on the surface and throughout the profile. The soil appears excessively drained and probably holds little available water in mid-summer. Soil texture is a sandy clay loam with a neutral soil reaction (pH of 7.0). Effective rooting depth is estimated at over 10 inches. Vegetation and litter cover are sufficient to protect the soil from serious erosion. The erosion condition class was determined to be slight in 2001.

Browse forage comes almost exclusively from mountain big sagebrush which accounts for over 90% of the browse cover. Sagebrush density was estimated at nearly 6,000 plants/acre in 1984. That number declined to just under 3,000 plants/acre in 1990. Utilization was extremely heavy in 1984 with 76% of the sagebrush displaying heavy use. Utilization was heavy on only 23% of the sagebrush in 1990, but percent decadence increased from 29% to 64%. Density remained similar in 1996 at 3,300 plants/acre and 2,780 in 2001. Use is normally moderate, vigor normal on most plants, and percent decadence moderate. Percent decadence declined to 19% in 1996, then rose to 31% in 2001. Annual leader growth, measured in 2001, averaged less than 2 inches (1.7").

The only other common shrub consists of broom snakeweed which numbered 1,540 plants/acre in 2001. The primary danger to this site is wildfire. A moderately dense understory of cheatgrass brome has demonstrated the capability to carry fire in this area. Nearby fires have consumed and virtually eliminated sagebrush on thousands of acres.

Perennial grasses and forbs provide relatively minor amounts of forage and ground cover. Only bluebunch wheatgrass is productive enough to be a significant forage producer. Sandberg bluegrass is also abundant but produces limited forage. Photographs taken from 1984 show an apparent increase in cheatgrass. However, annuals were not included quantitatively with the 1984 and 1990 samples. It accounted for 56% of the grass cover in 1996, but declined to 17% in 2001 because of the dry year. Other relatively common perennial grasses include bulbous bluegrass and Sandberg bluegrass. Forbs are diverse and fairly abundant. However, annual species account for over half of the forb cover. Common perennial forb species include Louisiana sage, three species of milkvetch, and silvery lupine.

1984 APPARENT TREND ASSESSMENT

Soil conditions appear stable. Past erosion has produced a soil surface relatively resistant to further erosion. Extreme rockiness, erosion pavement, and shrub cover all act to minimize erosion. Vegetative trend also appears stable. Mountain big sagebrush is the dominant browse which appears to be a stable. However, the herbaceous understory is depleted, with an excess of annual weeds posing an increased fire hazard.

1990 TREND ASSESSMENT

The soil trend has improved. Percent bare ground has declined from almost 12% to only 4%. Litter cover has also increased, while basal vegetative cover has increased dramatically. The mountain big sagebrush population declined 51% in number since 1984. Percent decadency has also increased from 29% to 64%. But, there was a large number of seedlings found in 1990, almost 2,000 seedlings per acre. There was actually more seedlings than decadent plants. The sagebrush show mostly moderate and some heavy hedging, yet display generally good vigor. Sagebrush canopy cover is estimated at 15%. While the understory remains dominated by cheatgrass, the sum of nested frequency for bluebunch wheatgrass increased significantly. Annual grasses provide the bulk of the vegetative and litter cover. Nested frequency of perennial forbs have declined. The site appears to have supported increased elk winter use in recent years.

TREND ASSESSMENT

soil - up (5)

browse - down (1)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Trend for the soil is stable. Percent bare ground has remained low at around 3% while litter cover continues to be high at 59%. Unfortunately, most of the vegetation and litter cover comes from the dense stand of annual cheatgrass. Erosion does not appear to be a major problem at this time. Trend for mountain big sagebrush is up. Sagebrush density has remained comparable, yet utilization is lighter, percent decadence lower, and vigor improved. Few seedlings were encountered in 1996, but young plants are fairly numerous. Trend for the herbaceous understory is also up. Sum of nested frequency for perennial grasses and forbs has increased. However, composition is still poor as cheatgrass currently accounts for 56% of the grass cover and annual forbs provide 62% of the forb cover.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - up but understory still dominated by annuals (5)

2001 TREND ASSESSMENT

Trend for soil is down slightly. Percent cover of bare ground increased from 3% to 9%, while litter cover declined. Some of the change is due to the decline in frequency and cover of cheatgrass which has dropped in cover from 14% to only 4%. Vegetation cover has remained similar, but due to the decline in litter cover, the ratio of protective ground cover to bare ground has declined by 38%. The erosion condition class was determined to be slight. Trend for the key browse species, mountain big sagebrush, is down slightly. Density has declined 16%, young recruitment is non existent, and percent decadence has increased from 19% in 1996 to 31% in 2001. Utilization is light to moderate, with normal vigor on most plants. The current trend is most likely driven by the dry conditions of the past 3 years (1999-2001). Trend for the herbaceous understory is up for perennial grasses but down for perennial forbs. The improvement in the grass component is primarily due to a significant decline in the nested frequency of the annual cheatgrass and a significant increase in the frequency of Sandberg bluegrass. Nested frequency of the low value perennial, bulbous bluegrass, also increased significantly. Since perennial grasses provide two thirds of the herbaceous cover, the overall herbaceous trend is considered slightly up.

TREND ASSESSMENT

soil - down slightly (2)

browse - down slightly (2)

herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 2

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	_a 125	_b 179	_b 182	_b 184	56	70	69	68	7.53	7.38
G	Bromus japonicus (a)	-	-	_a 16	_b 33	-	-	6	13	.08	.36
G	Bromus tectorum (a)	-	-	_b 330	_a 169	-	-	91	59	13.71	4.04
G	Poa bulbosa	_a -	_a -	_b 58	_c 85	-	-	20	35	1.31	2.56
G	Poa fendleriana	-	-	6	3	-	-	2	1	.01	.03
G	Poa pratensis	7	17	10	17	4	9	5	6	.12	.66
G	Poa secunda	_a 20	_a 22	_b 83	_c 169	8	11	30	56	1.81	7.96
G	Sitanion hystrix	-	-	1	-	-	-	1	-	.00	-
G	Sporobolus cryptandrus	-	-	4	8	-	-	2	4	.03	.07
G	Stipa lettermani	-	-	-	7	-	-	-	2	-	.06
Total for Annual Grasses		0	0	346	202	0	0	97	72	13.79	4.40
Total for Perennial Grasses		152	218	344	473	68	90	129	172	10.82	18.72
Total for Grasses		152	218	690	675	68	90	226	244	24.62	23.13
F	Achillea millefolium	-	2	4	4	-	1	2	2	.01	.01
F	Agoseris glauca	6	9	6	13	3	5	2	5	.01	.10
F	Allium acuminatum	_c 145	_a 6	_a -	_b 21	60	3	-	11	-	.11
F	Alyssum alyssoides (a)	-	-	199	167	-	-	67	65	5.09	1.06
F	Ambrosia psilostachya	-	-	-	-	-	-	-	-	-	.00
F	Antennaria rosea	-	-	-	3	-	-	-	2	-	.03
F	Artemisia ludoviciana	_{bc} 45	_c 65	_a 19	_{ab} 26	19	23	6	8	1.32	1.85
F	Astragalus beckwithii	-	-	9	9	-	-	3	3	.07	.24
F	Astragalus cibarius	_c 163	_a -	_b 15	_b 22	67	-	9	10	.09	.34
F	Astragalus utahensis	_a 6	_a 5	_c 75	_b 39	4	2	35	19	1.76	1.37
F	Castilleja linariaefolia	-	-	2	4	-	-	1	2	.00	.04
F	Camelina microcarpa (a)	-	-	-	8	-	-	-	4	-	.07
F	Calochortus nuttallii	1	-	1	6	1	-	1	3	.00	.02
F	Cirsium undulatum	6	17	13	5	3	7	7	3	.29	.18
F	Collomia linearis (a)	-	-	_a 14	_b 39	-	-	7	17	.04	.18
F	Collinsia parviflora (a)	-	-	_a 22	_b 97	-	-	9	35	.07	.72
F	Crepis acuminata	-	-	1	2	-	-	1	1	.00	.00

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Cymopterus spp.	A ⁻	a ⁻	a ⁻	b ¹³	-	-	-	7	-	.06
F	Descurainia pinnata (a)	-	-	-	3	-	-	-	2	-	.01
F	Draba spp. (a)	-	-	106	93	-	-	38	34	.31	.24
F	Epilobium brachycarpum (a)	-	-	a ⁻	b ¹⁰	-	-	-	5	-	.02
F	Erodium cicutarium (a)	-	-	b ⁹⁷	a ⁵⁷	-	-	32	20	2.56	2.00
F	Erigeron pumilus	-	-	-	3	-	-	-	1	-	.00
F	Eriogonum umbellatum	-	-	-	2	-	-	-	1	-	.00
F	Galium spp.	-	-	b ¹⁴	a ²	-	-	7	1	.08	.00
F	Grindelia squarrosa	a ⁻	a ⁻	b ²²	b ¹⁰	-	-	10	5	.10	.34
F	Heterotheca villosa	-	1	3	2	-	1	1	1	.00	.15
F	Holosteum umbellatum (a)	-	-	b ²³⁹	a ¹⁰⁶	-	-	78	37	1.67	.66
F	Lactuca serriola	-	-	3	-	-	-	2	-	.01	-
F	Lomatium spp.	a ⁻	a ³	b ²⁸	ab ¹⁹	-	3	14	7	.09	.14
F	Lupinus argenteus	a ¹	a ³	b ²⁵	b ³¹	1	3	13	16	.97	1.37
F	Machaeranthera spp	a ⁻	a ⁻	b ⁴²	a ⁻	-	-	20	-	.10	-
F	Microsteris gracilis (a)	-	-	a ⁻	b ²²	-	-	-	10	-	.05
F	Penstemon spp.	B ¹⁹	a ⁻	a ⁻	a ⁻	9	-	-	-	-	-
F	Ranunculus testiculatus (a)	-	-	a ²⁴	b ⁵³	-	-	10	19	.10	.53
F	Senecio integerrimus	-	-	-	2	-	-	-	1	-	.00
F	Sphaeralcea grossulariaefolia	-	-	4	-	-	-	2	-	.18	-
F	Taraxacum officinale	-	-	-	2	-	-	-	1	-	.00
F	Tragopogon dubius	a ⁻	bc ³⁵	c ⁶¹	b ³¹	-	18	26	16	.37	.49
F	Veronica biloba (a)	-	-	-	1	-	-	-	1	-	.00
F	Verbascum thapsus	-	-	-	4	-	-	-	2	-	.01
F	Vicia americana	a ⁻	a ¹⁰	c ⁶³	b ³⁶	-	4	25	15	.57	.36
F	Zigadenus paniculatus	-	1	-	-	-	1	-	-	-	-
Total for Annual Forbs		0	0	701	656	0	0	241	249	9.86	5.57
Total for Perennial Forbs		392	157	410	311	167	71	187	143	6.07	7.27
Total for Forbs		392	157	1111	967	167	71	428	392	15.94	12.85

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 04 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	75	77	14.32	15.01
B	Chrysothamnus nauseosus albicaulis	4	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	4	2	.45	.53
B	Gutierrezia sarothrae	20	34	.29	.90
B	Opuntia spp.	6	6	-	-
B	Symphoricarpos oreophilus	4	5	.18	.04
Total for Browse		113	125	15.25	16.48

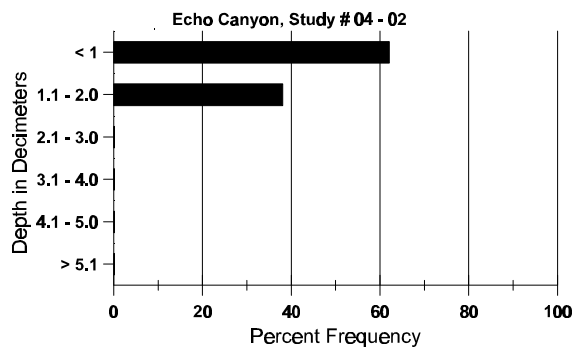
BASIC COVER --
Herd unit 04 , Study no: 2

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	387	369	2.50	10.50	49.46	50.97
Rock	254	244	23.00	13.50	9.88	11.98
Pavement	219	268	13.25	9.25	6.84	11.67
Litter	394	356	49.75	63.00	59.37	43.15
Cryptogams	16	22	0	0	.03	.10
Bare Ground	137	207	11.50	3.75	2.89	9.38

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 02, Echo Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.5	47.4 (10.6)	7.0	46.7	27.0	26.3	3.1	25.9	192.0	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 04 , Study no: 2

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Elk	17	1	78	6 (15)
Deer	17	29	653	50 (124)
Cattle	2	1	61	5 (13)

BROWSE CHARACTERISTICS --

Herd unit 04 , Study no: 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	
Amelanchier alnifolia																	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	0	32	29	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	0	34	37	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
	'84	00%			00%			00%									
	'90	00%			00%			00%									
	'96	00%			00%			00%									
	'01	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-			
											'90	0		-			
											'96	0		-			
											'01	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				
Artemisia tridentata vaseyana																		
S	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	29	-	-	-	-	-	-	-	-	29	-	-	-	1933		29	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	27	-	-	-	-	-	-	-	-	27	-	-	-	540		27	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	18	45	-	-	-	-	-	-	63	-	-	-	4200	26 35	63	
	90	1	10	5	-	-	-	-	-	-	16	-	-	-	1066	26 35	16	
	96	41	61	4	-	-	-	-	-	-	105	-	1	-	2120	18 37	106	
	01	33	53	10	-	-	-	-	-	-	94	2	-	-	1920	23 44	96	
D	84	-	3	23	-	-	-	-	-	-	26	-	-	-	1733		26	
	90	4	19	5	-	-	-	-	-	-	25	-	-	3	1866		28	
	96	17	12	3	-	-	-	-	-	-	31	-	-	1	640		32	
	01	16	20	7	-	-	-	-	-	-	30	-	3	10	860		43	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	860		43	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	320		16	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		23%			76%			00%			-51%							
'90		66%			23%			07%			+11%							
'96		44%			04%			01%			-16%							
'01		53%			12%			09%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	5999	Dec:	29%			
												'90	2932		64%			
												'96	3300		19%			
												'01	2780		31%			

A Y G R E	Form Class (No. of Plants)	1				2				3				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	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0				
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0				
	96	4	-	-	-	-	-	-	-	-	-	-	-	80	18	30	4				
	01	1	-	-	-	-	-	-	-	-	-	-	-	20	29	41	1				
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0				
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0				
	96	-	-	-	-	-	-	-	-	-	-	-	-	20			1				
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0				
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>							
'84		00%				00%				00%											
'90		00%				00%				00%											
'96		00%				00%				00%				-75%							
'01		00%				00%				00%											
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-						
												'90	0		-						
												'96	80		-						
												'01	20		-						
Chrysothamnus viscidiflorus viscidiflorus																					
M	84	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	66	7	9	1
	90	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	66	9	20	1
	96	3	-	-	1	-	-	-	-	-	-	-	-	4	-	-	-	80	12	22	4
	01	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	40	10	19	2
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>							
'84		00%				00%				00%				+ 0%							
'90		00%				00%				100%				+18%							
'96		00%				00%				00%				-50%							
'01		00%				00%				00%											
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-						
												'90	66		-						
												'96	80		-						
												'01	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				
Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	49	-	-	-	-	-	-	-	-	49	-	-	-	980		49	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	26	-	-	-	-	-	-	-	-	26	-	-	-	520		26	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	41	-	-	-	-	-	-	-	-	41	-	-	-	820	8	11	
	01	70	-	-	-	-	-	-	-	-	70	-	-	-	1400	7	9	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	5	-	-	-	-	-	-	-	-	3	-	-	2	100		5	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+13%							
'01		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	1340		0%			
												'01	1540		6%			

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	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	6	12	11
	'01	10	1	-	-	-	-	-	-	-	8	-	-	3	220	4	10	11
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+ 8%							
'01		08%			00%			23%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	240		-			
												'01	260		-			
Symphoricarpos oreophilus																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	25	25	1
	'01	4	-	-	-	-	-	2	-	-	6	-	-	-	120	16	22	6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	80		-			
												'01	120		-			

Trend Study 4-3-01

Study site name: Tank Canyon.

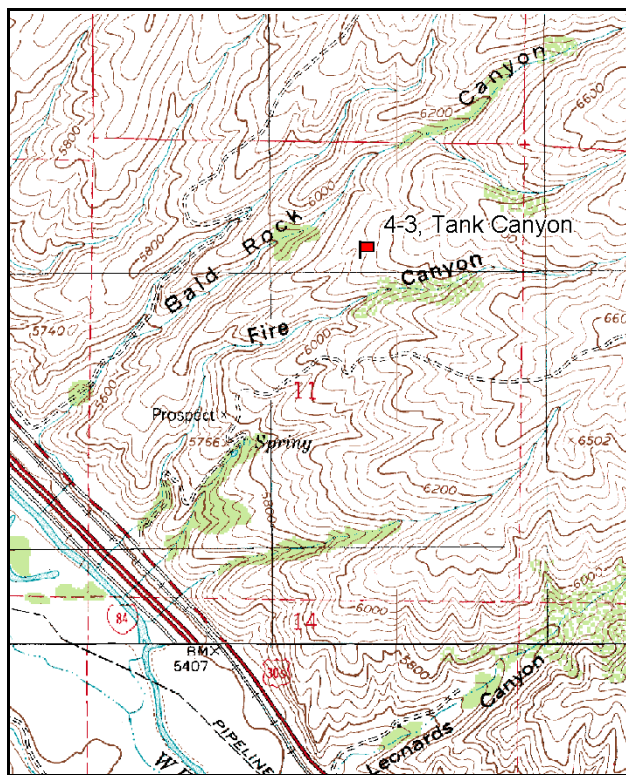
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 146 degrees magnetic.

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

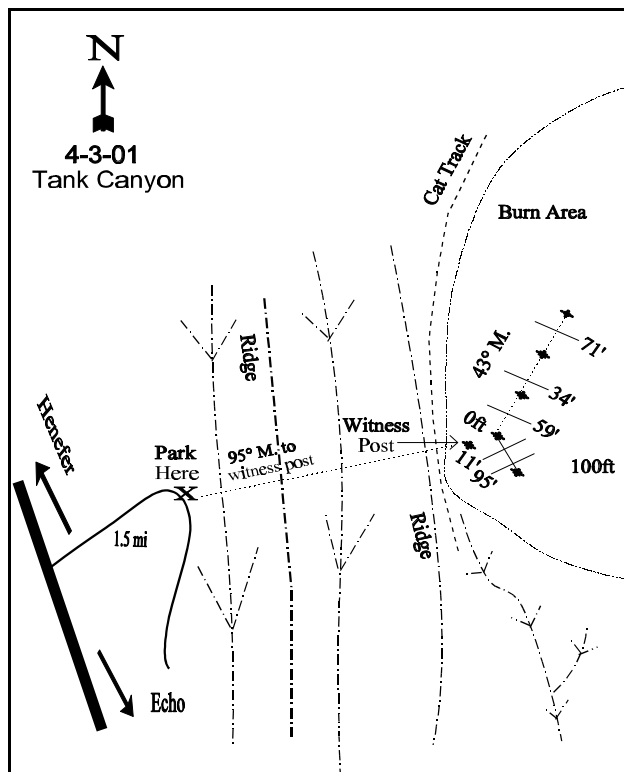
LOCATION DESCRIPTION

From the East Henefer Exit, travel east parallel to the freeway. Proceed 1.5 miles to the Fire Canyon Access road to a point where the road switchbacks. Park here and walk up a ridge, down the other side and up the next ridge to an open area that has been burned. A witness post is in the opening. The 0-foot baseline stake is just north of the witness post. The 0-foot baseline stake is marked with browse tag #7944. Line 1 runs at a bearing of 146 degrees magnetic. The rest of the baseline runs off the 0-foot baseline in a direction of 43 degrees magnetic.



Map Name: Henefer

Township 3N, Range 4E, Section 11



Diagrammatic Sketch

UTM 4540050 N 461327 E

DISCUSSION

Trend Study No. 4-3

The Tank Canyon trend study samples critical deer winter range on the Henefer-Echo wildlife management area between Tank Canyon and Bald Rock Canyon. The study is on a 30% west facing slope at 6,160 feet elevation. The range type is an extension or pocket of mountain big sagebrush/grass which is closely bordered by an extensive burn from a 1982 fire. Another small fire burned the area some time between 1984 and 1990. The original frequency baseline and one density plot were burned while the other two density plots remained in the sagebrush. The site was read in 1990 with no change to the layout making the frequency data totally different from the density data. During the 1996 reading, the stakes were moved into the burned area. Deer used the area fairly heavily in 1984. Pellet groups were abundant and several winter-killed carcasses were seen in the immediate vicinity during that reading. Pellet group quadrat frequencies were low for deer and elk in 1996, but some sheep apparently used the area during the summer. A pellet transect read on the site in 2001, estimated 46 elk and 21 deer days use/acre (112 edu/ha and 51 ddu/ha). Most of the deer pellet groups appeared to be from spring use. About half of the elk pellet groups were from spring use and the other half were from winter use.

Soil should be similar to that described for Echo Canyon 4-2, insofar as drainage, parent material, depth, and available water capacity are concerned. One major difference is that this site contains markedly fewer large cobblestones and may be slightly less gravelly in texture. Soil texture is a clay loam with a neutral soil reaction (pH of 7.0). Effective rooting depth is estimated at just over 16 inches with a moderate soil temperature of 64°F at 16 inches in depth. Phosphorus is marginal at only 9.8 ppm, where values less than 10 ppm have been shown to limit plant growth and development. Soil erosion is minimal due to the abundant herbaceous cover. The erosion condition class was determined to be stable in 2001.

Prior to the burn between 1984 and 1990, the browse composition consisted primarily of mountain big sagebrush, with lesser amounts of stickyleaf low rabbitbrush, mountain snowberry, and Saskatoon serviceberry. Long-term utilization of big sagebrush appeared at that time to be moderate. Utilization during the winter of 1983-84 was relatively light because deep crusted snow cover remained for most of the winter, which gave all but the tallest browse a temporary rest from use. Population density of mountain big sagebrush was estimated at 9,865 plants/acre in 1984. The mountain big sagebrush population was vigorous and fully capable of maintaining itself. After 1984, a small fire of approximately 40 acres burned the slope. One of the three original density plots was burned along with the frequency baseline. As a result, density of mountain big sagebrush declined to 4,599 plants/acre in 1990. Utilization was light to moderate. During the 1996 reading, the baseline was lengthened and placed inside of the burned area. This resulted in the density of sagebrush declining to only 220 plants/acre. Utilization of these shrubs was light. Density declined further in 2001, to only 120 lightly browsed plants/acre. Half of the population consists of young plants.

The most numerous shrub on the site is stickyleaf low rabbitbrush which had a density of 3,500 plants/acre in 1996. This rabbitbrush declined to 1,900 plants/acre in 2001. Density was extremely high in 1990, due in part to a large number of young plants (3,000 plants/acre). The current population appears stable, mostly mature, and mostly unutilized.

Grasses and forbs were rare prior to the burn. The small burned area was seeded prior to the 1990 reading. Sum of nested frequency for perennial grasses tripled as a result. Seeded alfalfa and small burnet were also abundant. The two most numerous grasses consisted of bulbous bluegrass and crested wheatgrass. Intermediate wheatgrass and smooth brome were also seeded. By 1996, sum of nested frequency for perennial grasses increased slightly, while frequency of perennial forbs doubled. Crested wheatgrass and bulbous bluegrass increased significantly in nested frequency. Alfalfa also increased significantly in nested frequency

with small burnet declined significantly. During the 2001 reading, crested wheatgrass again increased significantly in nested frequency. Bulbous bluegrass also increased significantly. Alfalfa is still the dominant forb. It provided 87% of the forb cover in 1996 and 2001.

1984 APPARENT TREND ASSESSMENT

This study area appears to have stable soil and vegetation trends. No serious erosion is apparent and the current plant community should persist unless some outside disturbance occurs.

1990 TREND ASSESSMENT

This site has burned since 1984. The 1990 data will provide baseline data on successional changes following the fire. Currently, bulbous bluegrass, crested wheatgrass, intermediate wheatgrass, and smooth brome dominate. Seeded alfalfa is also abundant within the burned area. Herbaceous vegetation is very limited in the dense, unburned sagebrush stand where sagebrush canopy cover averages 16%. Sagebrush was completely eliminated within the burned area, but a few seedlings have already become established on the site.

TREND ASSESSMENT

soil - stable (3)

browse - downward, 53% loss to fire (1)

herbaceous understory - upward, good establishment of seeded species (5)

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 23% to only 2%. Litter cover has also increased by 30% with no noticeable erosion. Trend for browse is down when compared to the unburned area adjacent to the site. During the 1990 reading, two of the three density plots occurred outside of the burn. In 1996, the base line was lengthened and placed completely inside of the burn. As a result, the density of sagebrush dropped from 4,599 plants/acre to only 220. Trend for browse inside of the burn is considered stable. No seedlings were encountered, but young plants account for 36% of the population. In addition, use is light and vigor good. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses and forbs has increased, including a significant increase in the nested frequency of crested wheatgrass, bulbous bluegrass, smooth brome, and alfalfa.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - slightly up (4)

2001 TREND ASSESSMENT

Trend for soil is stable. Percent cover of bare ground has increased slightly and litter cover has declined 45%. However, herbaceous cover increased from 50% to 76% making for ample protective cover to help prevent erosion. Density of mountain big sagebrush has declined slightly to 120 plants/acre, but half of the population consists of young plants. Density of serviceberry has increased from 60 plants/acre in 1996 to 220 plants/acre. The most abundant shrub on the site is still stickyleaf low rabbitbrush which currently provides nearly half of the shrub cover. While being the most abundant shrub, it's density has declined 46% since 1996. Taking all of these factors into account, trend for browse is considered stable but still depleted. Trend for the herbaceous understory is up slightly. Sum of nested frequency of perennial grasses has increased

slightly including a significant increase in the nested frequency of crested wheatgrass and bulbous bluegrass. Total grass cover has also increased from 36% in 1996, to 58% in 2001. Sum of nested frequency for perennial forbs has declined slightly but alfalfa, which accounts for nearly 90% of the forb cover, has remained stable. Utilization of grasses and forbs was light in 2001.

TREND ASSESSMENT

soil - stable (3)

browse - stable but depleted (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 3

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	a ₂	b ₂₃₁	c ₂₇₅	d ₃₂₂	2	83	89	98	14.40	28.78
G	Agropyron dasystachyum	a ⁻	a ⁻	b ₁₂	a ⁻	-	-	6	-	.10	-
G	Agropyron intermedium	a ⁻	c ₉₆	c ₅₆	b ₇₀	-	48	23	25	.77	2.92
G	Agropyron spicatum	15	3	15	4	7	1	5	2	1.08	.18
G	Bromus inermis	-	50	52	20	-	27	23	8	.70	.38
G	Bromus japonicus (a)	-	-	3	-	-	-	1	-	.00	-
G	Bromus tectorum (a)	-	-	b ₁₅	a ₁	-	-	8	1	.21	.00
G	Festuca ovina	-	-	3	3	-	-	2	1	.18	.00
G	Oryzopsis hymenoides	1	-	-	-	1	-	-	-	-	-
G	Poa bulbosa	a ⁻	b ₂₂₈	c ₂₈₇	d ₃₅₈	-	83	81	100	18.70	24.53
G	Poa fendleriana	-	1	-	-	-	1	-	-	-	-
G	Poa pratensis	b ₁₂	a ⁻	a ⁻	a ⁻	7	-	-	-	-	-
G	Poa secunda	d ₂₅₃	c ₅₈	a ⁻	b ₁₈	96	25	-	9	-	.81
G	Sitanion hystrix	-	-	1	1	-	-	1	1	.00	.00
Total for Annual Grasses		0	0	18	1	0	0	9	1	0.21	0.00
Total for Perennial Grasses		283	667	701	796	113	268	230	244	35.96	57.62
Total for Grasses		283	667	719	797	113	268	239	245	36.18	57.62
F	Achillea millefolium	3	-	-	-	1	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	69	52	-	-	27	26	.26	.18
F	Astragalus spp.	B ₁₃	a ₁	a ⁻	a ⁻	8	1	-	-	-	-
F	Calochortus nuttallii	-	-	-	3	-	-	-	2	-	.01
F	Cirsium undulatum	-	-	2	4	-	-	1	2	.00	.30
F	Collomia linearis (a)	-	-	-	2	-	-	-	1	-	.00
F	Comandra pallida	-	-	1	-	-	-	1	-	.00	-
F	Collinsia parviflora (a)	-	-	-	2	-	-	-	1	-	.00
F	Cymopterus spp.	-	-	-	5	-	-	-	3	-	.04

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Descurainia pinnata (a)	-	-	-	1	-	-	-	1	-	.00
F	Erodium cicutarium (a)	-	-	-	7	-	-	-	4	-	.04
F	Eriogonum ovalifolium	-	-	3	-	-	-	1	-	.00	-
F	Lesquerella spp.	-	-	-	3	-	-	-	1	-	.00
F	Medicago sativa	a-	b123	c169	c183	-	47	70	75	11.81	16.42
F	Polygonum douglasii (a)	-	-	5	-	-	-	2	-	.01	-
F	Sanguisorba minor	a-	b24	a9	a5	-	13	4	2	.06	.18
F	Sisymbrium altissimum (a)	-	-	-	1	-	-	-	1	-	.00
F	Sphaeralcea coccinea	-	-	2	-	-	-	1	-	.03	-
F	Tragopogon dubius	a-	a5	b23	a7	-	3	14	3	.11	.09
F	Vicia americana	a-	a-	c173	b102	-	-	74	46	1.22	1.50
Total for Annual Forbs		0	0	74	65	0	0	29	34	0.26	0.24
Total for Perennial Forbs		16	153	382	312	9	64	166	134	13.26	18.55
Total for Forbs		16	153	456	377	9	64	195	168	13.53	18.80

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 04 , Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	3	1	-	-
B	Artemisia tridentata vaseyana	9	3	.68	1.13
B	Chrysothamnus nauseosus albicaulis	6	6	.48	.39
B	Chrysothamnus viscidiflorus viscidiflorus	66	38	3.00	1.44
B	Gutierrezia sarothrae	6	6	.01	-
Total for Browse		90	54	4.18	2.97

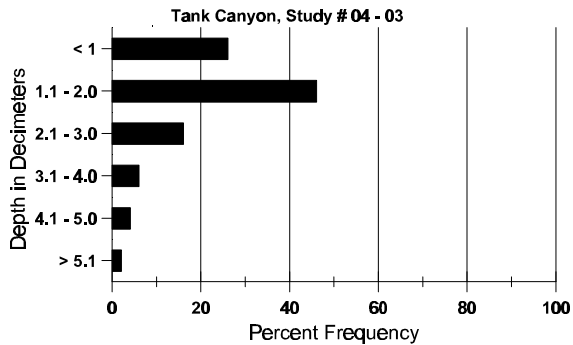
BASIC COVER --
Herd unit 04 , Study no: 3

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	384	390	3.25	10.75	53.31	68.63
Rock	205	134	2.25	3.75	3.11	2.72
Pavement	185	225	11.75	18.25	1.29	3.76
Litter	400	345	73.25	44.50	63.50	34.77
Cryptogams	59	30	.25	0	.40	.58
Bare Ground	111	151	9.25	22.75	1.60	3.50

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 03, Tank Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.3	64.0 (16.0)	7.0	41.9	29.7	28.4	3.8	9.8	108.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 04 , Study no: 3

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Sheep	26	-	-	-
Rabbit	-	6	26	N/A
Elk	9	15	592	46 (112)
Deer	11	12	270	21 (51)
Cattle	-	4	-	-

BROWSE CHARACTERISTICS --

Herd unit 04 , 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				
Amelanchier alnifolia																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	133	18	11	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	2	1	-	-	-	-	-	-	3	-	-	-	60	22	26	3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	20	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	1	-	-	-	-	-	1	-	-	1	133			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			+33%							
'90		00%			00%			33%			-70%							
'96		67%			33%			00%			+73%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	0%			
												'90	199		67%			
												'96	60		0%			
												'01	220		0%			

A Y G R E	Form Class (No. of Plants)	1				2				3				4				Plants Per Acre	Average (inches) Ht. Cr.		Total																							
		1	2	3	4	5	6	7	8	9	1	2	3	4	1	2																												
Artemisia tridentata vaseyana																																												
S	84	19	4	-	-	-	-	-	-	-	-	-	-	23	-	-	-	1533		23																								
	90	7	-	-	2	-	-	-	-	-	-	-	-	9	-	-	-	600		9																								
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																								
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																								
Y	84	28	13	-	-	-	-	-	-	-	-	-	-	41	-	-	-	2733		41																								
	90	17	-	-	-	-	-	-	-	-	-	-	-	15	-	2	-	1133		17																								
	96	4	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	420		21																								
	01	-	-	1	2	-	-	-	-	-	-	-	-	3	-	-	-	1340		67																								
M	84	22	37	8	-	-	-	-	-	-	-	-	-	67	-	-	-	4466	28 32	67																								
	90	12	12	2	-	-	-	-	-	-	-	-	-	24	2	-	-	1733	26 34	26																								
	96	6	1	-	-	-	-	-	-	-	-	-	-	7	-	-	-	480	21 27	24																								
	01	-	-	1	2	-	-	-	-	-	-	-	-	3	-	-	-	1340	22 22	67																								
D	84	9	26	5	-	-	-	-	-	-	-	-	-	40	-	-	-	2666		40																								
	90	15	6	4	-	1	-	-	-	-	-	-	-	20	1	-	5	1733		26																								
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																								
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																								
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																								
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																								
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1960		98																								
	01	-	-	1	2	-	-	-	-	-	-	-	-	3	-	-	-	1340		67																								
<table border="0"> <tr> <td>% Plants Showing</td> <td><u>Moderate Use</u></td> <td><u>Heavy Use</u></td> <td><u>Poor Vigor</u></td> <td><u>%Change</u></td> </tr> <tr> <td>'84</td> <td>51%</td> <td>09%</td> <td>00%</td> <td>-53%</td> </tr> <tr> <td>'90</td> <td>28%</td> <td>09%</td> <td>10%</td> <td>-80%</td> </tr> <tr> <td>'96</td> <td>02%</td> <td>00%</td> <td>00%</td> <td>+66%</td> </tr> <tr> <td>'01</td> <td>00%</td> <td>01%</td> <td>00%</td> <td></td> </tr> </table>																				% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>	'84	51%	09%	00%	-53%	'90	28%	09%	10%	-80%	'96	02%	00%	00%	+66%	'01	00%	01%	00%	
% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>																																								
'84	51%	09%	00%	-53%																																								
'90	28%	09%	10%	-80%																																								
'96	02%	00%	00%	+66%																																								
'01	00%	01%	00%																																									
Total Plants/Acre (excluding Dead & Seedlings)															'84	9865	Dec:	27%																										
															'90	4599		38%																										
															'96	900		0%																										
															'01	2680		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				
Chrysothamnus nauseosus albicaulis																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	24	36	5
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	24	27	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	140		14%			
												'01	140		43%			

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				
Chrysothamnus viscidiflorus viscidiflorus												
S	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	7	-	-	-	-	-	-	140		7	
	01	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	0		0	
	90	40	4	1	-	-	-	-	3000		45	
	96	25	3	-	-	-	-	-	560		28	
	01	6	-	-	-	-	-	-	120		6	
M	84	31	-	-	-	-	-	-	2066	11	12	31
	90	32	20	14	3	-	-	2	4733	9	11	71
	96	101	42	-	-	-	-	-	2860	13	19	143
	01	84	-	-	-	-	-	-	1680	8	11	84
D	84	28	-	-	-	-	-	-	1866			28
	90	18	5	5	-	-	-	-	1866			28
	96	4	-	-	-	-	-	-	80			4
	01	5	-	-	-	-	-	-	100			5
X	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%		+59%				
'90		20%		14%		15%		-64%				
'96		26%		00%		02%		-46%				
'01		00%		00%		01%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	3932	Dec:	47%			
						'90	9599		19%			
						'96	3500		2%			
						'01	1900		5%			

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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	7	10	4
	01	13	-	-	-	-	-	-	-	-	13	-	-	-	260	9	9	13
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+21%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	220		-				
											'01	280		-				
<i>Opuntia spp.</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	21	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	0		-				
											'01	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																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	22	13	1
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	45	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+ 0%							
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	0		-			
												'01	0		-			

Trend Study 4-4-01

Study site name: Owen's Canyon.

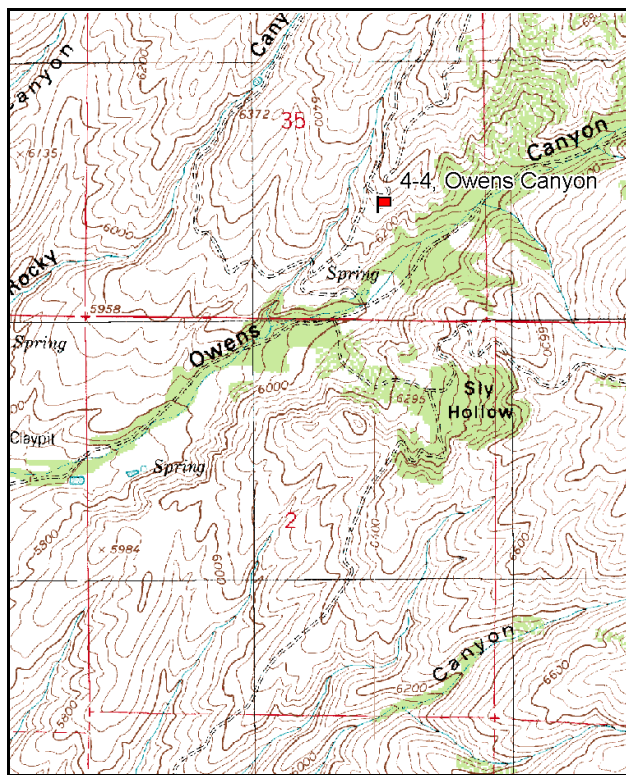
Vegetation type: Burned and Seeded.

Compass bearing: frequency baseline 160 degrees magnetic.

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

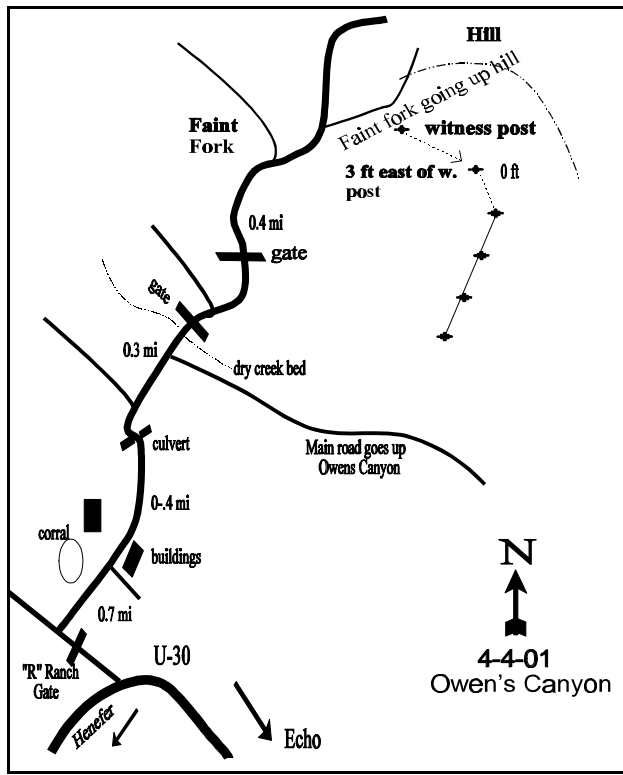
LOCATION DESCRIPTION

From the "R" Ranch main gate (contact Tiny Wostinhume for key or access through Tank Canyon), proceed 0.7 miles to the ranch buildings and a road to the right. Continue straight 0.4 miles to a culvert, then 0.45 miles further to a DWR gate. Continue through the gate 0.25 miles, turn left, cross the wash, stay on main road (left fork leads to DWR cabin). Proceed 0.4 miles to a fork in the road. Continue right for 0.3 miles. A witness post is three feet from the 0-foot stake. The 0-foot baseline stake is marked by browse tag #7945. The baseline doglegs after the 100-foot baseline stake and runs 214 degrees magnetic.



Map Name: Henefer

Township 4N, Range 4E, Section 35



Diagrammatic Sketch

UTM 4542410 N 461470 E

DISCUSSION

Trend Study No. 4-4

The Owen's Canyon study samples a mountain big sagebrush/grass type on a steep (30%) southwest slope at 6,200 feet in elevation. Located on Division of Wildlife Resources property on the north side of Owen's Canyon, this area in the past was considered an important winter range for deer. Elk make light use of the area during exceptionally heavy winters. Deer pellet groups were moderately abundant during the 1984 reading. Forage utilization was not exceptionally heavy. However, due to deep crusted snow in 1983-84, it prevented normal use patterns. During the 1996 reading, few deer and elk pellet groups were encountered. Some cattle also grazed the area in 1996. A fire burned the entire area prior to the 2001 reading. A pellet group transect read on the site in 2001, estimated 9 elk and 4 deer days use/acre (23 edu/ha and 10 ddu/ha).

The soil is moderately shallow and gravelly or cobbly. Effective rooting depth is estimated at only about 10 inches. It has a relatively high soil temperature of 66°F at just over 9 inches in depth. Soil texture is a clay loam with a neutral soil reaction (pH of 6.7). Drainage is probably excessive and soil moisture may be limiting in the upper horizons during midsummer. Big sagebrush and other deep rooted shrubs do well on the site indicating that rooting depth is generally not limiting for these species. This soil appears to have a high erosion potential. However, a moderate cover of shrub crowns, perennial grasses, annual grasses, and litter is effective in preventing most soil loss. After the fire, the abundant herbaceous cover appears adequate for protecting the soil from erosion. The erosion condition class for the site was determined as stable.

Prior to the burn, the browse composition consisted chiefly of mountain big sagebrush which accounted for 91% of the browse cover in 1996. Some of the sagebrush found on the site had growth form characteristics of basin big sagebrush (*Artemisia tridentata tridentata*). This would indicate some hybridization with mountain big sagebrush (*A. tridentata vaseyana*). Population density had remained fairly constant since 1984, ranging from 3,966 plants/acre in 1990 to 3,420 in 1996. In 1996, the population was mostly mature (69%), lightly to moderately hedged, in good vigor, with a low percent decadency (22%). Heavy utilization peaked in 1990, when 20% of the population displayed a heavily hedged growth form. Percent decadency also peaked that year at 43%. Dead plants, first sampled in 1996, were abundant at 1,180 plants/acre. This would suggest that many of the decadent plants sampled in 1990 died and were being replaced by young plants.

The fire which burned the site prior to the 2001 reading eliminated nearly all of the shrubs. The only browse found on the site in 2001 included a few sagebrush seedlings and young, some resprouting stickyleaf low rabbitbrush, and seeded prostate Kochia. Kochia currently ('01) numbers 1,460 plants/acre. Most of the population (71%) consists of small young plants.

Herbaceous composition primarily consists of grasses. Cheatgrass and Japanese brome were common and accounted for 63% of the total grass cover in 1996. After the burn, cheatgrass and Japanese brome provide only 9% of the grass cover. The most important herbaceous plants are exotic perennial grasses, crested and intermediate wheatgrass and smooth brome. Several other native perennial grasses are found on the site but only western wheatgrass is abundant. Forbs consist primarily of weedy biennials and annuals. The only common perennial forbs consist of northern sweet vetch and American vetch.

1984 APPARENT TREND ASSESSMENT

Although soil movement is detectable, it is not serious. A vigorous grass and shrub cover in combination with gentle to moderate slope helps maintain a stable trend. Vegetative trend also appears stable in spite of a somewhat exotic plant composition, where the understory is primarily seeded grasses. The key species is vigorous and should maintain itself.

1990 TREND ASSESSMENT

The sagebrush population on this important winter range appears to be stable. The only indication of downward trend is the increase in percent decadency, from 17% to 43%. The number of decadent plants are matched by the numbers of seedling and young age class plants, although there are some indications of a downward trend. While the mature sagebrush have good vigor, the decadent plants display poor growth and vigor. Twenty-one percent of the available sagebrush have a heavily hedged growth form. Sagebrush canopy cover is estimated at 18%. Seedling sagebrush are common, but many are suffering from drought and competition with the dense understory of cheatgrass. Broom snakeweed is uncommon, and has actually decreased. Crested wheatgrass shows a significant increase in sum of nested frequency. There is an adequate amount of litter cover with no evidence of erosion.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up slightly (4)

1996 TREND ASSESSMENT

The soil trend is up slightly due to a decline in bare ground and an increase in litter cover. Unfortunately these improvements come from a dense stand of annual grasses. Trend for browse is stable. It's density has declined slightly but heavy use and percent decadence have declined and vigor has improved. Seedlings and young are not abundant and likely have a difficult time competing with the extremely high densities of winter annuals. Trend for the herbaceous understory is up, slightly due to a slight increase in the sum of nested frequency for perennial grasses and forbs.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - up slightly, but still dominated by annuals (4)

2001 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in percent bare ground and a 52% decline in litter cover. However, herbaceous cover is still abundant. The erosion condition class was determined as stable in 2001. Trend for browse is down due to loss of nearly all browse to fire. The site currently supports a few seedling and young sagebrush, resprouting stickyleaf low rabbit brush, and seeded prostate kochia. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency for perennial grasses and a significant decline in the nested frequency of cheatgrass and Japanese brome. Sum of nested frequency for perennial forbs has remained stable but frequency of annual forbs has increased three-fold.

TREND ASSESSMENT

soil - down slightly (2)

browse - down, lost to fire (1)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 4

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	a70	b132	b133	a87	34	49	46	37	6.62	5.27
G	Agropyron intermedium	a1	a8	a15	b55	1	3	5	21	.69	3.37
G	Agropyron smithii	a-	a-	b29	b45	-	-	10	14	.39	4.52
G	Agropyron spicatum	3	-	2	-	1	-	2	-	.01	-
G	Bromus inermis	a50	ab83	b99	b105	20	26	34	33	3.80	9.85
G	Bromus japonicus (a)	-	-	b203	a73	-	-	65	30	4.48	.50
G	Bromus tectorum (a)	-	-	b321	a84	-	-	87	34	15.25	1.99
G	Dactylis glomerata	a-	a-	a-	b21	-	-	-	10	-	.35
G	Oryzopsis hymenoides	-	2	4	10	-	1	1	4	.03	.36
G	Poa bulbosa	a-	a-	a2	b26	-	-	2	9	.01	1.43
G	Poa fendleriana	-	-	-	4	-	-	-	1	-	.15
G	Poa pratensis	-	2	5	8	-	1	3	3	.09	.18
G	Poa secunda	-	1	2	-	-	1	1	-	.03	-
G	Sitanion hystrix	b9	ab2	a-	a-	6	1	-	-	-	-
Total for Annual Grasses		0	0	524	157	0	0	152	64	19.74	2.50
Total for Perennial Grasses		133	230	291	361	62	82	104	132	11.68	25.51
Total for Grasses		133	230	815	518	62	82	256	196	31.43	28.01
F	Agoseris glauca	-	-	-	3	-	-	-	1	-	.00
F	Alyssum alyssoides (a)	-	-	a157	b324	-	-	58	96	.81	25.80
F	Allium spp.	a-	a-	a-	b32	-	-	-	15	-	.20
F	Ambrosia psilostachya	-	-	-	7	-	-	-	3	-	.04
F	Arabis spp.	ab2	b13	ab2	a-	1	5	2	-	.01	-
F	Aster spp.	-	-	4	7	-	-	1	2	.03	.18
F	Astragalus spp.	-	-	2	1	-	-	1	1	.03	.03
F	Camelina microcarpa (a)	-	-	a4	b23	-	-	1	8	.38	.06
F	Carduus nutans (a)	-	-	-	-	-	-	-	-	-	.03
F	Calochortus nuttallii	-	-	-	3	-	-	-	1	-	.00
F	Cirsium undulatum	-	2	8	5	-	2	3	2	.06	.01
F	Collomia linearis (a)	-	-	a-	b14	-	-	-	5	-	.02
F	Collinsia parviflora (a)	-	-	a3	b45	-	-	1	14	.00	.68
F	Cymopterus spp.	-	-	1	-	-	-	1	-	.00	-
F	Descurainia pinnata (a)	-	-	-	10	-	-	-	4	-	.04
F	Draba spp. (a)	-	-	a-	b18	-	-	-	8	-	.04
F	Epilobium brachycarpum (a)	-	-	a-	b39	-	-	-	12	-	.75

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Erodium cicutarium</i> (a)	-	-	a ⁻	b ⁷⁰	-	-	-	21	-	3.65
F	<i>Erigeron strigosus</i>	-	-	5	-	-	-	2	-	.03	-
F	<i>Grindelia squarrosa</i>	8	-	-	3	3	-	-	2	-	.03
F	<i>Hedysarum boreale</i>	a ⁻	a ⁻	b ⁴⁰	a ⁻	-	-	19	-	.42	-
F	<i>Holosteum umbellatum</i> (a)	-	-	a ³¹	b ⁶⁹	-	-	11	26	.36	.43
F	<i>Lactuca serriola</i>	a ⁻	a ⁻	a ⁻	b ¹⁷	-	-	-	8	-	.06
F	<i>Machaeranthera</i> spp	-	-	6	-	-	-	3	-	.01	-
F	<i>Melilotus officinalis</i>	-	-	-	5	-	-	-	2	-	.18
F	<i>Microsteris gracilis</i> (a)	-	-	a ⁻	b ¹²	-	-	-	7	-	.08
F	<i>Oenothera caespitosa</i>	3	-	-	-	1	-	-	-	-	-
F	<i>Penstemon</i> spp.	-	-	-	1	-	-	-	1	-	.03
F	<i>Phlox longifolia</i>	a ⁻	a ⁻	a ⁻	b ¹⁴	-	-	-	5	-	.36
F	<i>Polygonum douglasii</i> (a)	-	-	3	3	-	-	1	2	.00	.01
F	<i>Ranunculus testiculatus</i> (a)	-	-	a ³	b ⁸	-	-	1	4	.00	.04
F	<i>Sanguisorba minor</i>	a ⁻	a ⁻	a ⁻	b ⁷	-	-	-	5	-	.66
F	<i>Sisymbrium altissimum</i> (a)	-	-	a ⁻	b ²⁵	-	-	-	10	-	.21
F	<i>Sphaeralcea coccinea</i>	-	-	-	4	-	-	-	2	-	.21
F	<i>Tragopogon dubius</i>	a ⁶	a ⁶	c ²⁰	ab ¹²	2	3	12	6	.16	.10
F	<i>Vicia americana</i>	a ⁻	a ⁴	c ⁶¹	b ²⁹	-	3	28	13	.36	.26
Total for Annual Forbs		0	0	201	660	0	0	73	217	1.57	31.87
Total for Perennial Forbs		19	25	149	150	7	13	72	69	1.14	2.39
Total for Forbs		19	25	350	810	7	13	145	286	2.72	34.26

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 04 , Study no: 4

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	3	0	-	-
B	Artemisia tridentata vaseyana	82	3	19.85	-
B	Chrysothamnus nauseosus albicaulis	7	0	.83	-
B	Chrysothamnus viscidiflorus viscidiflorus	16	16	.97	.36
B	Gutierrezia sarothrae	1	1	.07	-
B	Kochia prostrata	0	37	-	.35
B	Symphoricarpos oreophilus	1	0	-	-
Total for Browse		110	57	21.72	0.70

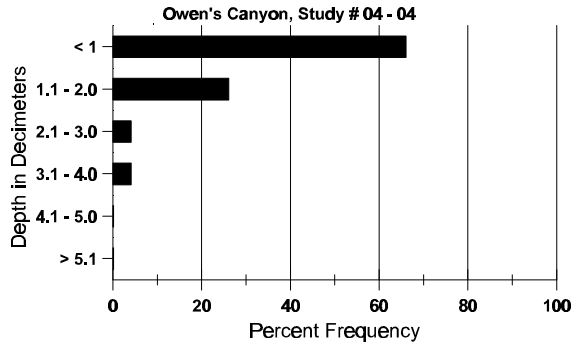
BASIC COVER --
Herd unit 04 , Study no: 4

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	396	392	.75	8.50	50.47	63.19
Rock	131	176	0	7.00	2.49	4.01
Pavement	120	267	25.50	11.75	2.90	5.78
Litter	400	367	0	61.50	68.31	32.54
Cryptogams	37	3	2.00	0	.95	.00
Bare Ground	74	283	0	11.25	1.56	15.32

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 04, Owen's Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.8	66.0 (9.35)	6.7	44.6	27.4	28.0	3.2	22.4	176.0	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 04 , Study no: 4

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Rabbit	1	-	-	-
Elk	4	3	122	9 (23)
Deer	12	3	52	4 (10)
Cattle	1	-	-	-

BROWSE CHARACTERISTICS --

Herd unit 04 , Study no: 4

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 alnifolia																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	1	-	-	-	-	-	-	-	-	-	20		1	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'96	1	-	-	1	-	-	-	-	-	-	-	-	-	40	25	20	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
												'01	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											
Artemisia tridentata vaseyana																
S	84	4	-	-	-	-	-	-	-	4	-	-	133		4	
	90	32	-	-	-	-	-	-	-	31	-	-	1066		32	
	96	6	-	-	-	-	-	-	-	6	-	-	120		6	
	01	7	-	-	-	-	-	-	-	7	-	-	140		7	
Y	84	17	13	-	-	-	-	-	-	30	-	-	1000		30	
	90	12	10	4	-	-	-	-	-	25	-	1	866		26	
	96	15	-	-	1	-	-	-	-	16	-	-	320		16	
	01	3	-	-	-	-	-	-	-	2	1	-	60		3	
M	84	13	48	8	-	-	-	-	-	68	-	1	2300	23	32	69
	90	5	29	8	2	-	-	-	-	44	-	-	1466	14	17	44
	96	105	12	1	-	-	-	-	-	114	-	3	2360	26	45	118
	01	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	4	11	5	-	-	-	-	-	18	-	2	666		20	
	90	11	29	12	-	1	-	-	-	33	-	4	1766		53	
	96	23	11	2	1	-	-	-	-	30	-	2	740		37	
	01	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	1180		59	
	01	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'84		61%			11%			03%			+ 3%					
'90		56%			20%			17%			-17%					
'96		13%			02%			06%			-98%					
'01		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'84	3966	Dec:	17%			
										'90	4098		43%			
										'96	3420		22%			
										'01	60		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				
Chrysothamnus nauseosus albicaulis																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	9	6	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	24	34	4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+67%							
'90		00%			00%			00%			+38%							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	0%			
												'90	99		67%			
												'96	160		38%			
												'01	0		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				
Chrysothamnus viscidiflorus viscidiflorus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	1	-	-	-	-	-	-	-	-	-	1	-	33	6	8	1
	96	15	-	-	2	-	-	-	-	-	17	-	-	-	340	14	22	17
	01	23	-	-	-	-	-	-	-	-	23	-	-	-	460	11	16	23
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+ 0%							
'90		100%			00%			100%			+92%							
'96		00%			00%			00%			+ 9%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	100%			
												'90	33		0%			
												'96	420		10%			
												'01	460		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				
Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	33	-	-	-	-	-	-	-	-	33	-	-	-	1100	12	6	33
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	5	6	1
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160	10	12	8
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-97%							
'90		00%			00%			00%			+84%							
'96		00%			00%			00%			-90%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1133	Dec:	3%			
												'90	33		0%			
												'96	200		0%			
												'01	20		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				
Kochia prostrata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	52	-	-	-	-	-	-	-	-	52	-	-	-	1040		52	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	21	-	-	-	-	-	-	-	-	20	1	-	-	420	4	6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	0		-				
											'01	1460		-				
Symphoricarpos oreophilus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	17	16	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	20		-				
											'01	0		-				

Trend Study 4-6-01

Study site name: Harris Canyon.

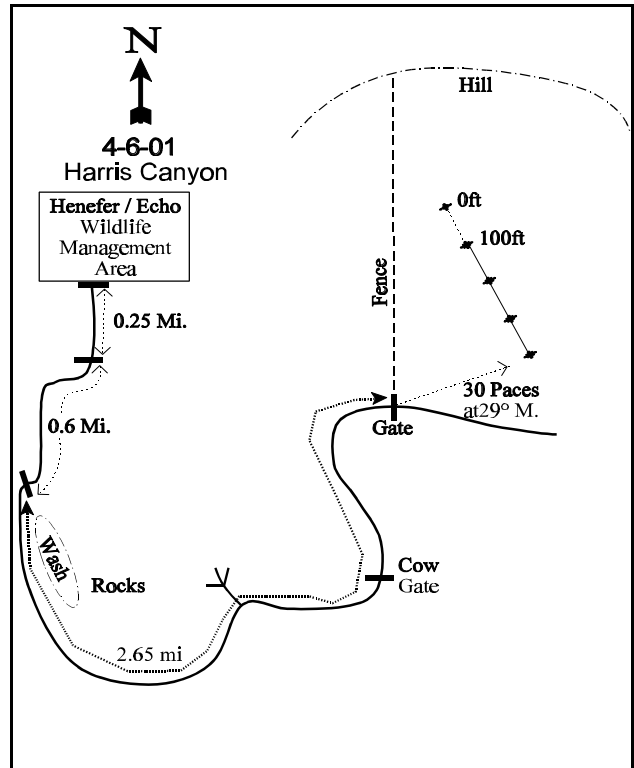
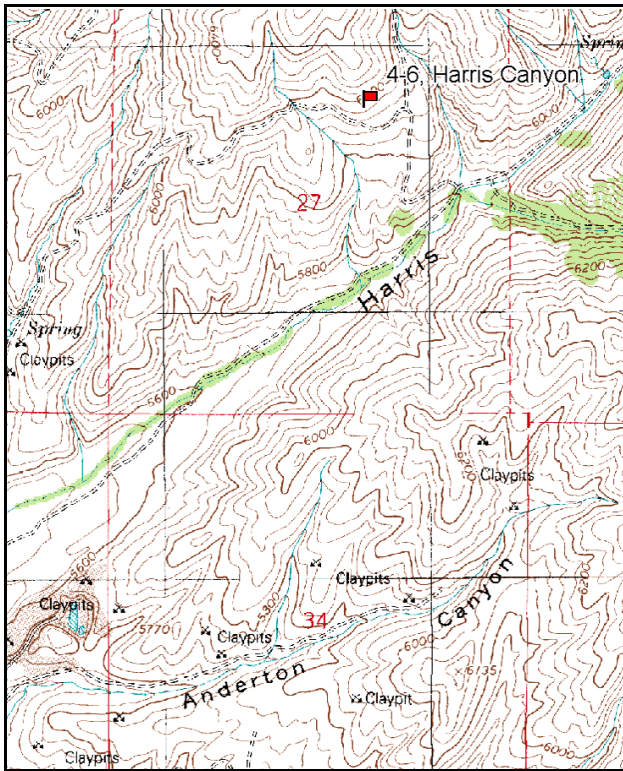
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 164 degrees magnetic.

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

LOCATION DESCRIPTION

From the "R" Ranch main gate, proceed northwest for 3.5 miles (towards Croyden) to the Croyden access road. At the DWR/R-Ranch property, turn right and travel 0.25 miles. Turn right at the DWR fence line and proceed 0.6 miles to another gate. Stay to the right, traveling around a wash for 0.9 miles. Travel 1.2 miles to a cow gate. Continue for 0.4 miles to a fence with a gate. Stop here and park. From the gate walk 30 paces (at 29 degrees magnetic) to the 400-foot baseline stake. Walk 400 feet to the north at a bearing of 342 degrees magnetic to the 0-foot stake. The 0-foot stake is marked by browse tag #7975.



Map Name: Henefer

Diagrammatic Sketch

Township 4N, Range 4E, Section 27

UTM 4544767 N 459759 E

DISCUSSION

Trend Study No. 4-6

The Harris Canyon study samples a mountain big sagebrush/grass type on a steep south facing slope (40%). Elevation is approximately 6,240 feet. Deer use has been exceptionally heavy in the past and shares much of the responsibility for the impact on the vegetative condition and trend. Frequency of deer pellet groups was moderate in 1996 and 2001. Elk pellet groups were also present in relatively small numbers in 1996, but nearly as abundant as deer pellet groups in 2001. Some cattle were observed near the study site during the 1996 reading. A pellet group transect read on site in 2001, estimated 79 deer and 22 elk days use/acre (195 ddu/ha and 55 edu/ha). Most elk and deer pellet groups appear to be mostly from spring use.

The soil is fairly deep in places but moderately rocky and of apparent alluvial origin. Most surface rocks are rounded and cobblestone-like. Soil texture is a clay loam with a neutral soil reaction (pH of 7.2). Effective rooting depth is estimated at a little over 12 inches. Due to the high rock content and south facing slope, soil temperature is relatively high at nearly 68°F at a depth of just over 12 inches. Phosphorus could also be a limiting factor with a value of only 6.9 ppm. Values less than 10 ppm have been shown to limit plant growth and development. Organic matter content is relatively high at 4%. Color of the surface soil is reddish, indicating some iron oxide content. Surface erosion does not appear excessive. The erosion condition class was determined to be slight in 2001.

Total browse density is well below optimum for this type of site. Although species composition includes four desirable shrubs, it also includes two aggressive invaders or increasers. The key species are mountain big sagebrush and antelope bitterbrush. Both were heavily browsed in 1984 and 1990. They also exhibited excessive levels of decadence and inadequate reproduction. Use of mountain big sagebrush was mostly light to moderate in 1996 and 2001. Vigor was normal on most plants and percent decadence has declined from 63% in 1984 to 21% in 2001.

Bitterbrush had an estimated density of 300 plants/acre in 2001. These shrubs have a prostrate growth form and average only 15 inches in height, yet they have a crown of almost 3 feet. They have been consistently heavily hedged, due in part, to their palatability and low numbers. Vigor is currently good on all plants sampled with no decadent plants sampled in 2001. White stem rabbitbrush offers some additional browse forage with a population estimated at 800 plants/acre in 2001. A few serviceberry plants also occur on the site.

Stickyleaf low rabbitbrush and broom snakeweed are both common on the site and have increased dramatically since 1984. Broom snakeweed appeared to have a dynamic population in 1996, with abundant seedlings and young. Due to the dry conditions of the past few years, it actually declined in density between 1996 and 2000. Stickyleaf low rabbitbrush also steadily increased in density until 1996. In 2001, density declined by 26%.

Understory composition is dominated by bluebunch wheatgrass which accounted for over 50% of the grass cover in 1996 and 2001. Annual grasses, Japanese brome, and cheatgrass, are also abundant. Other perennial grasses occur rarely. A fair number of forbs are also present, but only a few occur frequently. Among these are yellow salsify, Utah milkvetch, thistle, and Louisiana sage. Annual forbs and grasses are common, yet do not occur enough to constitute an obvious fire hazard. However, cheatgrass has that capability should range conditions continue to decline.

1984 APPARENT TREND ASSESSMENT

Soil conditions appear stable even though this area has a steep slope and relatively poor cover. In spite of this, evidence of rapid soil erosion is not predominant. Vegetative parameters appear to be declining. The most abundant of two key species is mountain big sagebrush which appears to be suffering from overuse and may decline in density.

1990 TREND ASSESSMENT

The relatively low density of big sagebrush in this stand has been heavily used winter range in the past. It remains in poor condition with heavily to severely hedged growth forms and 58% decadence. Precipitation data from Morgan indicate drier than normal conditions have existed since 1987. There was no seed production in 1990, but seedling and young plants currently make up 37% of the population. The seedlings have reduced vigor due to the prolonged drought conditions. Rubber rabbitbrush and low rabbitbrush are the most common browse plants and both have increased in density. Even the less desirable stickyleaf low rabbitbrush has been heavily hedged. Bitterbrush is infrequent and heavy hedging has led to a high percentage of decadent plants. Bluebunch wheatgrass is common but there is an excessive amount of bare soil.

TREND ASSESSMENT

soil - down (1)

browse - stable (3)

herbaceous understory - stable but dominated by annuals (3)

1996 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground from 30% to 5%. Litter cover also increased. Trend for browse is up for the two key species, mountain big sagebrush and antelope bitterbrush. Density of both species has increased. In addition, heavy use and percent decadence has declined, and vigor improved. Trend for the herbaceous understory is down slightly for grasses but slightly up for forbs. Nested frequency of bluebunch wheatgrass declined significantly. The increase in forb sum of nested frequency comes primarily from increases in frequency of weedy biennials such as yellow salsify, prickly lettuce, and Louisiana sage. Overall, trend for the herbaceous understory is considered slightly down.

TREND ASSESSMENT

soil - up (5)

browse - up (5)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is down slightly due to a threefold increase in percent cover of bare ground and a decline in litter cover. There are some signs of past erosion on the site, but the erosion condition class was determined to be only slight in 2001. Trend for the key browse species, mountain big sagebrush and bitterbrush, is stable. Density of mountain big sagebrush has declined slightly due to a reduction in the number of young plants. However, utilization is light to moderate, vigor is normal on most plants, and percent decadence, although higher than 1996, is only moderate at 21%. Annual leader growth of sagebrush is 2.6 inches. All bitterbrush sampled display heavy use, but the population has remained fairly stable, vigor is normal on all plants, and there were no decadent plants sampled. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses increased slightly, while that of perennial forbs declined slightly. The

dominant grass, bluebunch wheatgrass, remained stable. Unfortunately, sum of nested frequency for annual grasses also remained stable. Another negative aspect of the herbaceous understory is the increase in the frequency of annual forbs. Annuals currently account for 69% of the forb cover and 39% of the grass cover.

TREND ASSESSMENT

soil - up (2)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 6

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron intermedium	3	2	5	7	1	1	2	3	.03	.33
G	Agropyron spicatum	ab218	b231	a182	a189	79	86	65	70	11.84	11.55
G	Bromus brizaeformis (a)	-	-	4	3	-	-	2	1	.01	.03
G	Bromus japonicus (a)	-	-	205	227	-	-	69	79	2.62	3.64
G	Bromus tectorum (a)	-	-	b267	a239	-	-	77	81	6.97	5.10
G	Elymus cinereus	-	-	-	4	-	-	-	1	-	.38
G	Festuca ovina	-	-	-	2	-	-	-	1	-	.03
G	Oryzopsis hymenoides	a4	ab16	ab11	b20	2	8	4	9	.36	.50
G	Poa pratensis	b17	a5	a-	a2	6	2	-	1	-	.03
G	Poa secunda	a-	b26	a6	b28	-	14	3	13	.06	.77
Total for Annual Grasses		0	0	476	469	0	0	148	161	9.60	8.77
Total for Perennial Grasses		242	280	204	252	88	111	74	98	12.31	13.61
Total for Grasses		242	280	680	721	88	111	222	259	21.92	22.39
F	Achillea millefolium	b7	a-	ab6	ab2	5	-	3	1	.01	.15
F	Agoseris glauca	-	1	-	5	-	1	-	3	-	.01
F	Alyssum alyssoides (a)	-	-	a245	b304	-	-	85	96	1.12	6.27
F	Allium spp.	a-	a-	a4	b11	-	-	1	7	-	.03
F	Artemisia ludoviciana	a24	a23	a30	b68	9	11	12	26	.53	2.45
F	Aster chilensis	b15	a2	a1	a1	6	1	1	1	.00	.00
F	Astragalus spp.	B31	a-	a7	a-	16	-	3	-	.21	-
F	Astragalus utahensis	2	1	3	2	2	1	2	1	.03	.03
F	Castilleja linariaefolia	-	-	4	-	-	-	2	-	.18	-
F	Camelina microcarpa (a)	-	-	a2	b17	-	-	1	8	.00	.04
F	Cirsium undulatum	b23	b27	b16	a5	12	11	8	3	.21	.24
F	Collomia linearis (a)	-	-	-	2	-	-	-	2	-	.01
F	Collinsia parviflora (a)	-	-	10	7	-	-	4	4	.02	.07
F	Cryptantha spp.	b10	a-	a-	a-	5	-	-	-	-	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Cymopterus</i> spp.	a-	b8	ab3	ab2	-	5	1	1	.03	.03
F	<i>Cynoglossum officinale</i>	-	-	2	2	-	-	1	2	.00	.03
F	<i>Descurainia pinnata</i> (a)	-	-	-	9	-	-	-	3	-	.04
F	<i>Erodium cicutarium</i> (a)	-	-	a24	b77	-	-	11	29	.10	1.62
F	<i>Hackelia patens</i>	-	-	7	-	-	-	3	-	.04	-
F	<i>Helianthus annuus</i> (a)	-	1	-	-	-	1	-	-	-	-
F	<i>Hedysarum boreale</i>	-	7	2	6	-	3	1	3	.15	.04
F	<i>Holosteum umbellatum</i> (a)	-	-	a32	b130	-	-	14	51	.09	.60
F	<i>Lactuca serriola</i>	a-	a-	a6	b16	-	-	2	7	.01	.08
F	<i>Lithospermum ruderales</i>	6	6	-	-	2	2	-	-	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	a-	b35	-	-	-	16	-	.20
F	<i>Oenothera caespitosa</i>	6	-	1	-	3	-	1	-	.03	-
F	<i>Penstemon</i> spp.	5	-	-	-	2	-	-	-	-	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Streptanthus cordatus</i>	-	2	-	-	-	1	-	-	-	-
F	<i>Taraxacum officinale</i>	-	-	-	2	-	-	-	1	-	.03
F	<i>Tragopogon dubius</i>	b134	a37	b96	a66	62	19	45	32	1.27	.48
F	<i>Vicia americana</i>	a-	a-	b52	b29	-	-	22	16	.65	.42
Total for Annual Forbs		0	1	313	584	0	1	115	210	1.34	8.88
Total for Perennial Forbs		263	114	240	217	124	55	108	104	3.39	4.06
Total for Forbs		263	115	553	801	124	56	223	314	4.74	12.94

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 04 , Study no: 6

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier utahensis	4	1	.41	.15
B	Artemisia tridentata vaseyana	30	30	3.45	7.90
B	Chrysothamnus nauseosus albicaulis	37	31	1.99	5.21
B	Chrysothamnus viscidiflorus viscidiflorus	32	28	1.61	.95
B	Gutierrezia sarothrae	41	35	1.43	.75
B	Leptodactylon pungens	0	0	-	.15
B	Mahonia repens	4	5	.06	.27
B	Purshia tridentata	10	8	.69	.22
Total for Browse		158	138	9.66	15.61

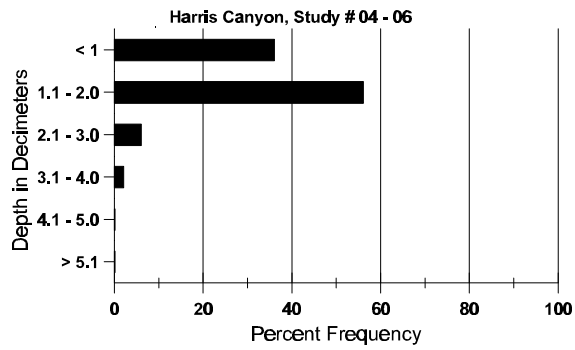
BASIC COVER --
Herd unit 04 , Study no: 6

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	340	369	2.25	10.00	40.52	52.22
Rock	241	249	19.00	16.50	13.25	18.04
Pavement	97	154	5.25	5.00	.59	.80
Litter	359	369	55.00	38.50	48.43	33.40
Cryptogams	49	22	0	0	.33	.14
Bare Ground	145	241	18.50	30.00	4.82	14.94

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 06, Harris Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.4	67.6 (12.3)	7.2	43.3	26.7	30.0	4.0	6.9	163.2	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 04 , Study no: 6

Type	Quadrat Frequency	
	'96	'01
Elk	4	20
Deer	25	22
Cattle	-	1
Sheep	-	-
Rabbit	-	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
287	22 (55)
1027	79 (195)
17	N/A
17	N/A

BROWSE CHARACTERISTICS --

Herd unit 04 , Study no: 6

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																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	1	1	-	-	-	-	-	-	2	-	-	-	40	27	28	2
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	48	29	0
D	'84	-	-	1	-	-	-	-	-	-	-	-	1	-	33			1
	'90	-	-	1	-	-	-	-	-	-	-	-	-	1	33			1
	'96	-	1	-	1	-	-	-	-	-	2	-	-	-	40			2
	'01	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			100%			+ 0%							
'90		00%			100%			100%			+59%							
'96		50%			25%			00%			-75%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	100%			
												'90	33		100%			
												'96	80		50%			
												'01	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		1	2									
Artemisia tridentata vaseyana																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	4	-	-	-	-	-	-	-	2	-	1	1	133		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	5	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	2	-	3	-	-	-	-	-	5	-	-	-	166		5	
	96	10	-	-	-	-	-	-	-	10	-	-	-	200		10	
	01	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	1	1	-	-	-	-	-	2	-	-	-	66	6	6	2
	90	-	-	5	-	-	-	-	-	5	-	-	-	166	26	31	5
	96	21	6	-	1	-	-	-	-	28	-	-	-	560	25	44	28
	01	17	7	-	-	-	1	-	-	23	2	-	-	500	28	46	25
D	84	-	1	11	-	-	-	-	-	12	-	-	-	400		12	
	90	-	2	9	-	-	-	-	-	6	-	3	2	366		11	
	96	2	1	1	-	-	-	-	-	2	-	-	2	80		4	
	01	5	2	-	-	-	-	-	-	4	-	-	3	140		7	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	560		28	
	01	-	-	-	-	-	-	-	-	-	-	-	-	320		16	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		11%			63%			00%			+ 9%						
'90		10%			81%			24%			+17%						
'96		17%			02%			05%			-19%						
'01		26%			03%			09%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	632	Dec:	63%		
												'90	698		52%		
												'96	840		10%		
												'01	680		21%		

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 nauseosus albicaulis																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	90	23	-	-	-	-	-	-	-	-	23	-	-	-	766			23
	96	7	4	-	-	-	-	-	-	-	11	-	-	-	220			11
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	84	-	-	4	-	-	-	-	-	-	4	-	-	-	133	36	27	4
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	66	40	52	2
	96	37	8	-	-	-	-	-	-	-	45	-	-	-	900	22	35	45
	01	11	8	3	-	-	2	-	-	-	22	2	-	-	480	25	34	24
D	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66			2
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	6	4	2	1	-	-	-	-	-	8	-	-	5	260			13
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			+75%							
'90		04%			00%			00%			+21%							
'96		20%			00%			00%			-32%							
'01		30%			18%			13%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	232	Dec:	28%			
												'90	932		11%			
												'96	1180		5%			
												'01	800		33%			

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 viscidiflorus viscidiflorus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	4	-	-	-	-	-	-	3	-	2	-	166		5	
	96	12	-	-	-	-	-	-	-	-	12	-	-	-	240		12	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	4	-	3	-	-	-	-	-	-	7	-	-	-	233	6	8	7
	96	50	3	2	2	-	-	-	-	-	57	-	-	-	1140	11	17	57
	01	43	1	-	3	-	-	-	-	-	44	3	-	-	940	9	14	47
D	84	-	1	-	-	-	-	-	-	-	-	-	1	-	33		1	
	90	-	1	7	-	1	1	1	-	-	5	-	4	2	366		11	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		100%			00%			100%			+96%							
'90		13%			65%			35%			+45%							
'96		04%			03%			00%			-26%							
'01		02%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	100%			
												'90	765		48%			
												'96	1380		0%			
												'01	1020		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				
Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	199	-	-	6	-	-	-	-	-	205	-	-	-	4100		205	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	96	62	-	-	7	-	-	-	-	-	69	-	-	-	1380		69	
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	29	-	-	-	-	-	-	-	-	29	-	-	-	966	7	12	
	96	55	-	-	2	-	-	-	-	-	57	-	-	-	1140	10	13	
	01	95	-	-	1	-	-	-	-	-	95	1	-	-	1920	8	9	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	4	-	-	-	-	-	-	-	-	-	-	-	4	80		4	
	01	4	-	-	-	-	-	-	-	-	1	-	-	3	80		4	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%			+56%							
'96		00%			00%			03%			-18%							
'01		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	1132		3%			
												'96	2600		3%			
												'01	2140		4%			

A G R E	Y 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				
Mahonia repens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	33	-	-	-	-	-	-	-	-	33	-	-	-	660		33	
	01	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	154	-	-	-	-	-	-	-	-	154	-	-	-	3080	3	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	00%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%			+80%							
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	660		-			
												'01	3300		-			
Purshia tridentata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66	15	15	
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	33	11	28	
	96	-	7	8	2	-	-	-	-	-	17	-	-	-	340	16	29	
	01	-	-	-	-	-	14	-	-	1	15	-	-	-	300	15	30	
D	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	3	-	-	-	-	-	-	-	-	1	2	100		3	
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	00%			100%			00%			+20%							
	'90	20%			80%			60%			+56%							
	'96	42%			47%			00%			-21%							
	'01	00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	132	Dec:	50%			
												'90	166		60%			
												'96	380		5%			
												'01	300		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																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	22	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	00%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%										
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			

Trend Study 4-8-01

Study site name: Shell Hollow

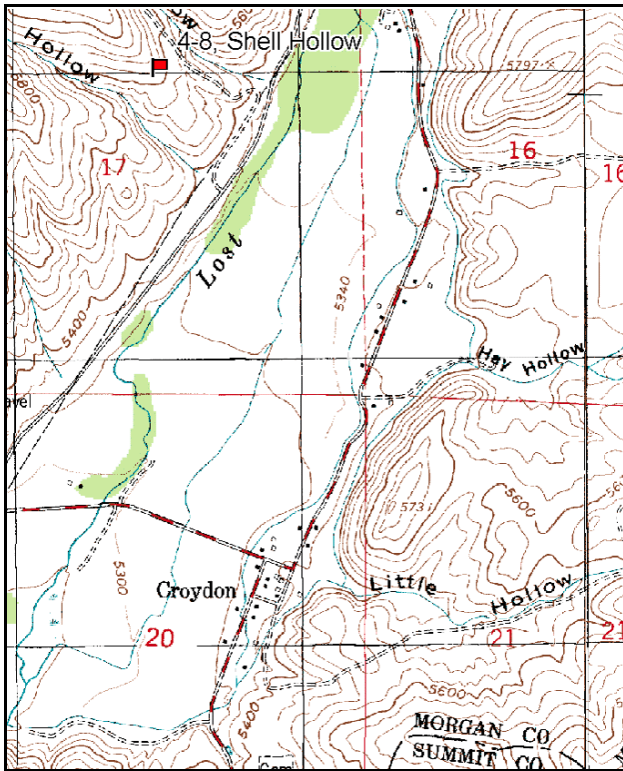
Vegetation type: Big Sagebrush

Compass bearing: frequency baseline 159 degrees magnetic.

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

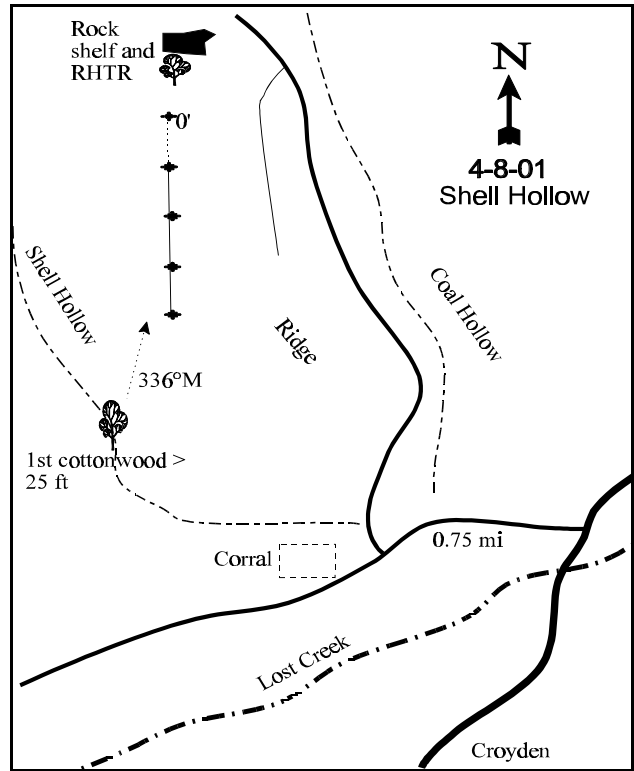
LOCATION DESCRIPTION

From 6900 East and 1900 South in Croyden, proceed east 1.55 miles to a road paralleling Lost Creek. Turn left here and travel 0.75 miles to Coal Hollow Road. Just east of the road is a corral. Northwest of the corral is the ravine, Shell Hollow. Walk up Shell Hollow to the first cottonwood tree over 25 feet tall. Nearby should be a small drainage up the slope to the right. From the tree, take a bearing of 351 degrees true and walk approximately 150 yards up-slope to the 0-foot stake of the baseline marked by browse tag #7947. Ten feet north of the 0-foot stake is a sumac and a rocky shelf behind. Just east of the 0-foot stake is a large rock with a perfect seat carved by the wind. Contact the land owner prior to accessing the site.



Map Name: Devil's Slide

Township 4N, Range 4E, Section 17



Diagrammatic Sketch

UTM 4547986 N 456489 E

DISCUSSION

Trend Study No. 4-8

The Shell Hollow study is located on a small ridge between Shell Hollow and Coal Hollow on the west side of Lost Creek. The area has been considered critical deer winter range in the past with a south aspect and a steep 30% slope. The study samples an impoverished and in the recent past, over grazed mountain big sagebrush hillside community 150 yards above shell hollow. Winter deer and spring sheep use was heavy in the past on the key species as well as understory plants. Few perennial grasses or forbs remain. Cattle were present along the creek during the 1996 reading and had already utilized the available understory forage on the site. Few deer pellet groups were encountered on the site in 1996. A pellet group transect read on the site in 2001, estimated 21 deer and 2 cow days use/acre (51 ddu/ha and 5 cdu/ha). The age of the deer pellet groups suggests the site was used primarily during the winter.

The soil is moderately deep in places, but the average effective rooting depth is estimated at almost 11 inches. A hard pan layer was encountered in some places at about 8-10 inches. Soil texture is a sandy clay loam with a slightly alkaline soil reaction (pH of 7.8). The soil is very gravelly, derived from a conglomerate parent material. Some large boulders are exposed. Due to the high rock content, steep south aspect, and dryness of the soil, soil temperatures are very high, averaging 78.2°F at a depth of nearly 12 inches. There is currently little bare soil exposed due to a dense stand of cheatgrass. No active gullies occur on the site, although some of the cattle trailing shows signs of erosion. The erosion condition class was determined as stable in 2001.

The key browse species is mountain big sagebrush. It appears to be hybridizing with basin big sagebrush (*Artemisia tridentata tridentata*) since many of the sagebrush on the site are tall and have the upright growth form of basin big sagebrush. Sagebrush accounted for 74% of the total shrub cover in 1996 and 84% in 2001. Sagebrush density was estimated at 4,800 plants/acre in 1984, remaining relatively stable until 1996. Density declined in 2001, to 3,340 plants/acre. Utilization was heavy on 24% of the shrubs in 1984, but light to moderate since then. Percent decadency has declined from a high of 54% in 1990 to 20% in 2001. Poor vigor steadily increased, reaching a high of 28% in 1996. In 2001, only 8% of the shrubs sampled displayed poor vigor. However, 36% of the decadent sagebrush sampled were classified as dying. A condition that could be foretelling what is going to happen in the future.

Stickyleaf low rabbitbrush, an increaser, has increased in density from 1,799 plants/acre in 1984 to 5,360 by 1996. Age class structure indicated an expanding population, but due to the dry conditions of the past few years, density of low rabbitbrush has actually declined by 15% in 2001. Broom snakeweed was picked up for the first time in 1996. It currently numbers only 280 plants/acre.

Perennial grasses and forbs are rare. Apart from occasional individuals of the listed species, herbaceous forage production came almost entirely (93%) from Japanese brome in 1996. Due to the dry conditions and timing of precipitation in 2001, nested frequency and cover of Japanese brome declined significantly, while frequency and cover of annual forbs increased dramatically.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be stable to slightly down and in poor condition. Cover, especially herbaceous cover, is poor. There is some litter but most is from dead cheatgrass and it affords little protection. Erosion is proceeding at a higher than acceptable rate. Vegetation conditions also appear to be stable to slightly declining. Although the sagebrush stand is in no immediate danger of disappearing, conditions are such that a long term decline is possible. This site has an extremely poor understory, a potential fire hazard from dead cheatgrass, and vigorous populations of invader and increaser shrubs are disturbing signs.

1990 TREND ASSESSMENT

The sagebrush on this privately owned winter range has generally good vigor and a moderately hedged growth form. Sagebrush canopy cover averages 29%. Recently, the range has been grazed by cattle. There is very little herbaceous understory vegetation, although several species of weedy forbs were encountered in 1990. The understory is in poor condition providing limited protective ground cover. There are obvious signs of soil erosion with exposed plant roots.

TREND ASSESSMENT

soil - down (1)

browse - stable (3)

herbaceous understory - slightly upward, but still in very poor condition (4)

1996 TREND ASSESSMENT

The soil trend is up due to a dramatic decline in percent bare ground. Unfortunately, most of the improvement is due to a dense stand of Japanese brome, cheatgrass, and rattlesnake brome which constitutes a significant fire hazard. No serious erosion is currently occurring. Trend for the mountain big sagebrush is stable. Sagebrush density appears to have reached carrying capacity for the site. Presently canopy cover of sagebrush averages just over 22%. Utilization is light to moderate and percent decadency has dropped to 24%. The only negative aspect of the stand is the high number of shrubs displaying poor vigor (28%). The herbaceous understory is poor and dominated by annual grasses and forbs. However, trend is up slightly due to an increase in the sum of nested frequency for perennial grasses and forbs.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - up slightly but dominated by annuals (4)

2001 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in bare ground cover and a decline in litter cover. This trend is driven primarily by drought conditions which have persisted for the past few years. The dry conditions during the spring of 2001, have caused a significant decline in the nested frequency of Japanese brome. Cover averaged 26% in 1996, now it is only 2% in 2001. The lack of annual grasses has allowed a dramatic increase in the sum of nested frequency for annual forbs. Erosion is not severe and the erosion condition class was determined as stable in 2001. Trend for mountain big sagebrush is stable. Utilization is mostly light to moderate, vigor has improved, and percent decadence has declined slightly. Average annual leader growth is substantially lower than the average for mountain big sagebrush in this unit (1.8" vs 2.5"). Density of the increaser, stickyleaf low rabbitbrush, has remained stable. Trend for the herbaceous understory is stable for perennial species. However, perennials are still depleted as most perennial grasses are only found growing within the protection of sagebrush crowns. Annual Japanese brome, which dominated the herbaceous understory in 1996 has declined significantly in nested frequency. It's cover has declined from 26% in 1996 to only 2% in 2001. Perennial forbs increased slightly in nested frequency but annual forbs also increased. Annuals, bur buttercup and *Veronica biloba*, both increased significantly in nested frequency and now account for 38% of the forb cover. The only common perennial species consist of wild onion and American vetch. Conditions on this site will likely never improve much due to the consistent spring and summer use by livestock.

TREND ASSESSMENT

soil - down slightly (2)

browse - stable (3)

herbaceous understory - stable but perennials are depleted (3)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 8

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	a-	a-	b ¹⁸	b ¹⁸	-	-	6	5	1.52	1.67
G	Agropyron spicatum	-	4	10	7	-	3	3	3	.18	.18
G	Bromus brizaeformis (a)	-	-	4	12	-	-	2	5	.01	.10
G	Bromus japonicus (a)	-	-	b ³⁸²	a ¹⁹⁸	-	-	100	77	26.01	1.53
G	Bromus tectorum (a)	-	-	a ⁶	b ²⁵	-	-	2	9	.03	.51
G	Elymus cinereus	3	1	7	7	1	1	3	3	.06	.83
G	Oryzopsis hymenoides	-	-	1	6	-	-	1	2	.03	.18
G	Poa secunda	a-	a-	b ¹³	b ¹²	-	-	6	6	.08	.13
Total for Annual Grasses		0	0	392	235	0	0	104	91	26.05	2.15
Total for Perennial Grasses		3	5	49	50	1	4	19	19	1.89	3.00
Total for Grasses		3	5	441	285	1	4	123	110	27.95	5.15
F	Achillea millefolium	-	5	3	3	-	2	1	1	.03	.15
F	Allium acuminatum	a ¹	a ⁴	b ²⁵	c ¹²³	1	3	14	63	.07	.55
F	Alyssum alyssoides (a)	-	-	212	78	-	-	78	33	.96	.21
F	Astragalus beckwithii	ab ³	a-	a-	b ¹⁰	1	-	-	6	-	.15
F	Aster chilensis	-	3	-	-	-	1	-	-	-	-
F	Astragalus convallarius	-	-	6	-	-	-	3	-	.06	-
F	Astragalus utahensis	-	-	2	1	-	-	2	1	.01	.00
F	Camelina microcarpa (a)	-	-	15	13	-	-	6	9	.03	.04
F	Calochortus nuttallii	-	-	-	2	-	-	-	1	-	.00
F	Cirsium undulatum	8	4	15	6	5	3	7	4	.12	.10
F	Collomia linearis (a)	-	-	a ⁸	b ³⁰	-	-	3	14	.01	.12
F	Comandra pallida	a-	a-	ab ¹⁰	b ¹¹	-	-	4	5	.07	.10
F	Collinsia parviflora (a)	-	-	a-	b ³⁴	-	-	-	11	-	.18
F	Descurainia pinnata (a)	-	-	-	2	-	-	-	2	-	.01
F	Epilobium brachycarpum (a)	-	-	-	4	-	-	-	2	-	.01
F	Erodium cicutarium (a)	-	-	16	7	-	-	6	2	.10	.03
F	Galium aparine (a)	-	-	3	1	-	-	1	1	.00	.03
F	Gayophytum ramosissimum (a)	-	-	11	-	-	-	4	-	.02	-
F	Hackelia patens	a-	b ¹⁵	b ¹⁴	b ¹²	-	8	8	6	.16	.25

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Helianthus annuus</i> (a)	-	1	-	1	-	1	-	1	-	.00
F	<i>Holosteum umbellatum</i> (a)	-	-	a-	b18	-	-	-	7	-	.08
F	<i>Lactuca serriola</i>	-	-	9	-	-	-	4	-	.02	.00
F	<i>Machaeranthera canescens</i>	-	-	1	-	-	-	1	-	.00	-
F	<i>Microsteris gracilis</i> (a)	-	-	a-	b55	-	-	-	24	-	.32
F	<i>Phlox longifolia</i>	a-	c117	a4	b38	-	52	2	17	.01	.13
F	<i>Ranunculus testiculatus</i> (a)	-	-	a53	b220	-	-	17	69	.13	4.38
F	<i>Tragopogon dubius</i>	1	3	9	3	1	1	4	1	.02	.00
F	<i>Veronica biloba</i> (a)	-	-	a7	b341	-	-	3	97	.04	7.48
F	<i>Verbascum blattaria</i>	a-	a-	b31	a-	-	-	14	-	.09	-
F	<i>Vicia americana</i>	a-	b31	c92	c98	-	15	46	45	1.06	1.46
Total for Annual Forbs		0	1	325	804	0	1	118	272	1.31	12.92
Total for Perennial Forbs		13	182	221	307	8	85	110	150	1.74	2.92
Total for Forbs		13	183	546	1111	8	86	228	422	3.06	15.84

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 04 , Study no: 8

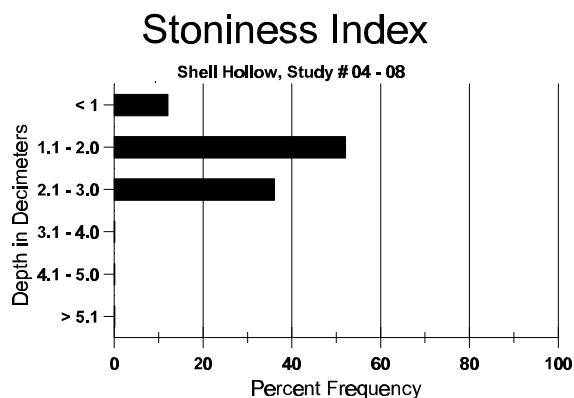
T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Amelanchier alnifolia</i>	1	1	-	-
B	<i>Artemisia tridentata vaseyana</i>	97	88	22.27	26.68
B	<i>Chrysothamnus nauseosus albicaulis</i>	8	10	1.83	1.88
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	76	65	6.00	2.81
B	<i>Gutierrezia sarothrae</i>	3	9	-	.36
Total for Browse		185	173	30.11	31.75

BASIC COVER --
Herd unit 04 , Study no: 8

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	393	368	1.50	5.75	55.91	52.17
Rock	130	78	2.50	1.50	1.75	1.55
Pavement	174	254	10.75	13.50	1.62	5.81
Litter	394	368	58.00	47.75	51.50	46.72
Cryptogams	15	1	0	0	.06	.03
Bare Ground	203	217	27.25	31.50	8.15	18.02

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 08, Shell Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.6	78.2 (11.9)	7.8	49.6	23.4	27.0	2.5	18.1	217.6	.7



PELLET GROUP FREQUENCY --
Herd unit 04 , Study no: 8

Type	Quadrat Frequency	
	'96	'01
Rabbit	-	6
Deer	10	6
Cattle	-	1
Rabbit	-	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
270	21 (51)
26	2 (5)
87	N/A

BROWSE CHARACTERISTICS --

Herd unit 04 , Study no: 8

A G 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 alnifolia																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	1	-	-	-	-	-	-	1	-	-	-	20	23	40	1
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	25	43	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			100%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	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				
Artemisia tridentata vaseyana																		
S	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	'84	1	5	-	-	-	-	-	-	-	6	-	-	-	400		6	
	'90	3	-	-	-	-	-	1	-	-	4	-	-	-	266		4	
	'96	19	-	-	-	-	-	-	-	-	17	-	2	-	380		19	
	'01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	'84	1	32	9	-	-	-	-	-	-	42	-	-	-	2800	30	34	42
	'90	8	14	-	-	-	-	-	-	-	22	-	-	-	1466	29	37	22
	'96	79	68	15	-	-	-	-	-	-	119	-	43	-	3240	29	48	162
	'01	96	27	1	5	-	-	-	-	-	128	1	-	-	2580	35	47	129
D	'84	-	16	8	-	-	-	-	-	-	22	-	2	-	1600		24	
	'90	10	20	1	-	-	-	-	-	-	20	-	1	10	2066		31	
	'96	17	35	5	1	-	-	-	-	-	36	-	19	3	1160		58	
	'01	24	6	2	1	-	-	-	-	-	20	-	1	12	660		33	
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	460		23	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	540		27	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		74%			24%			03%			-21%							
'90		60%			02%			19%			+21%							
'96		43%			08%			28%			-30%							
'01		20%			02%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	4800	Dec:	33%			
												'90	3798		54%			
												'96	4780		24%			
												'01	3340		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				
Chrysothamnus nauseosus albicaulis																		
Y	'84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'84	-	1	-	-	-	-	-	-	-	1	-	-	-	66	21	27	1
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	8	-	-	-	-	-	-	-	-	7	-	1	-	160	29	38	8
	'01	3	-	-	1	-	-	-	-	-	4	-	-	-	80	32	44	4
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	2	2	-	-	-	-	-	-	-	2	-	-	2	266		4	
	'96	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
	'01	4	1	-	-	-	-	-	-	-	4	-	-	1	100		5	
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	50%			00%			00%			+50%							
	'90	50%			00%			50%			-17%							
	'96	00%			00%			09%			- 9%							
	'01	10%			00%			10%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	132	Dec:	0%				
											'90	266		100%				
											'96	220		18%				
											'01	200		50%				

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 viscidiflorus viscidiflorus																				
Y	'84	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	66		1	
	'90	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	200		3	
	'96	24	-	-	8	-	-	-	-	-	-	-	-	32	-	-	640		32	
	'01	8	-	-	-	-	-	-	-	-	-	-	-	8	-	-	160		8	
M	'84	12	12	-	-	-	-	-	-	-	-	-	-	19	5	-	1600	14	17	24
	'90	15	6	1	7	1	-	-	-	-	-	-	-	27	-	3	2000	10	12	30
	'96	169	2	-	57	-	-	-	-	-	-	-	-	216	1	11	4560	13	16	228
	'01	195	10	-	1	-	-	-	7	-	-	-	-	213	-	-	4260	9	13	213
D	'84	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	133		2	
	'90	5	4	-	5	-	-	6	-	-	-	-	-	7	-	-	1333		20	
	'96	3	4	-	1	-	-	-	-	-	-	-	-	5	-	1	160		8	
	'01	7	-	-	-	-	-	-	-	-	-	-	-	2	-	-	140		7	
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>									
'84		56%			00%			00%			+49%									
'90		21%			02%			30%			+34%									
'96		02%			00%			05%			-15%									
'01		04%			00%			02%												
Total Plants/Acre (excluding Dead & Seedlings)											'84	1799	Dec:	7%						
											'90	3533		38%						
											'96	5360		3%						
											'01	4560		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>Gutierrezia sarothrae</i>																		
S	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	7	-	-	-	-	-	-	-	-	7	-	-	-	140	11	9	7
	'01	11	-	-	-	-	-	-	-	-	11	-	-	-	220	8	10	11
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+50%							
'01		00%			00%			07%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	0		0%				
											'96	140		0%				
											'01	280		21%				
<i>Opuntia spp.</i>																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	9	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	14	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	0		-				
											'01	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				
Rhus trilobata																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	72	128	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	00%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%										
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			

Trend Study 4-9-01

Study site name: Scott Rees Ranch.

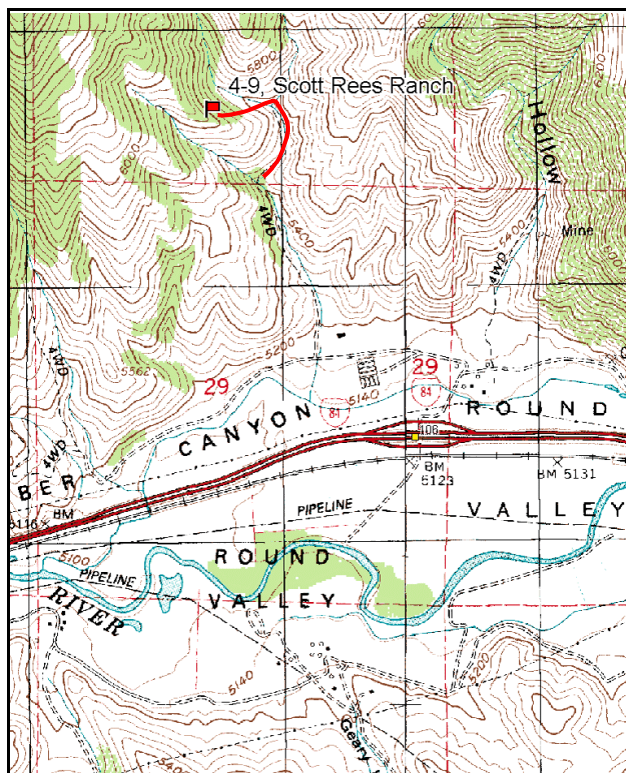
Vegetation type: Gambel Oak.

Compass bearing: frequency baseline 165 degrees magnetic.

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

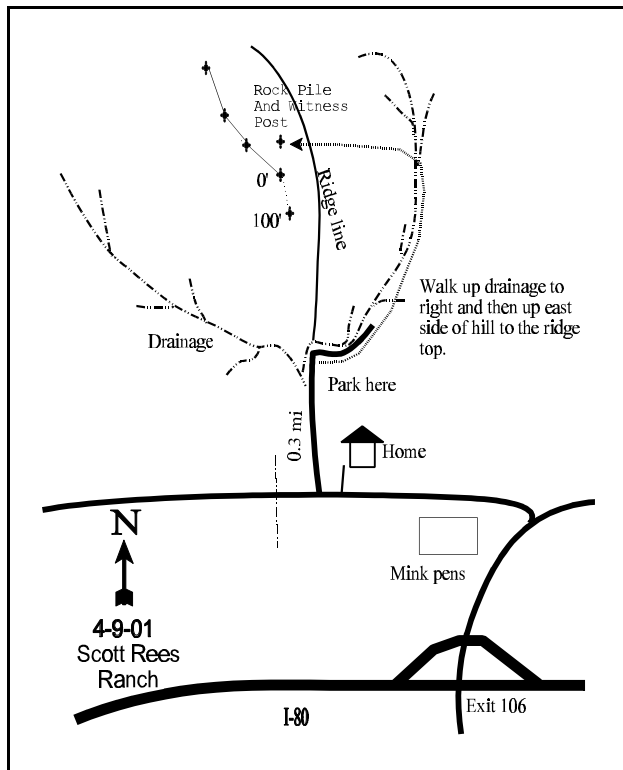
LOCATION DESCRIPTION

On I-80 between Morgan and Henefer, take exit 106 and go north to the Scott Rees Ranch. Turn left (west) on the road north of the mink pens. Drive on this road approximately 0.3 miles past the main house and turn right (north). Drive up a rough road 0.3 miles to the end of the road at a fork in the canyon and where a 4-wheeler trail takes off. From here walk up the road past the draw and continue around the hill. Start walking up the east slope of the hill to the ridge top. On top of a knoll in low growing oak, there is a rock pile with a witness post sticking out of it. The 0-foot baseline stake is just south of the rock monument, and is marked by browse tag #7971. The first 100 feet of the baseline runs 165 degrees magnetic. The rest of the baseline runs off the 0-foot baseline stake. Line 2 runs 258 degrees magnetic. Line 3 runs 252 degrees magnetic. Line 4 runs 277 degrees magnetic. Contact the land owner prior to accessing the site.



Map Name: Morgan

Township 4N, Range 3E, Section 20



Diagrammatic Sketch

UTM 4545657 N 446713 E

DISCUSSION

Trend Study No. 4-9

The Scott Rees Ranch study samples critical deer winter range in the Weber River Canyon, east of Morgan. Located north of Round Valley, the study area has a steep (45%), south-southwest facing slope occupied by low growing Gambel Oak interspersed by an occasional mountain big sagebrush and white rubber rabbitbrush. Deer use was moderate to heavy in 1984, but it had little significant impact on vigor or reproduction of oak. The low growth habit of oak on this site may limit its availability when snow becomes deep and crusted. Numerous winter killed deer were observed during the 1984 reading within the immediate study site vicinity. During the 1995 reading, pellet group quadrat frequency for deer and elk were moderately low. This study area, although owned by the DWR, reportedly is grazed by trespass sheep almost every year. Sheep sign was noted in 1996. A pellet group transect read on the site in 2001, estimated 32 deer and 4 elk days use/acre (79 ddu/ha and 10 edu/ha). Most of the deer pellet groups were found in open areas where there was no oak brush. It also appears that deer use this area primarily in the spring. Four deer were seen on site during the 2001 reading (6-15-01).

The soil is shallow and very rocky on the surface and throughout the profile. Effective rooting depth is estimated at only a little over 8 inches. Soil texture is a clay loam with a neutral soil reaction (pH of 6.9). Due to the high rock cover and the steep southwest aspect, soil temperature is high, averaging 74°F at about 8 inches in depth. The study area has three principal cover components, aerial vegetative crowns, surface rock, and litter. Where low growing oak occurs, litter cover is also good and little erosion originates from these sites. Current erosion is confined primarily to oak interspaces and unavoidable terracing of the steeper slopes. The soil erosion condition class was determined as stable in 2001.

Browse composition consists almost entirely of low growing Gambel oak. On this site, average height of mature oak is only about 24 inches. In spite of low stature and past rather heavy use, the oak has a high level of vigor and an abundance of young sprouts. This species may even be spreading outward to lessen the extent and number of oak interspaces. Soil characteristics (site potential) are probably the principal factor limiting height of oak. Root sprouting is certainly not inhibited. Density of stems/acre has fluctuated considerably since 1990, likely due to sampling errors in counting the very abundant oak stems. Even though stem density was much lower in 1996 compared to 2001 (9,240 stems/acre compared to 16,120 stems/acre), strip frequency and average cover have remained fairly similar. Oak received moderate use in 1990 and 1996, but only light use in 2001. Vigor has been normal during all readings and percent decadence is low.

Other shrubs occur rarely. They include broom snakeweed, white rubber rabbitbrush, Saskatoon service berry, bitterbrush, and mountain big sagebrush. The latter three have sustained exceptionally heavy use and mostly are decadent plants.

The herbaceous understory contains six perennial grasses of which bluebunch wheatgrass is the only abundant perennial species. Annual grasses, consisting of rattlesnake and Japanese brome, cheatgrass, and rattail fescue dominate the grass component by providing 76% of the total grass cover in 1996 and 55% in 2001. Among perennial forbs, Louisiana sage, thistle, low fleabane, and yellow salsify are the most common. Perennial grasses and forbs are most common in association with oak brush with the open interspaces dominated by annual grasses and forbs.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable or slightly down. Slope steepness is such that outstanding cover is required to prevent soil movement. Study site cover is only fair. Vegetative trend appears quite stable. The only possible change in the immediate future may be an expansion of Gambel oak. Herbaceous production is unlikely to improve.

1990 TREND ASSESSMENT

This site remains dominated by Gambel oak, with a lack of other browse on the slopes. The low-growing oak is moderately hedged. A majority of the plants display reduced vigor and decadence due to heavy insect infestation. Cheatgrass and bluebunch wheatgrass are the most common understory plants. The shallow, rocky soil has adequate protection to prevent erosion on the study site. Slopes with less vegetation are subject to disturbance and excessive soil movement.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable but dominated by annuals (3)

1996 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare ground and an increase in litter cover. Trend for oak is stable. The change in density is likely due to the larger sample used in 1996. However, it appears that young plants have declined in number since 1984. Utilization is mostly moderate and vigor has improved since 1990. Trend for the herbaceous understory is down for perennial grasses but improved for forbs. Overall trend is considered slightly down due to a significant decline in the sum of nested frequency for bluebunch wheatgrass. The improvement in forb nested frequency comes primarily from low value weedy species.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is stable with abundant protective ground cover on the site. Trend for Gambel oak is also stable. The 65% increase in density appears to be caused by observer error in 1996. Since strip frequency and cover of oak have remained stable, the estimated density of 26,120 stems/acre in 2001, is likely correct. Use of the stunted oak was light in 2001. It is difficult to judge utilization of oak brush, especially low growing plants. The stunted life form of the low growing oak brush, has an appearance of a hedged growth form when it actually has not been utilized. There are no other significant sources of browse forage on this site. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses increased, including a significant increase in the frequency of bluebunch wheatgrass. Annuals, cheatgrass and Japanese brome also declined significantly. Sum of nested frequency for perennial forbs also increased.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --
Herd unit 04 , Study no: 9

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	ab201	b227	a168	b221	77	85	62	80	7.03	9.83
G	Bromus brizaeformis (a)	-	-	b102	a49	-	-	41	21	.83	.13
G	Bromus japonicus (a)	-	-	b120	a77	-	-	43	36	2.13	.38
G	Bromus tectorum (a)	-	-	b347	a207	-	-	94	69	21.03	9.11
G	Carex spp.	-	-	-	4	-	-	-	1	-	.15
G	Festuca myuros (a)	-	-	a15	b94	-	-	6	38	.37	3.53
G	Koeleria cristata	-	-	-	6	-	-	-	2	-	.06
G	Poa bulbosa	-	-	-	9	-	-	-	3	-	.04
G	Poa pratensis	b24	a-	b19	b17	10	-	8	6	.38	.15
G	Poa secunda	a7	b31	ab19	b32	4	17	8	17	.09	.40
Total for Annual Grasses		0	0	584	427	0	0	184	164	24.36	13.15
Total for Perennial Grasses		232	258	206	289	91	102	78	109	7.50	10.64
Total for Grasses		232	258	790	716	91	102	262	273	31.87	23.80
F	Achillea millefolium	ab6	a2	b20	b25	2	1	9	8	.26	.72
F	Agoseris glauca	a-	a3	a9	b20	-	1	4	11	.02	.15
F	Alyssum alyssoides (a)	-	-	a-	b16	-	-	-	7	-	.22
F	Allium spp.	a-	a-	a-	b14	-	-	-	7	-	.08
F	Amsinckia menziesii	-	-	-	3	-	-	-	1	-	.00
F	Artemisia ludoviciana	c109	a38	ab64	bc92	46	20	32	38	2.07	2.48
F	Astragalus utahensis	2	-	6	4	1	-	2	2	.06	.18
F	Balsamorhiza sagittata	8	5	4	6	5	2	1	3	.25	.51
F	Camelina microcarpa (a)	-	-	-	3	-	-	-	1	-	.00
F	Calochortus nuttallii	4	-	1	7	2	-	1	5	.00	.03
F	Cirsium undulatum	19	27	34	17	13	18	18	8	1.17	.93
F	Collomia linearis (a)	-	-	a14	b52	-	-	6	21	.03	.13
F	Comandra pallida	b55	a3	a9	a10	22	1	5	6	.07	.08
F	Collinsia parviflora (a)	-	-	a-	b66	-	-	-	26	-	.40
F	Cryptantha spp.	-	3	-	-	-	1	-	-	-	-
F	Cymopterus spp.	-	-	-	3	-	-	-	1	-	.03
F	Delphinium nuttallianum	-	-	4	-	-	-	2	-	.06	-
F	Descurainia pinnata (a)	-	-	a-	b38	-	-	-	17	-	.11
F	Draba spp. (a)	-	-	a-	b10	-	-	-	5	-	.07
F	Epilobium brachycarpum (a)	-	-	a-	b47	-	-	-	22	-	.21
F	Erodium cicutarium (a)	-	-	a7	b51	-	-	3	22	.06	1.42

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Erigeron pumilus</i>	_a 13	_a 6	_b 70	_a 3	6	5	32	2	1.95	.06
F	Unknown fern	-	-	-	4	-	-	-	2	-	.01
F	<i>Galium aparine</i> (a)	-	-	_a 11	_b 49	-	-	5	21	.05	.79
F	<i>Gayophytum ramosissimum</i> (a)	-	-	48	34	-	-	21	13	.22	.16
F	<i>Geranium</i> spp.	-	-	-	2	-	-	-	1	-	.00
F	<i>Hackelia patens</i>	3	-	-	-	1	-	-	-	-	-
F	<i>Helianthella uniflora</i>	1	-	-	-	1	-	-	-	-	-
F	<i>Holosteum umbellatum</i> (a)	-	-	_a 28	_b 51	-	-	12	21	.08	.20
F	<i>Lathyrus brachycalyx</i>	-	-	-	3	-	-	-	1	-	.03
F	<i>Lappula occidentalis</i> (a)	-	-	2	-	-	-	2	-	.01	-
F	<i>Lactuca serriola</i>	_a -	_{ab} 3	_{ab} 8	_b 17	-	2	4	7	.04	.06
F	<i>Machaeranthera</i> spp	-	-	1	-	-	-	1	-	.00	-
F	<i>Microsteris gracilis</i> (a)	-	-	-	3	-	-	-	1	-	.03
F	<i>Penstemon</i> spp.	-	-	3	2	-	-	2	1	.03	.03
F	<i>Scutellaria antirrhinoides</i>	-	-	-	11	-	-	-	4	-	.09
F	<i>Tragopogon dubius</i>	_a 18	_b 74	_c 116	_d 152	8	41	54	65	1.51	4.15
F	<i>Zigadenus paniculatus</i>	-	2	-	3	-	1	-	1	-	.06
Total for Annual Forbs		0	0	110	420	0	0	49	177	0.46	3.78
Total for Perennial Forbs		238	166	349	398	107	93	167	174	7.53	9.73
Total for Forbs		238	166	459	818	107	93	216	351	8.00	13.51

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 04 , Study no: 9

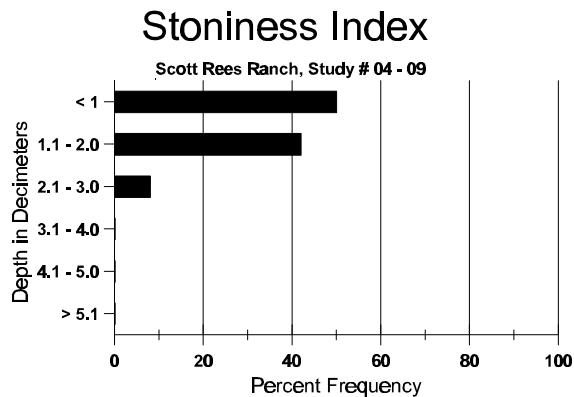
T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Amelanchier alnifolia</i>	1	1	-	-
B	<i>Artemisia tridentata vaseyana</i>	11	7	.53	-
B	<i>Chrysothamnus nauseosus albicaulis</i>	0	1	-	-
B	<i>Gutierrezia sarothrae</i>	17	18	.67	.78
B	<i>Purshia tridentata</i>	1	1	.15	.15
B	<i>Quercus gambelii</i>	91	92	27.84	31.14
Total for Browse		121	120	29.19	32.07

BASIC COVER --
Herd unit 04 , Study no: 9

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	387	362	2.25	2.75	56.99	63.45
Rock	231	222	31.25	30.75	15.05	15.46
Pavement	14	5	1.50	.75	.10	.01
Litter	397	377	52.50	59.75	64.02	58.97
Cryptogams	37	15	2.25	0	.26	.14
Bare Ground	41	42	10.25	6.00	.32	1.12

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 09, Scott Rees Ranch

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
8.4	74.2 (7.9)	6.9	38.6	34.1	27.4	2.9	22.5	217.6	.6



PELLET GROUP FREQUENCY --
Herd unit 04 , Study no: 9

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Sheep	4	-	01	01
Elk	4	1	-	-
Deer	11	15	52	4 (10)
Rabbit	-	-	418	32 (79)
			17	N/A

BROWSE CHARACTERISTICS --

Herd unit 04 , 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		1	2							
<i>Amelanchier alnifolia</i>															
M	84	-	-	-	-	-	-	-	0	-	-	0			
	90	-	-	-	1	-	-	-	1	-	-	66	28	33	1
	96	-	-	1	-	-	-	-	1	-	-	20	52	18	1
	01	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	1	1	-	20			1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'84		00%		00%		00%									
'90		100%		00%		00%		-70%							
'96		00%		100%		00%		+ 0%							
'01		00%		100%		00%									
Total Plants/Acre (excluding Dead & Seedlings)									'84	0	Dec:	0%			
									'90	66		0%			
									'96	20		0%			
									'01	20		100%			
<i>Artemisia tridentata vaseyana</i>															
M	84	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	6	-	-	-	-	-	7	-	-	140	22	27	7
	01	2	-	-	2	-	-	-	4	-	-	80	22	25	4
D	84	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	0			0	
	96	1	1	2	-	-	-	-	4	-	-	80			4
	01	4	-	1	-	-	-	-	4	-	-	100			5
X	84	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	320			16	
	01	-	-	-	-	-	-	-	-	-	100			5	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'84		00%		00%		00%									
'90		00%		00%		00%									
'96		64%		18%		00%		-18%							
'01		00%		11%		11%									
Total Plants/Acre (excluding Dead & Seedlings)									'84	0	Dec:	0%			
									'90	0		0%			
									'96	220		36%			
									'01	180		56%			

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				
Cercocarpus ledifolius																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	49	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			
Chrysothamnus nauseosus albicaulis																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	31	31	1
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	35	41	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+ 0%							
'90		100%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	0		-			
												'01	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	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	20		1	
M	84	1	-	-	-	-	-	-	66	12	7	1
	90	-	-	-	-	-	-	-	0	-	-	0
	96	48	-	-	-	-	-	-	960	15	20	48
	01	29	-	-	-	-	-	-	580	11	14	29
D	84	-	1	-	-	-	-	-	66			1
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		50%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		00%		-38%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	132	Dec:	50%			
						'90	0		0%			
						'96	960		0%			
						'01	600		0%			
<i>Purshia tridentata</i>												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	0	37	54	0
	01	-	-	-	-	-	-	1	20	47	61	1
D	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	1	20			1
	01	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		100%		100%		+ 0%				
'01		00%		100%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%			
						'90	0		0%			
						'96	20		100%			
						'01	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									
Quercus gambelii																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	31	-	-	-	-	-	-	-	31	-	-	-	620		31	
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	148	-	33	-	-	-	-	-	181	-	-	-	12066		181	
	90	68	61	3	1	9	-	-	-	65	77	-	-	9466		142	
	96	70	18	-	1	-	-	-	-	89	-	-	-	1780		89	
	01	169	-	-	-	-	-	-	-	165	4	-	-	3380		169	
M	84	46	9	124	-	-	-	-	-	179	-	-	-	11933	21	11	179
	90	1	40	-	-	-	-	-	-	-	41	-	-	2733	21	22	41
	96	36	291	13	-	-	-	-	-	340	-	-	-	6800	24	31	340
	01	1099	13	-	-	-	-	-	-	1109	3	-	-	22240	23	16	1112
D	84	3	23	27	-	-	-	-	-	53	-	-	-	3533		53	
	90	18	39	-	-	-	-	-	-	12	30	1	14	3800		57	
	96	1	19	13	-	-	-	-	-	33	-	-	-	660		33	
	01	23	2	-	-	-	-	-	-	24	-	-	1	500		25	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	460		23	
	01	-	-	-	-	-	-	-	-	-	-	-	-	920		46	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		08%			45%			00%			-42%						
'90		62%			01%			06%			-42%						
'96		71%			06%			00%			+65%						
'01		01%			00%			.07%									
Total Plants/Acre (excluding Dead & Seedlings)										'84	27532	Dec:	13%				
										'90	15999		24%				
										'96	9240		7%				
										'01	26120		2%				

Suspended

Trend Study 4-12-96

Study site name: Bennett Creek.

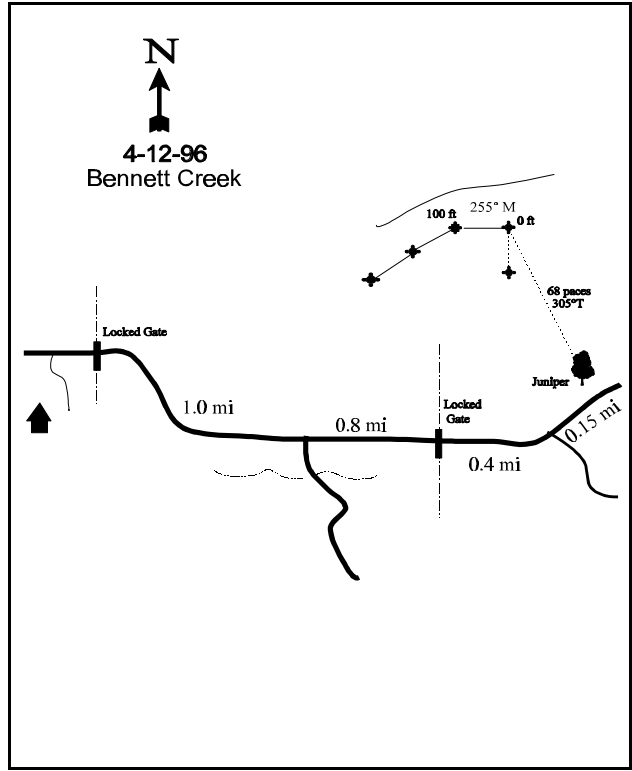
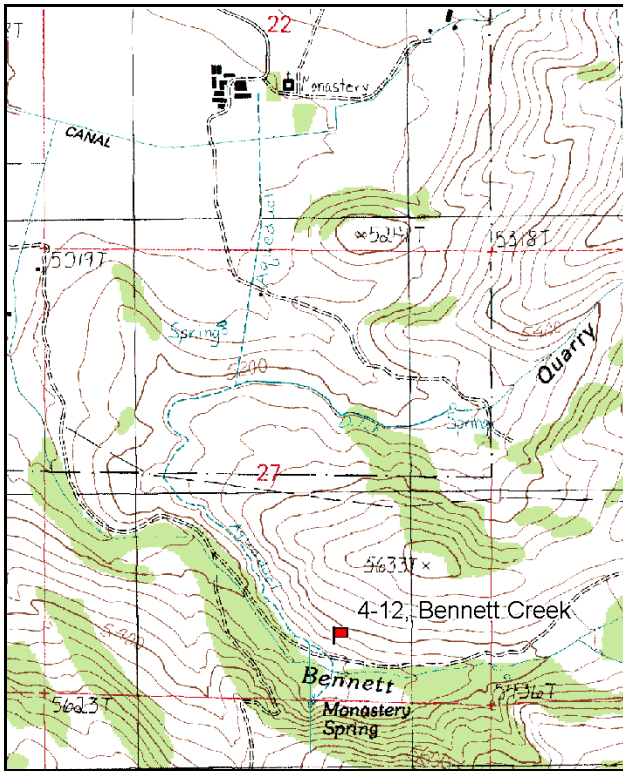
Vegetation type: Low Sagebrush.

Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

Two keys and permission to cross private land are necessary to access this study site. Brother Nicolas at the monastery can direct you to bypass the first locked gate which is theirs. The second locked gate is owned by Basin Land and Livestock but it was not locked (Steve Hansen in Park City is managing the land). If it is locked the site is a short walk east up the road. At the corner of 1200 South and 9500 East southeast of Huntsville, drive down 8900 East (with a dead end sign) 1.2 miles to a locked gate (monastery). Go through the gate 1 mile to a fork which goes to Sheep Herd Creek. Bear left, go 0.8 miles to another locked gate (Basin Land and Livestock). Past the gate, continue 0.4 miles to a fork. Bear left and go 0.15 miles to a lone juniper which marks the study site. The large lone juniper is 75 feet north of the road. From the juniper, walk 68 paces bearing 305°T to the 0-foot baseline stake.



Map Name: Durst Mountain

Diagrammatic Sketch

Township 6N, Range 2E, Section 26,

UTM 4564136 N 441849 E

DISCUSSION

Trend Study No. 4-12

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. In 1996, the area appeared to support minimal wintering big game. The site is totally dominated by the low value perennial, bulbous bluegrass, annual grasses, and weedy forbs.

The Bennett Creek study was a new trend study put in place in 1990. It samples deer and elk winter range on the south side of Huntsville Valley. Most of the area is private land making access to the isolated state section difficult. The range has been heavily grazed by domestic sheep in the past. Sign of big game was more moderate in 1990, with evidence of sage grouse and a recently transplanted moose observed. During the 1996 reading, no elk and little deer sign was observed. Sheep and cattle sign was encountered. A pair of Sandhill cranes were observed near the site in 1996.

The study is on the south-facing side of a low ridge above Bennett Creek. The slope is 18% with an elevation of 5,700 feet. Soil on the ridge is shallow and very rocky. Effective rooting depth (see methods) was estimated at only about 5 inches due to the rockiness of the soil. Soil texture is a clay loam with a neutral soil reaction (7.2 pH). Due to the high rock content and south facing slope, soil temperatures are high averaging over 72°F at about 5 inches in depth. Vegetative cover combined with rock and pavement cover appear adequate to protect the soil from erosion.

A low, spreading sagebrush dominates the study site. The low sagebrush (*Artemisia arbuscula*) has a compact growth form and appeared moderately hedged in 1990, with some heavy use on the mature plants (32% were classified in form class 3). Seedling and young sagebrush were very common and vigor was good on all age classes that year. Sagebrush canopy cover averaged 23%. A spotty fire appears to have burned through the site prior to the 1996 reading. This along with the larger sample used in 1996 are mostly the reason for the significant decline in sagebrush density (11,265 plants/acre to 3,700). Currently the sagebrush stand is mostly young (61%) and lightly hedged. Vigor is normal on most plants but poor on 19% of the population which appear chlorotic. The only other shrub found on the site consisted of one broom snakeweed.

Past heavy grazing has eliminated valuable perennial grasses and forbs. The depleted understory is almost exclusively bulbous bluegrass, Sandberg bluegrass, Japanese brome, and cheatgrass. There are occasional remnant bluebunch wheatgrass plants. Forbs are abundant yet dominated by annuals and weedy biennials, primarily curlycup gumweed and yellow salsify which accounted for 77% of the total forb cover in 1996.

1990 APPARENT TREND ASSESSMENT

Adequate ground cover translates into a stable soil trend. The soil would have a high hazard of erosion if vegetative cover was removed. There are active gullies in the valley below the site. The site displays a lack of diversity in the depleted understory, but the browse stand is stable. The community is very susceptible to wildfire with the dense understory of weedy annuals.

1996 TREND ASSESSMENT

The soil trend is stable. Percent bare ground has declined to less than 1%, while litter cover has declined from 59% to 14%. Vegetation and rock cover adequately protect the soil from significant erosion. The browse trend is down due to a decline in density caused by a burn over some of the area. Seedlings and young plants are still found in good numbers, making it appear that the population will rebound. Trend for the herbaceous understory is stable for grasses but up for forbs. Nested frequency of bulbous bluegrass increased

significantly, although sum of nested frequency for the more preferred Sandberg bluegrass declined significantly. Overall, sum of nested frequency for perennial grasses increased slightly. Sum of nested frequency for perennial forbs increased dramatically. However, this increase came primarily from curlycup gumweed and yellow salsify. The former species is a very undesirable species. Trend for the herbaceous understory is considered slightly down due to the significant increases in low value weedy forbs.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - down slightly, very poor condition (2)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 12

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %
		'90	'96	'90	'96	'96
G	Agropyron spicatum	9	30	4	13	.22
G	Bromus japonicus (a)	-	307	-	94	3.51
G	Bromus tectorum (a)	-	201	-	67	2.47
G	Melica bulbosa	-	2	-	1	.00
G	Poa bulbosa	326	*367	98	97	35.12
G	Poa secunda	72	60	32	23	.53
Total for Annual Grasses		0	508	0	161	5.98
Total for Perennial Grasses		407	459	134	134	35.89
Total for Grasses		407	967	134	295	41.87
F	Achillea millefolium	-	1	-	1	.15
F	Agoseris glauca	-	*23	-	13	.09
F	Ambrosia psilostachya	-	3	-	1	.03
F	Artemisia ludoviciana	-	*12	-	5	.36
F	Cirsium spp.	-	*9	-	6	.09
F	Collomia linearis (a)	-	2	-	2	.01
F	Collinsia parviflora (a)	-	16	-	7	.06
F	Erodium cicutarium (a)	-	207	-	74	2.72
F	Erigeron divergens	-	*13	-	8	.26
F	Grindelia squarrosa	28	*269	14	91	12.66
F	Helianthus annuus (a)	14	7	8	6	.03
F	Lactuca serriola	8	*26	4	15	.10
F	Lomatium dissectum	-	3	-	1	.00
F	Machaeranthera canescens	-	*23	-	10	.05
F	Polygonum douglasii (a)	-	6	-	2	.01
F	Taraxacum officinale	-	*15	-	8	.09

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %
		'90	'96	'90	'96	'96
F	Tragopogon dubius	20	*102	10	52	1.04
F	Unknown forb-annual (a)	-	30	-	12	.06
F	Viola spp.	-	5	-	2	.01
Total for Annual Forbs		14	268	8	103	2.88
Total for Perennial Forbs		56	504	28	213	14.95
Total for Forbs		70	772	36	316	17.84

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 04 , Study no: 12

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia arbuscula	65	2.81
B	Gutierrezia sarothrae	1	.15
Total for Browse		66	2.96

BASIC COVER --

Herd unit 04 , Study no: 12

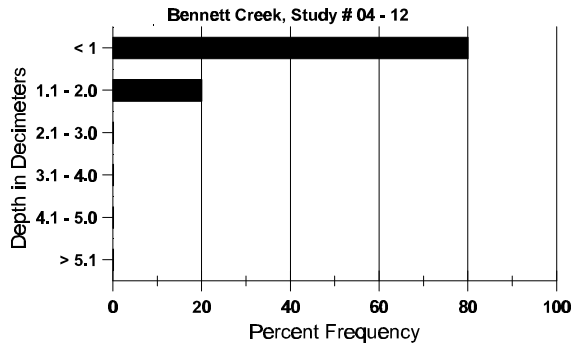
Cover Type	Nested Frequency	Average Cover %	
		'90	'96
Vegetation	391	5.50	61.56
Rock	283	16.75	21.93
Pavement	174	9.75	1.97
Litter	362	59.25	14.06
Cryptogams	12	.50	.06
Bare Ground	173	8.25	.96

SOIL ANALYSIS DATA --

Herd Unit 04, Study no: 12, Bennett Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
4.5	72.4 (5.5)	6.6	41.7	34.0	24.3	3.1	30.6	208.0	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 04 , Study no: 12

Type	Quadrat Frequency '96
Sheep	2
Rabbit	1
Deer	1
Cattle	5

BROWSE CHARACTERISTICS --

Herd unit 04 , Study no: 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				
Artemisia arbuscula																		
S	90	63	-	-	-	-	-	-	-	-	63	-	-	-	4200			63
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
Y	90	48	10	-	-	-	-	-	-	-	57	-	1	-	3866			58
	96	112	-	-	-	-	-	-	-	-	92	-	20	-	2240			112
M	90	16	42	22	-	-	-	-	-	-	74	4	2	-	5333	12	21	80
	96	72	-	-	-	-	-	-	-	-	58	-	14	-	1440	11	15	72
D	90	11	6	14	-	-	-	-	-	-	19	2	8	2	2066			31
	96	1	-	-	-	-	-	-	-	-	-	-	1	-	20			1
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		34%			21%			08%			-67%							
'96		00%			00%			19%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	11265	Dec:	18%			
												'96	3700		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				
<i>Artemisia tridentata vaseyana</i>																		
M	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	20	30	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		100%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	66	Dec:	-			
												'96	0		-			
<i>Gutierrezia sarothrae</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	16	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	20		-			

Trend Study 4-13-01

Study site name: Wheatgrass Hollow .

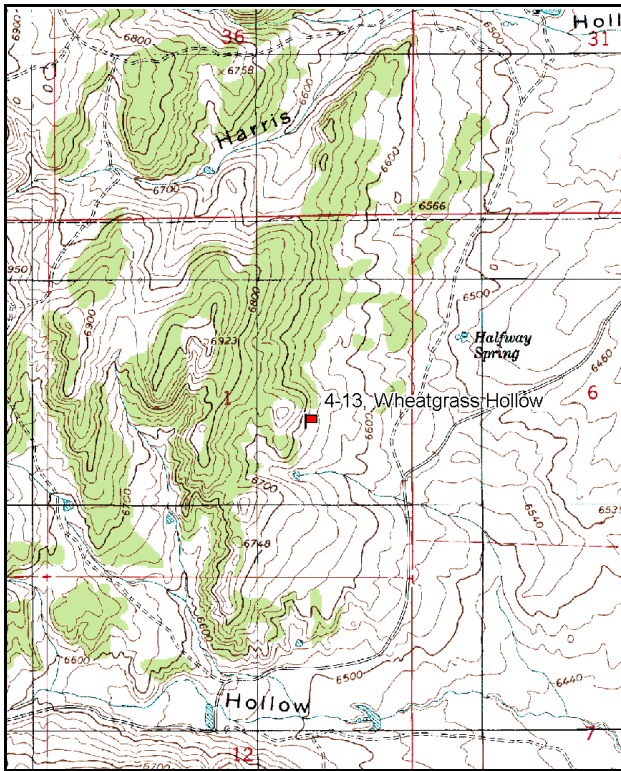
Vegetation type: Big Sagebrush .

Compass bearing: frequency baseline 135 degrees magnetic.

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

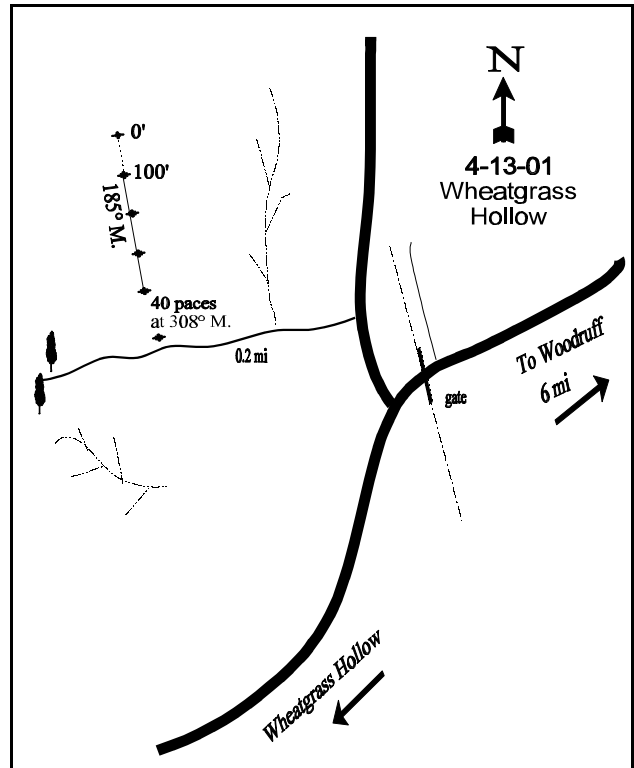
LOCATION DESCRIPTION

Where Highway U-16 bends to the east on the south side of Woodruff, continue straight on Deseret Road (South Main). Go 2.5 miles and turn right (west) onto the Wheatgrass Road. Go 3.25 miles, crossing several cattleguards, to the fourth cattleguard. Continue past this cattleguard to a fork. Go north 0.05 miles to a fork with a faint road on the left. Go 0.2 miles west on the faint road to a witness post. From the witness post, walk 40 paces at 308 degrees magnetic to the 400-foot baseline stake. The 0-foot baseline stake is located 400 feet to the north at a bearing of 315 degrees magnetic.



Map Name: Neponset Reservoir NW

Township 8N, Range 6E, Section 1



Diagrammatic Sketch

UTM 4589340 N 482214 E

DISCUSSION

Trend Study No. 4-13

The Wheatgrass Hollow study was established in 1990. It samples BLM winter range in an area that is mostly private land. The range type is Wyoming big sagebrush with scattered juniper and pinyon and a sparse understory. The woodland is moderately dense on the ridge above the site. The site has a southeast aspect and 13% slope with an elevation of 6,650 feet. Deer use the area in most winters. Pellet group frequency was moderately high for deer in 1996, at 38%. Only a few elk pellet groups or cattle pats were encountered. A pellet group transect read on the site in 2001, estimated 58 deer days use/acre (144 ddu/ha). Only 1 elk pellet group was encountered. Most of the deer pellet groups appear to be from winter use.

The fine-textured soil is moderately shallow and compacted. Effective rooting depth is estimated at just over 10 inches. Soil texture is a sandy clay loam with a neutral soil reaction (pH 7.2). Phosphorus is marginal at only 10.3 ppm, where values of less than 10 ppm have been shown to limit plant growth and development. Pavement is a significant ground cover component. Other indicators of soil erosion include small shallow gullies and plant pedestalling. There is good ground cover under shrub crowns, but the shrub interspaces are largely bare. Due to the gentle terrain, erosion is not significant and the erosion condition class was determined to be stable in 2001.

Wyoming big sagebrush is the only abundant shrub on the site. It has a moderately high density with canopy cover averaging 23% in 1996 and 26% in 2001. Forage production per plant was low in 1990, partially due to the dense stand, but also to past heavy use and a high percentage of decadent plants. Also, 43% of the decadent sagebrush had reduced vigor due to insect damage. During the 1996 and 2001 readings, utilization of sagebrush has moderated. Vigor was normal on most plants and percent decadence has declined from 55% in 1990 to 23% in 2001. Recruitment is good with adequate numbers of seedlings and young plants to maintain the population.

A few shadscale, narrowleaf low rabbitbrush, greasewood, and prickly pear also occupy the site. Point-quarter data estimated the scattered junipers to have a density of 32 trees/acre in 1990, increasing to 47 trees/acre in 1996, and 58 trees/acre by 2001. Average diameter of juniper was 3.8 inches in 2001. Some of these trees have been heavily hedged (highlined) where available.

The native grass understory is comprised mainly of Sandberg bluegrass and bluebunch wheatgrass. Spring forb forage is lacking. The most numerous species consists of longleaf phlox and hoods phlox. Grasses and forbs combined produced only about 12% ground cover in 1996 and 2001.

1990 APPARENT TREND ASSESSMENT

The long-term vegetative trend for this site appears stable. The amount and diversity of forage produced is below optimum. The soil has previously suffered the effects of severe erosion, but currently it appears is relatively stable.

1996 TREND ASSESSMENT

The soil trend appears stable with similar amounts of protective ground cover compared to 1990. Trend for Wyoming big sagebrush is also stable. Density is slightly lower, but vigor has improved and percent decadency has declined from 55% to 25%. Trend for the herbaceous understory is stable but depleted. Nested frequency for bluebunch wheatgrass declined significantly. The sum of nested frequency for perennial grasses declined slightly overall, although sum of nested frequency for perennial forbs increased. Bluebunch

wheatgrass is more preferred but the decline probable does not warrant a declining trend designation for it only contributes 3% of the total grass cover.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable but depleted (3)

2001 TREND ASSESSMENT

Trend for soil is stable with similar amounts of protective ground cover compared to 1996. Percent cover of bare ground did increase but litter and vegetation cover also increased. There is little erosion currently occurring and the erosion condition class was determined as stable. Trend for Wyoming big sagebrush is up slightly. Utilization is mostly light to moderate. Density has increased 31%, vigor is normal on most plants, and percent decadence is relatively low at 23%. About 33% of the decadent plants were classified as dying, but young plants account for 23% of the population which is more than adequate to maintain the stand. Trend for the herbaceous understory is stable but depleted. All grasses and forbs combined produce only about 13% total cover. Sum of nested frequency for perennial grasses increased slightly, while that of perennial forbs declined slightly. Nested frequency of the more preferred bluebunch wheatgrass increased significantly. The forb composition is still very poor with hoods phlox and longleaf phlox providing 59% of the forb cover.

TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - stable but depleted (3)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 13

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	Agropyron smithii	a-	a-	b14	-	-	6	-	.08
G	Agropyron spicatum	c71	a15	b47	35	8	19	.26	1.02
G	Bromus tectorum (a)	-	27	29	-	10	11	.05	.10
G	Carex spp.	1	-	-	1	-	-	-	-
G	Oryzopsis hymenoides	7	8	3	4	4	1	.22	.01
G	Poa secunda	ab307	b310	a294	99	97	97	8.73	8.43
G	Sitanion hystrix	a23	b38	a7	10	20	4	.39	.21
G	Stipa comata	a16	ab15	b36	7	7	12	.54	.52
Total for Annual Grasses		0	27	29	0	10	11	0.05	0.10
Total for Perennial Grasses		425	386	401	156	136	139	10.15	10.28
Total for Grasses		425	413	430	156	146	150	10.21	10.39

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
F	Agoseris glauca	-	1	-	-	1	-	.00	-
F	Antennaria rosea	17	24	32	7	12	15	.38	.20
F	Arabis spp.	4	3	-	2	1	-	.00	-
F	Astragalus convallarius	-	-	2	-	-	1	-	.03
F	Asclepias speciosa	-	4	-	-	1	-	.03	-
F	Astragalus spatulatus	_a	_a 5	_b 14	-	3	10	.06	.07
F	Astragalus utahensis	-	3	3	-	1	1	.00	.00
F	Cordylanthus ramosus (a)	-	_a	_b 49	-	-	22	-	.59
F	Cryptantha spp.	-	1	-	-	1	-	.03	-
F	Erigeron pumilus	_b 13	_{ab} 10	_a 6	9	4	2	.02	.01
F	Lappula occidentalis (a)	-	-	1	-	-	1	-	.00
F	Orobancha spp.	-	3	-	-	1	-	.00	-
F	Phlox hoodii	_a 90	_b 119	_{ab} 114	40	51	47	1.39	1.26
F	Phlox longifolia	_b 43	_b 50	_a 14	20	19	7	.12	.06
Total for Annual Forbs		0	0	50	0	0	23	0	0.59
Total for Perennial Forbs		167	223	185	78	95	83	2.05	1.64
Total for Forbs		167	223	235	78	95	106	2.05	2.24

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 04 , Study no: 13

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	99	95	23.40	25.77
B	Atriplex confertifolia	3	2	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	15	10	.09	.33
B	Juniperus osteosperma	1	1	.00	-
B	Opuntia spp.	18	18	.04	.07
B	Sarcobatus vermiculatus	1	0	-	-
Total for Browse		137	126	23.54	26.20

BASIC COVER --

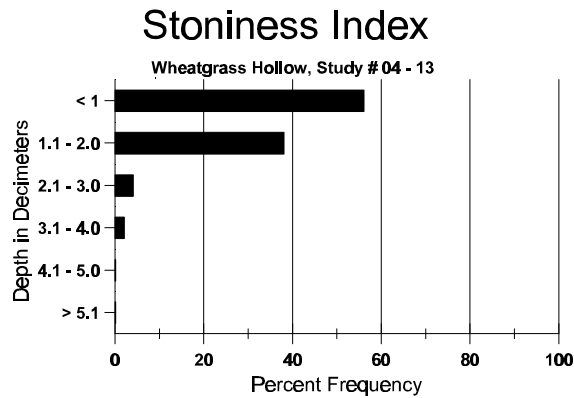
Herd unit 04 , Study no: 13

Cover Type	Nested Frequency		Average Cover %		
	'96	'01	'90	'96	'01
Vegetation	331	326	8.00	34.17	39.87
Rock	170	127	5.50	3.24	2.07
Pavement	300	309	27.00	17.76	18.94
Litter	382	348	34.50	25.90	27.56
Cryptogams	226	182	8.50	8.83	8.57
Bare Ground	296	269	16.50	15.49	26.14

SOIL ANALYSIS DATA --

Herd Unit 04, Study no: 13, Wheatgrass Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.4	58.6 (11.5)	7.2	49.0	22.0	29.0	4.5	10.3	204.8	.7



PELLET GROUP FREQUENCY --

Herd unit 04 , Study no: 13

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Rabbit	10	3	26	N/A
Horse	-	1	17	N/A
Elk	4	4	9	1 (2)
Deer	38	20	757	58 (144)
Cattle	1	1	-	-

BROWSE CHARACTERISTICS --

Herd unit 04 , 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	90	2	-	-	2	-	-	-	-	-	4	-	-	-	266			4
	96	56	-	-	-	-	-	-	-	-	56	-	-	-	1120			56
	01	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
Y	90	21	2	1	1	-	-	-	-	-	23	2	-	-	1666			25
	96	23	8	-	1	-	-	-	-	-	32	-	-	-	640			32
	01	98	-	-	-	-	-	-	-	-	98	-	-	-	1960			98
M	90	11	5	3	1	-	-	-	-	-	13	1	6	-	1333	19	23	20
	96	57	117	14	-	4	-	-	-	-	190	2	-	-	3840	14	33	192
	01	137	80	15	-	-	1	-	-	-	233	-	-	-	4660	15	28	233
D	90	22	17	15	-	-	-	-	-	-	18	23	10	3	3600			54
	96	15	46	10	-	2	-	-	-	-	59	-	-	14	1460			73
	01	43	40	11	3	-	-	-	-	-	65	-	-	32	1940			97
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1180			59
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	860			43
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		24%			19%			19%			-10%							
'96		60%			08%			05%			+31%							
'01		28%			06%			07%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	6599	Dec:	55%				
											'96	5940		25%				
											'01	8560		23%				
<i>Atriplex confertifolia</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	11	10	3
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	15	12	2
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%										
'96		00%			00%			00%			-33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	-				
											'96	60		-				
											'01	40		-				

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																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	35	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	0		-			
												'01	0		-			
Chrysothamnus viscidiflorus viscidiflorus																		
S	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	3	-	-	-	-	-	3	-	-	-	60			3
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	6	8	1
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	10	16	17
	01	10	1	-	-	-	-	-	-	-	11	-	-	-	220	10	18	11
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	1	-	-	2	60			3
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		100%			00%			00%			+86%							
'96		00%			00%			09%			-39%							
'01		14%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	66	Dec:	0%			
												'96	460		13%			
												'01	280		7%			

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				
Juniperus osteosperma																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			+ 0%							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	20		-			
												'01	20		-			
Opuntia spp.																		
S	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	2	-	-	-	-	-	1	-	-	3	-	-	-	60		3	
M	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200	3	2	
	96	27	-	-	-	-	-	-	-	-	27	-	-	-	540	4	13	
	01	27	-	-	-	-	-	-	-	-	27	-	-	-	540	3	12	
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	3	3	-	-	-	-	-	-	-	6	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			+38%							
'96		00%			00%			00%			+25%							
'01		08%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	333	Dec:	0%			
												'96	540		0%			
												'01	720		17%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4				
Sarcobatus vermiculatus									
M	'90	-	-	-	-	-	-	0	
	'96	1	-	-	-	-	-	20	
	'01	-	-	-	-	-	-	0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>	
	'90	00%		00%		00%			
	'96	00%		00%		00%			
	'01	00%		00%		00%			
Total Plants/Acre (excluding Dead & Seedlings)						'90	0	Dec:	-
						'96	20		-
						'01	0		-

Trend Study 4-14-01

Study site name: Chapman Canal.

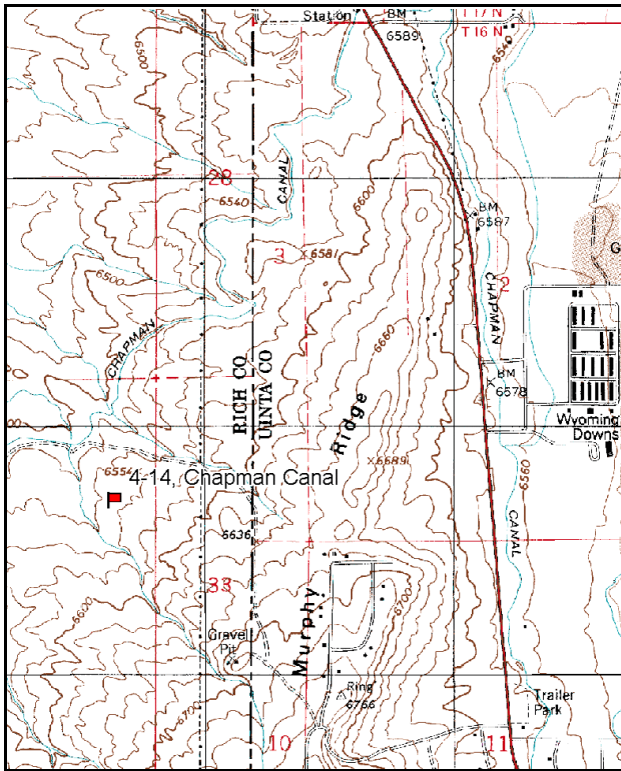
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 165 degrees magnetic.

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

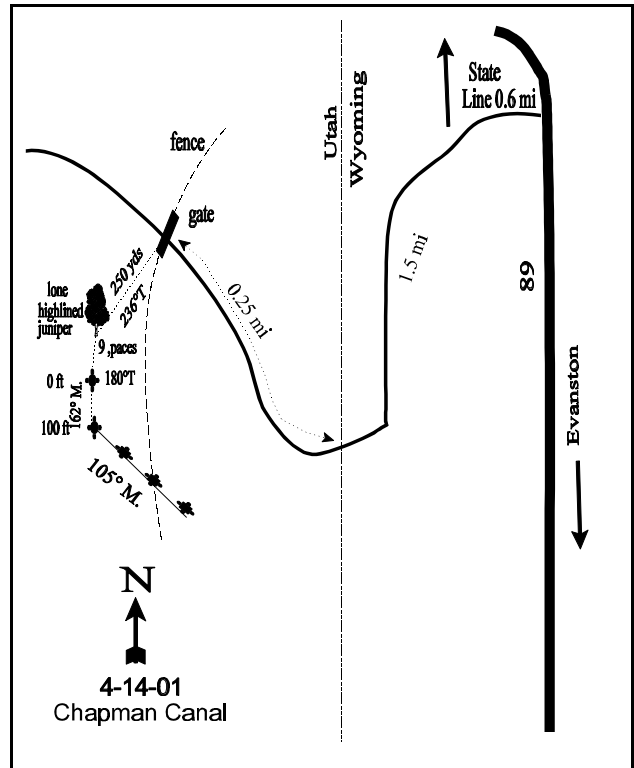
LOCATION DESCRIPTION

From the state line southbound on Highway 16/89, proceed 0.6 miles towards Evanston and turn right (west). Proceed 1.5 miles, crossing Chapman Canal, to a gate (DL&L). Go through the gate and travel 0.25 miles to a fence/gate. From the gate walk approximately 130 paces at 218 degrees magnetic to a lone high lined juniper. This is the only juniper present in the area. From the tree walk 9 paces at 165 degrees magnetic to the 0-foot stake of the baseline, marked with browse tag #7939. The baseline doglegs after 100 feet an runs 105 degrees magnetic.



Map Name: Neponset Reservoir NE

Township 8N, Range 8E, Section 32



Diagrammatic Sketch

UTM 4581670 N 495612 E

DISCUSSION

Trend Study No. 4-14

The Chapman Canal trend study samples an area that, at first glance, would appear to have little value as big game winter range. Located close to the Wyoming state line, this study lies in the midst of an extensive big sagebrush-grass type that extends for miles before any cover from trees or terrain is discernible. However, large numbers of deer, elk, antelope, sage grouse, horses, and cattle all utilize the area. A brood of Hungarian partridge were also observed at the time of study establishment in 1984. In addition, five winter killed deer carcasses were encountered that same year. Deer use was moderately heavy in 1996 with a pellet group quadrat frequency of 24%. A few elk pellet groups were also encountered. A pellet group transect read on site in 2001, estimated 30 deer, 5 elk and 5 cow days use/acre (74 ddu/ha, 13 edu/ha and 13 cdu/ha). All deer pellet groups appear to be from winter use. About half of the elk pellet groups appeared to be from winter use, while the other half were from spring or early summer use.

The site varies from nearly level to perhaps a 10% west facing slope. Elevation is 6,560 feet. Soil is "Duckree Gravelly Loam," a category typified by moderately deep, well drained, rapidly permeable soils, formed in alluvium from quartzite, chert, and sandstone. This soil is strongly calcareous and alkaline at all depths. Available water capacity is low and the erosion hazard is moderate (Campbell and Lacey 1982). Soil at the site has an estimated effective rooting depth of nearly 11 inches. Soil texture is a clay loam with a moderately alkaline soil reaction (pH of 8.0). Phosphorus could be a limiting factor at only 5.5 ppm because values of less than 10 ppm have been shown to limit plant growth and development. Organic matter is also relatively low at only 1.9%. Ground cover is poor and comes primarily from the shrub crowns. Most shrub interspaces are barren and some soil compaction from trampling is evident. Sheet and gully erosion is noticeable throughout the area, but is not excessive. The soil erosion condition class was determined as slight in 2001.

The key browse species is Wyoming big sagebrush which contributes the most browse cover (69% to 78%). Wyoming big sagebrush was generally low in stature and heavily browsed in 1984. Vigor was poor on 18% of the population and although there was noticeable decadence among larger plants, there appeared to be adequate reproduction. By 1990, the population remained comparable, although utilization was more moderate and vigor improved. The population declined by 46% by 1996, primarily due to the reduction in the number of young plants from 2,133 to only 60. Some of the decrease in numbers is due to the extended drought of the late 1980's, yet the larger sample size utilized in 1996 gives a greatly improved estimate of browse populations. Density was estimated at 4,040 plants/acre in 2001. Utilization of the sagebrush was light to moderate, vigor good on most plants, and percent decadence actually dropped slightly. No seedlings were encountered and young plants are still lacking.

Narrowleaf low rabbitbrush is abundant yet on average accounts for only 23% of the total browse cover. Its population has remained fairly stable since 1984 at about 4,200 plants/acre. Mature plants are small, averaging only 8 inches in height in 2001. They are mostly unutilized and in good vigor.

The herbaceous understory is characterized by adequate diversity among grasses, but few quality forbs. The most common grass is Sandberg bluegrass which accounted for 67% of the total grass cover in 1996 and 2001. Western wheatgrass is also fairly common. Annual cheatgrass was picked up in the 2001 sample, but it only occurred in small numbers. By far the most abundant forbs include hoods phlox and longleaf phlox, two low value perennial forbs.

1984 APPARENT TREND ASSESSMENT

Trend appears basically stable. Some erosion is occurring but is limited by the gentle terrain. However, there is an active gully in the area which indicates the potential for erosion. Vegetative trend indicators suggest that the key species, Wyoming big sagebrush, "turns over" rather quickly but is stable insofar as population maintenance is concerned.

1990 TREND ASSESSMENT

At the Chapman Canal site, as suggested in 1984, the Wyoming big sagebrush population is dynamic in terms of age class structure, but fairly stable concerning total density. The sagebrush has a moderate to heavily hedged growth form. Sagebrush canopy cover averaged about 21%. Western wheatgrass and Sandberg bluegrass are very abundant and lightly used. Western wheatgrass increased slightly in nested frequency while Sandberg bluegrass declined slightly. Even with the fair understory, shrub interspaces are bare with 41% bare soil. Litter cover has declined slightly but cryptogamic and basal vegetation cover have increased. Soil movement is excessive considering the gentle terrain.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - stable (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Trend for soil is stable. Ground cover characteristics are similar compared to 1990 estimates. Erosion is occurring, but not at a significant level due to the gentle terrain. Trend for browse is down slightly due to the 46% decline in density of Wyoming big sagebrush. The change is principally due to a drop in the number of young plants. Density of mature plants remained similar to 1984 estimates. The percentage of decadent plants classified as dying has increased from 9% to 28%. Use is more moderate and percent decadence has declined from 43% to 31%. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency for perennial grasses and forbs. Western wheatgrass declined slightly in nested frequency, while Sandberg bluegrass increased significantly. The increase in forb sum of nested frequency came largely from significant increases in hoods phlox and longleaf phlox.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - slightly up (4)

2001 TREND ASSESSMENT

Trend for soil is up slightly. Percent bare ground is still high at 32%, but litter cover, cryptogams, and vegetation cover have all increased since 1996. There is still some localized erosion occurring but it is not significant due to the gentle terrain. The erosion condition class was determined to be slight in 2001. Trend for Wyoming big sagebrush appears stable with a similar density compared to 1996. Utilization continues to be light to moderate, vigor good on most plants, and percent decadence has declined slightly from 31% to 26%. Recruitment is poor with no seedlings encountered and young plants accounting for only 1% of the population. Without an improvement in reproduction, this population will likely decline slightly in the future since 12% of the decadent plants were classified as dying. Trend for the herbaceous understory is stable with similar sum of nested frequency values for perennial grasses and forbs compared to 1996. The two dominant perennial grasses, western wheatgrass and Sandberg bluegrass, have remained stable.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 14

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	-	-	-	2	-	-	-	1	.00	.15
G	Agropyron smithii	206	220	202	215	72	85	71	73	1.81	2.99
G	Agropyron spicatum	_b 30	_b 13	_a -	_a 1	14	7	-	1	-	.00
G	Bromus tectorum (a)	-	-	_a -	_b 16	-	-	-	7	-	.04
G	Oryzopsis hymenoides	_a 4	_{ab} 11	_b 27	_{ab} 19	2	4	12	11	.21	.21
G	Poa fendleriana	-	-	-	7	-	-	-	3	-	.06
G	Poa secunda	_{ab} 205	_a 178	_b 234	_b 231	82	71	89	83	4.33	7.26
G	Sitanion hystrix	_b 15	_a 1	_{ab} 13	_a -	7	1	4	-	.07	-
G	Stipa comata	-	3	-	6	-	2	-	3	-	.18
Total for Annual Grasses		0	0	0	16	0	0	0	7	0	0.04
Total for Perennial Grasses		460	426	476	481	177	170	176	175	6.43	10.87
Total for Grasses		460	426	476	497	177	170	176	182	6.43	10.92
F	Alyssum alyssoides (a)	_a -	_a -	_b 19	_c 164	-	-	9	53	.04	.44
F	Antennaria rosea	_b 38	_b 38	_a 9	_a 4	15	16	4	2	.24	.18
F	Arabis drummondii	-	-	2	-	-	-	2	-	.01	-
F	Arenaria spp.	3	-	-	-	2	-	-	-	-	-
F	Astragalus convallarius	-	5	-	1	-	2	-	1	-	.01
F	Astragalus spp.	7	7	3	8	2	3	1	4	.00	.12
F	Astragalus utahensis	-	1	-	-	-	1	-	-	-	-
F	Cordylanthus ramosus (a)	-	-	-	2	-	-	-	1	-	.03
F	Cryptantha spp.	_B 11	_b 14	_{ab} 4	_a -	7	7	2	-	.06	-
F	Cymopterus spp.	-	-	3	5	-	-	2	3	.01	.04
F	Descurainia pinnata (a)	-	-	-	7	-	-	-	4	-	.02
F	Draba spp. (a)	-	-	-	1	-	-	-	1	-	.00
F	Erigeron pumilus	-	5	7	11	-	2	3	5	.01	.12
F	Haplopappus acaulis	1	4	3	1	1	2	1	1	.03	.03
F	Lappula occidentalis (a)	-	-	-	5	-	-	-	2	-	.01
F	Microsteris gracilis (a)	-	-	-	6	-	-	-	2	-	.01
F	Phlox hoodii	_a 71	_{ab} 108	_c 145	_{bc} 110	32	45	60	53	3.79	1.88
F	Phlox longifolia	_a 16	_a 6	_b 56	_b 64	6	3	26	28	.28	.24

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Ranunculus testiculatus (a)	-	-	8	17	-	-	5	7	.02	.03
F	Senecio integerrimus	-	-	-	1	-	-	-	1	-	.00
F	Trifolium spp.	5	7	-	1	3	3	-	1	-	.00
F	Unknown forb-perennial	-	2	-	-	-	1	-	-	-	-
Total for Annual Forbs		0	0	27	202	0	0	14	70	0.07	0.55
Total for Perennial Forbs		152	197	232	206	68	85	101	99	4.44	2.65
Total for Forbs		152	197	259	408	68	85	115	169	4.51	3.20

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 04 , Study no: 14

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	88	84	14.79	18.32
B	Atriplex gardneri falcata	7	14	.53	.09
B	Ceratoides lanata	8	8	.21	-
B	Chrysothamnus viscidiflorus stenophyllus	82	83	5.54	4.51
B	Opuntia spp.	13	4	.21	.53
B	Tetradymia canescens	1	2	-	.15
Total for Browse		199	195	21.29	23.60

BASIC COVER --

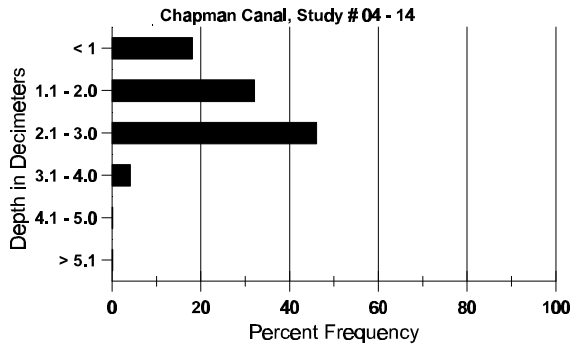
Herd unit 04 , Study no: 14

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	335	352	2.00	8.50	28.93	38.24
Rock	25	10	0	.25	.07	.06
Pavement	119	165	0	.75	.63	1.22
Litter	387	359	43.25	31.00	27.83	31.87
Cryptogams	244	292	10.00	18.25	12.77	21.15
Bare Ground	344	298	44.75	41.25	40.43	31.89

SOIL ANALYSIS DATA --
 Herd Unit 04, Study no: 14, Chapman Canal

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.7	61.0 (9.4)	8.0	44.8	26.0	29.3	1.9	5.5	67.2	.7

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 04 , Study no: 14

Type	Quadrat Frequency	
	'96	'01
Rabbit	9	28
Elk	5	2
Deer	24	25
Cattle	1	-
Coyote	-	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
287	N/A
70	5 (13)
392	30 (74)
61	5 (13)
9	N/A

BROWSE CHARACTERISTICS --

Herd unit 04 , Study no: 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				
Artemisia tridentata wyomingensis																		
S	84	13	1	-	-	-	-	-	-	-	14	-	-	-	933		14	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	11	11	-	-	-	-	-	-	-	22	-	-	-	1466		22	
	90	18	13	1	-	-	-	-	-	-	30	2	-	-	2133		32	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	15	17	-	-	-	-	-	-	31	-	1	-	2133	13 19	32	
	90	7	14	6	-	-	-	-	-	-	27	-	-	-	1800	15 18	27	
	96	93	31	-	-	-	-	-	-	-	123	-	1	-	2480	18 34	124	
	01	79	60	3	-	3	2	-	-	-	147	-	-	-	2940	19 33	147	
D	84	-	4	44	-	-	-	-	-	-	30	1	14	3	3200		48	
	90	10	24	9	1	-	-	-	-	-	31	9	-	4	2933		44	
	96	26	29	3	-	-	-	-	-	-	42	-	-	16	1160		58	
	01	25	24	-	1	-	2	-	-	-	44	2	-	6	1040		52	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	760		38	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	760		38	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		29%			60%			18%			+ 1%							
'90		50%			16%			04%			-46%							
'96		32%			02%			09%			+ 8%							
'01		43%			03%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	6799	Dec:	47%			
												'90	6866		43%			
												'96	3700		31%			
												'01	4040		26%			

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				
Atriplex canescens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	22	36	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			
Atriplex gardneri falcata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	22	-	-	-	-	-	-	-	-	22	-	-	-	440			22
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	30	-	-	-	-	-	-	-	-	30	-	-	-	600	4	9	30
	01	19	1	-	-	-	-	-	-	-	20	-	-	-	400	3	7	20
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%						+29%				
'01		02%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	600		-			
												'01	840		-			

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				
Ceratoides lanata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	8	2	-	1	-	-	-	-	-	11	-	-	-	220	5	11	
	01	7	2	2	-	-	-	-	-	-	11	-	-	-	220	6	11	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		13%			00%			00%			-20%							
'01		17%			17%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	300		-			
												'01	240		-			

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 viscidiflorus stenophyllus																		
Y	84	11	-	-	-	-	-	-	-	-	11	-	-	-	733		11	
	90	10	3	-	-	-	-	-	-	-	12	-	1	-	866		13	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	47	-	-	-	-	-	-	-	-	47	-	-	-	3133	10	11	47
	90	13	18	2	4	-	-	1	-	-	37	1	-	-	2533	5	7	38
	96	147	2	-	11	-	-	-	-	-	156	-	-	4	3200	10	17	160
	01	149	2	-	4	-	-	-	-	-	155	-	-	-	3100	8	15	155
D	84	1	4	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	7	9	1	1	-	-	-	-	-	13	4	1	-	1200		18	
	96	43	-	-	7	-	-	-	-	-	45	-	-	5	1000		50	
	01	56	-	-	-	-	-	-	-	-	48	-	-	8	1120		56	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	06%			00%			00%			+ 9%							
	'90	43%			04%			03%			- 7%							
	'96	.93%			00%			04%			- 0%							
	'01	.94%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	4199	Dec:	8%			
												'90	4599		26%			
												'96	4260		23%			
												'01	4240		26%			

A G R E	Y 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.																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266	4	9	4
	90	2	-	-	-	-	-	-	-	-	-	-	2	-	133	5	3	2
	96	22	-	-	-	-	-	-	-	-	22	-	-	-	440	4	15	22
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	3	11	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+43%							
'90		00%			00%			29%			+ 3%							
'96		00%			00%			00%			-83%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	266	Dec:	0%				
											'90	466		0%				
											'96	480		8%				
											'01	80		25%				
Tetradymia canescens																		
M	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133	7	14	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	7	0
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	7	10	2
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		100%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			100%			+50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	133	Dec:	0%				
											'90	0		0%				
											'96	20		100%				
											'01	40		0%				

Trend Study 4-15-01

Study site name: Woodruff Creek South.

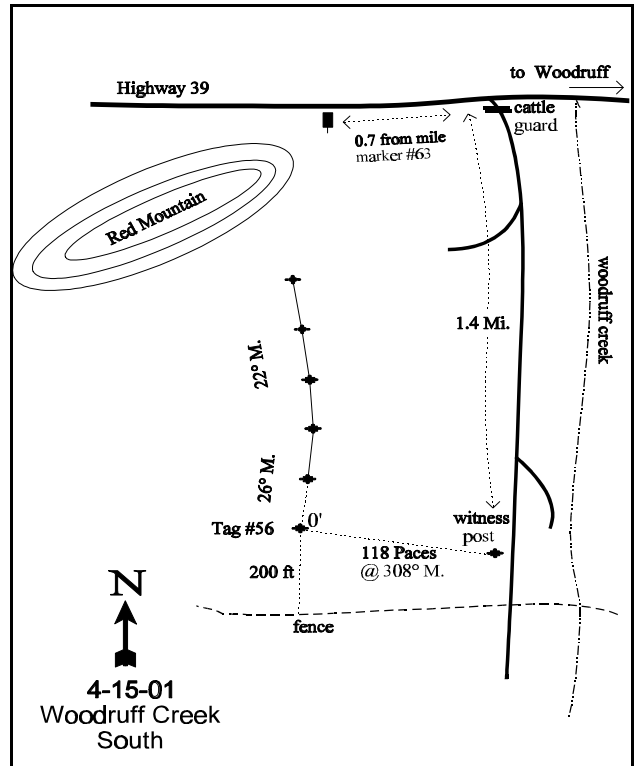
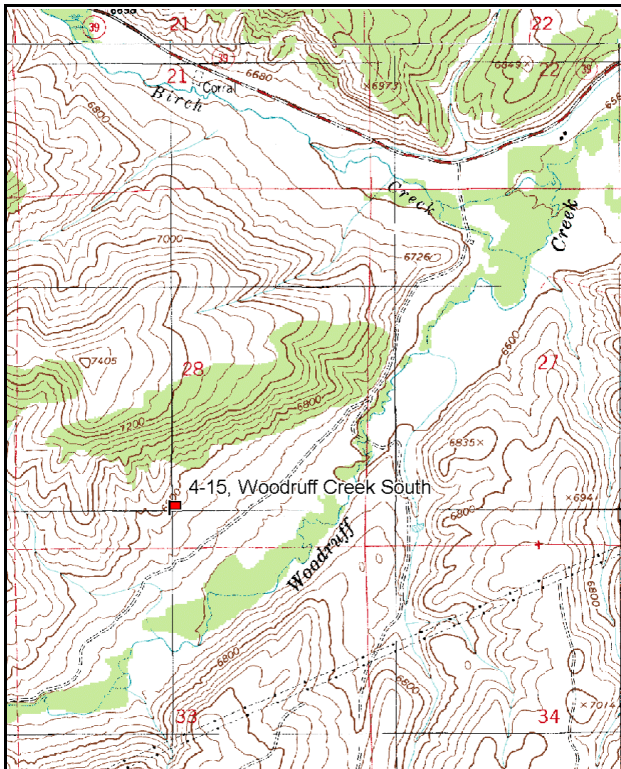
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 26 degrees magnetic.

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

LOCATION DESCRIPTION

Travel south on highway 39 and turn right (west) 0.7 miles past mile marker #63. Travel west for 1.4 miles to a witness post on the right hand side of the road. From the witness post, walk 118 paces at 308 degrees magnetic to the 0-foot baseline stake. The 0-foot baseline stake is marked with a browse tag #56. There is a fence 200 feet to the west from the 0-foot baseline stake. The baseline runs in a direction of 26 degrees magnetic. The baseline doglegs at the 300-foot baseline stake and runs in a direction of 22 degrees magnetic.



Map Name: Meachum Ridge

Diagrammatic Sketch

Township 9N, Range 6E, Section 28

UTM 4591981 N 476988 E

DISCUSSION

Trend Study No. 4-15

The Woodruff Creek South site is a new study established in 1996. It is placed down stream from Woodruff reservoir and about one-third of a mile north of Woodruff creek. The site samples a Wyoming big sagebrush site with a juniper overstory. Slope varies from 10% to 20% with an elevation of about 6,700 feet. The area typically receives heavy winter use by deer. Five winter killed deer were found on the site in 1996. They appear to have been dead for a few years and probably died during the particularly harsh winter of 1992-93. Deer pellet groups were fairly numerous in 1996, with a quadrat frequency of 28%. Cattle had utilized the site prior to the 1996 reading and were grazing just west of the site in another pasture when the site was read. Deer pellet group quadrat frequency was also moderately high in 2001, at 34%. A pellet group transect read on the site in 2001, estimated 31 deer days use/acre (76 ddu/ha) and 34 cow days use/acre (84 cdu/ha). All deer pellet groups appeared to be from winter use while cattle pats were from the previous fall (2000).

The soil is moderately deep but gravelly. Effective rooting depth is estimated at a little over 12 inches. Soil texture is a sandy clay loam with a neutral soil reaction (pH of 6.8). Infiltration is likely rapid and water holding capacity poor. Pea sized gravel covers bare areas where there is no vegetative ground cover. At about 6 inches in depth, a layer of larger gravel can be detected. The soil doesn't have much structure and was dry down to about 1½ feet in 1996. Unprotected bare ground is not abundant on the site due to the adequate herbaceous ground cover. Unfortunately most of that cover comes from cheatgrass. Some erosion is occurring in the form of flow patterns, rills, pedestalling, and an active gully near the end of the study site baseline. However, it is currently not excessive and the soil erosion condition class was determined as slight in 2001.

The site supports a moderately dense stand of Wyoming big sagebrush with an estimated density of 3,300 plants/acre in 1996, increasing to 5,480 plants/acre by 2001. Most of the sagebrush sampled in 1996 was losing its leaves due the excessively dry conditions. Data from Woodruff indicates that only 62% of the normal precipitation was collected from April-Sept of 1996 (Utah climate summaries 2001). Seed production appeared good with mostly light utilization. Seedlings were abundant with an additional 18% of the population classified as young plants. Decadent plants accounted for 33% of the population. Dead plants were also numerous, numbering 840 plants/acre (1:4 dead to live plant ratio), indicating a fairly rapid turnover on the site. Density increased to 5,480 plants/acre in 2001. Utilization was still light to moderate, vigor good, and percent decadence declined from 33% to 23%. Young plants were numerous and accounted for 29% of the population.

Other shrubs encountered include narrowleaf low rabbitbrush, prickly pear, and a few gray horsebrush. A few snowberry and winterfat plants were also observed on the site but not sampled. Juniper trees are scattered through the area. Most of the mature trees are highlined. There are quite a few young trees in the 3 to 4 foot class. Point-quarter data estimated 85 juniper trees/acre with an average diameter of 4 inches in 1996. During the 2001 reading, point-quarter data estimated 94 trees/acre with an average diameter of 7 inches. Overhead canopy cover averaged 11% during both readings.

The herbaceous understory consists of patches of thick cheatgrass. In other areas where cheatgrass is not as abundant, Sandberg bluegrass, western and bluebunch wheatgrass are common. Also fairly abundant is Indian ricegrass. Several other perennial grasses are found on the site in small numbers. Cheatgrass accounted for 63% of the total grass cover on the site in 1996, while Sandberg bluegrass and bluebunch wheatgrass combined to produce 30%. Due to the dry conditions of 2000 and 2001 (Utah climate summaries 2001), average cover of the annual, cheatgrass, declined from 16% to only about 2%. Cheatgrass now provides only 13% of the total grass cover. Forbs are almost absent, combining to produce less than one-half of 1% cover in 1996 and 2001.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the gentle terrain and the sandy nature of the soil. Herbaceous cover is also abundant yet composed mostly of cheatgrass. The browse trend also appears stable. Seedlings are abundant and young sagebrush account for 18% of the population. Utilization is mostly light and vigor normal. The herbaceous understory contains several desirable perennial grasses, but only Sandberg bluegrass is very abundant. Cheatgrass currently makes up 63% of the grass cover. Forbs are nearly nonexistent. Trend appears stable, but with a poor composition (too much cheatgrass) and almost nonexistence of forbs.

2001 TREND ASSESSMENT

Trend for soil is down slightly due to a 53% increase in bare ground and a decline in herbaceous vegetation cover from 25% in 1996 to 13% in 2001. Litter cover remained similar. The decline in herbaceous cover comes entirely from a significant reduction in cheatgrass. Cover and nested frequency of perennial grasses actually increased slightly since 1996. Some erosion is occurring on the site, but it is not excessive. The erosion condition class was determined as only slight in 2001. Trend for Wyoming big sagebrush is up. Density has increased 40%, utilization continues to be light to moderate, vigor is good, and percent decadence has declined to 23%. Reproduction is also excellent with abundant seedlings and young. Annual leader growth of Wyoming big sagebrush averaged only 1.2 inches, but this is above the average for the Wyoming big sagebrush sites in Unit 4 which averaged only 1 inch of annual growth. The only other common shrub consists of stickleaf low rabbitbrush which has remained relatively stable in density. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses has increased slightly while frequency of cheatgrass has declined significantly. Cover of cheatgrass has also declined from 16% to 2% due to the dry conditions of the past 2 years. Forbs are nearly nonexistent but have remained at similar frequencies compared to 1996.

TREND ASSESSMENT

soil - down slightly (2)

browse - up (5)

herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --
Herd unit 04 , Study no: 15

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron smithii	37	*123	14	35	.29	2.29
G	Agropyron spicatum	52	*2	15	2	1.37	.01
G	Bromus tectorum (a)	354	*232	87	72	15.76	1.60
G	Elymus cinereus	4	-	2	-	.06	-
G	Koeleria cristata	2	-	1	-	.00	-
G	Oryzopsis hymenoides	36	*22	20	10	.81	.49
G	Poa fendleriana	9	-	5	-	.22	-
G	Poa pratensis	1	-	1	-	.03	-
G	Poa secunda	257	309	76	91	6.25	7.15
G	Sitanion hystrix	22	*13	11	4	.23	.04
G	Stipa comata	2	*31	2	12	.03	1.09
Total for Annual Grasses		354	232	87	72	15.76	1.60
Total for Perennial Grasses		422	500	147	154	9.30	11.10
Total for Grasses		776	732	234	226	25.07	12.71
F	Antennaria rosea	-	5	-	2	-	.01
F	Arabis drummondi	12	*-	6	-	.03	.03
F	Astragalus convallarius	2	*15	1	7	.01	.16
F	Astragalus spp.	2	-	1	-	.03	-
F	Astragalus utahensis	5	5	2	2	.03	.06
F	Chaenactis douglasii	1	3	1	1	.00	.00
F	Cryptantha spp.	-	-	-	-	.03	-
F	Descurainia pinnata (a)	6	2	3	1	.04	.00
F	Erigeron pumilus	-	1	-	1	-	.00
F	Lappula occidentalis (a)	-	7	-	3	-	.04
F	Orobanche spp.	5	-	2	-	.01	-
F	Phlox hoodii	6	6	4	3	.04	.04
F	Phlox longifolia	3	4	1	2	.00	.01
F	Tragopogon dubius	-	3	-	2	-	.01
Total for Annual Forbs		6	9	3	4	0.04	0.04
Total for Perennial Forbs		36	42	18	20	0.20	0.32
Total for Forbs		42	51	21	24	0.24	0.37

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 04 , Study no: 15

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	83	86	10.83	10.98
B	Atriplex canescens	0	0	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	58	54	2.68	1.89
B	Juniperus osteosperma	7	8	6.98	8.26
B	Opuntia spp.	13	6	.16	.00
B	Tetradymia canescens	3	3	.01	-
Total for Browse		164	157	20.67	21.20

CANOPY COVER --

Herd unit 04 , Study no: 15

Point-Quarter Tree Data

Species	Percent Cover		Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01	'96	'01
Juniperus osteosperma	7	11	85	93	4.1	7.4

BASIC COVER --

Herd unit 04 , Study no: 15

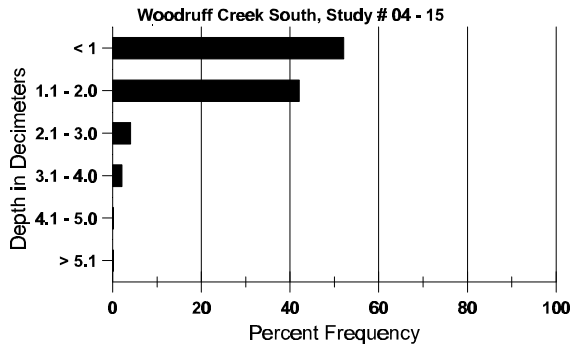
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	444	403	44.31	37.37
Rock	187	131	3.07	1.93
Pavement	266	312	10.89	13.43
Litter	494	472	46.23	47.56
Cryptogams	89	121	2.21	4.95
Bare Ground	219	257	7.96	14.96

SOIL ANALYSIS DATA --

Herd Unit 04, Study no: 15, Woodruff Creek South

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.3	61.0 (12.4)	6.8	53.7	19.3	27.0	2.8	20.9	204.8	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 04 , Study no: 15

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Rabbit	13	25	61	N/A
Horse	1	-	17	N/A
Elk	7	1	-	-
Deer	28	34	400	31 (76)
Cattle	6	12	409	34 (84)

BROWSE CHARACTERISTICS --

Herd unit 04 , Study no: 15

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 tridentata wyomingensis									
S	96	55	-	-	-	-	-	-	55
	01	18	-	-	-	-	-	-	18
Y	96	29	1	-	-	-	-	-	30
	01	79	-	-	-	-	-	-	79
M	96	65	15	-	-	-	-	-	80
	01	96	34	1	-	-	2	-	133
D	96	38	15	1	1	-	-	-	55
	01	36	23	1	2	-	-	-	62
X	96	-	-	-	-	-	-	-	840
	01	-	-	-	-	-	-	-	720
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>	
'96		19%		.60%		05%		+40%	
'01		21%		.72%		.36%			
Total Plants/Acre (excluding Dead & Seedlings)						'96	3300	Dec:	33%
						'01	5480		23%

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>Atriplex canescens</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	27	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	0		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
S	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	96	111	-	-	-	-	-	-	-	-	111	-	-	-	2220	13	20	111
	01	88	-	-	12	-	-	1	-	-	101	-	-	-	2020	10	15	101
D	96	7	-	-	-	-	-	-	-	-	5	-	-	2	140			7
	01	13	-	-	-	-	-	-	-	-	9	1	-	3	260			13
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			02%			- 8%							
'01		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	2540	Dec:	6%			
												'01	2340		11%			
<i>Gutierrezia sarothrae</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	8	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	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>Juniperus osteosperma</i>																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	20			1	
M	96	7	-	-	-	-	-	-	-	-	7	-	-	140	-	-	7	
	01	6	-	-	-	-	-	-	2	-	7	1	-	160	-	-	8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+22%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	140	Dec:	-			
												'01	180		-			
<i>Opuntia spp.</i>																		
Y	96	6	-	-	-	-	-	-	-	-	6	-	-	120			6	
	01	7	-	-	-	-	-	-	-	-	7	-	-	140			7	
M	96	14	-	-	-	-	-	-	-	-	14	-	-	280	4	15	14	
	01	5	-	-	-	-	-	-	-	-	5	-	-	100	3	10	5	
D	96	1	-	-	-	-	-	-	-	-	1	-	-	20			1	
	01	3	-	-	-	-	-	-	-	-	-	-	3	60			3	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	20			1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-29%							
'01		00%			00%			20%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	420	Dec:	5%			
												'01	300		20%			
<i>Tetradymia canescens</i>																		
M	96	4	-	-	-	-	-	-	-	-	4	-	-	80	12	23	4	
	01	4	-	-	-	-	-	-	-	-	4	-	-	80	8	20	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	80	Dec:	-			
												'01	80		-			

Trend Study 4-16-01

Study site name: Dry Hollow.

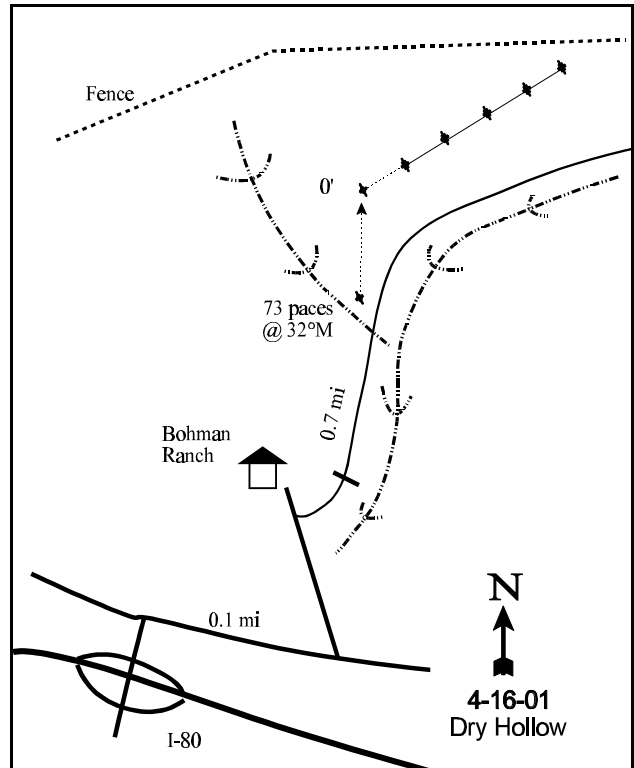
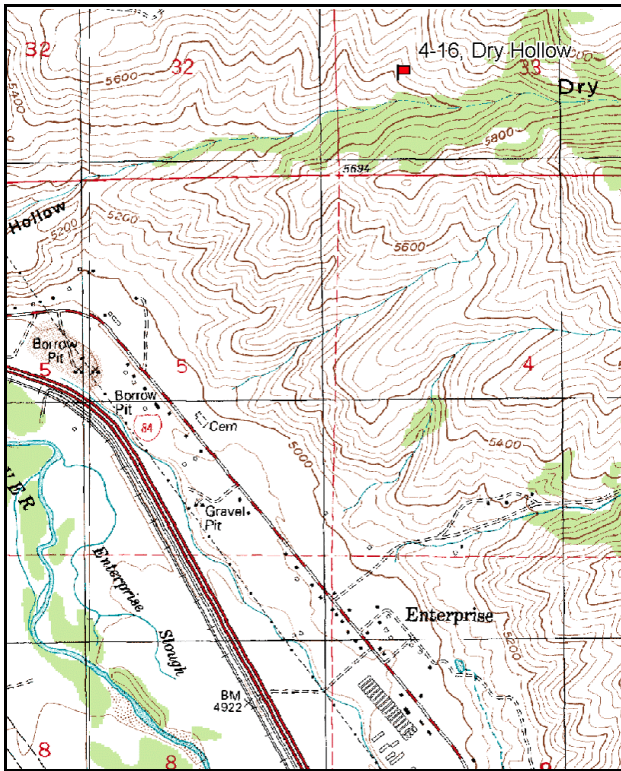
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 73 degrees magnetic.

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

LOCATION DESCRIPTION

From I-84, take exit 96 and travel north to a “T” in the road. Turn right and travel 0.1 miles. Take a left toward Bohman Ranch. Just before Bohman Ranch turn right and travel toward a gate. From the gate, proceed 0.7 miles to a witness post. From the witness post walk 73 paces at 32 degrees magnetic to the 0 foot baseline stake. The baseline runs 73 degrees magnetic.



Map Name: Morgan

Diagrammatic Sketch

Township 5N, Range 2E, Section 33

UTM 4552328 N 438325 E

DISCUSSION

Trend Study No. 4-16

The Dry Hollow site was established in 1996, on private land owned by Frank Bohman. It is located about 1 mile east of the Bohman Ranch in Dry Hollow. The site is on a south facing hillside about 300 feet above the hollow within a sagebrush/grass type. Slope ranges from 9% to 20%. Aspect is southwest with an elevation of 5,440. Deer and elk have used this area during the winter in the past, but pellet groups have not been particularly abundant in 1996 or 2001. One large 4 point antler drop was found on the site in 1996. Cattle utilized the site in 1996, with this particular pasture being differed in 1997. A pellet group transect read on site in 2001, estimated only 3 deer days use/acre (8 ddu/ha). Cattle use was estimated at 13 days use/acre. Some cows were still in the area during the 2001 reading (6/7/01) but most use appears to have been in early spring.

The soil is shallow and rocky on the surface and throughout the profile along the first 100 feet of the baseline. Effective rooting depth (see methods) here is only 6 inches. Rock consist of rounded river cobble. Soil depth is deeper along the rest of the baseline with smaller gravel sized rocks on the surface and within the profile. Effective rooting depth along the rest of the baseline averages 15 inches. Average for the whole site is almost 14 inches. The soil is very dark, compact, but with good structure. It has a clay loam texture with a neutral soil reaction (pH of 7.3). Due to the rock and gravel on the surface and within the profile in association with the sloping south aspect, soil temperature is very high averaging 76°F at a depth of 16 inches. High soil temperatures cause the soil profile to dry early in the summer and give winter annuals, like cheatgrass and Japanese brome, a competitive advantage over the more preferred perennial species. Erosion is not currently a problem due to the abundant protective ground cover. The erosion condition class was determined as slight in 2001.

Browse on the site consists of a combination of low sagebrush (*Artemisia arbuscula*) and mountain big sagebrush (*A. tridentata vaseyana*). Low sagebrush grows primarily along the first part of the base line where rooting depth is more restricted. Other browse encountered on the site include bitterbrush, woods rose, Gambel oak, snowberry, and some chokecherry. Oak clones are growing near the site but were not sampled. Utilization of the sagebrush has been mostly light but some moderate use was encountered in 1996 and 2001. During the 1996 reading, poor vigor was apparent on mountain big sagebrush along belt 2 which is near the more shallow soil where low sagebrush dominates. Vigor was classified as poor on 24% of the mountain big sagebrush population in 1996. However, percent decadence was only 6%. During the 2001 reading, percent decadence increased slightly for both low sagebrush and mountain big sagebrush. Average vigor improved for mountain big sagebrush and slightly declined for low sagebrush. Recruitment is good for both species with adequate young plants to maintain their respective populations.

Less desirable shrubs include stickyleaf low rabbitbrush, broom snakeweed, Oregon holly grape, and woods rose, which are found on the site in limited numbers. However, all have increased in density since 1996.

Understory vegetation, like many south slopes in this area, is composed mostly of weedy perennial forbs and annual grasses. Japanese brome and cheatgrass accounted for 97% of the grass cover in 1996. The only perennial grasses found on the site consist of occasional bluebunch wheatgrass and a slightly more abundant Sandberg bluegrass. In 2001, annual grasses continue to dominate the grass component even though cheatgrass has increased and Japanese brome declined abundance. Combined, these annual grasses still account for 77% of the grass cover.

Forbs are abundant but they are composed mostly of annual and weedy biennial and perennial species. The most abundant species include pale alyssum, Louisiana sage, aster, storksbill, prickly lettuce, and yellow salsify. Annual forbs were particularly abundant in 2001, increasing from 3% cover in 1996 to 26% in the last survey.

1996 APPARENT TREND ASSESSMENT

Soil trend appears stable due to the abundant protective ground cover and little exposed bare ground. Trend for browse appears stable with light to moderate utilization, generally good vigor, adequate numbers of young plants, and low decadency rates. The herbaceous understory is poor and contains few valuable species, mostly weeds and annuals.

2001 TREND ASSESSMENT

Trend for soil is down slightly. Percent bare ground nearly doubled, but it is still relatively low at 11%. Litter cover also declined considerably because of the extremely dry conditions. However, herbaceous vegetation is still abundant and the erosion is not a significant factor at this time. The erosion condition class was determined as slight. Trend for the key browse species, low sagebrush and mountain big sagebrush, is up slightly. Density for both populations has increased slightly, percent decadence remains relatively low, vigor is generally good, and young recruitment has improved. Trend for the herbaceous understory is mixed for perennials. Sum of nested frequency for perennial grasses has increased slightly with a significant increase in the nested frequency of bluebunch wheatgrass and Sandberg bluegrass. However, perennial grasses are not abundant and provide only 23% of the grass cover. Annual grasses continue to dominate the grass component by providing the other 77% of the grass cover. The annual grass composition has changed somewhat since 1996 with cheatgrass increasing significantly in nested frequency, while Japanese brome declined significantly. The herbaceous understory composition has also changed in that forbs now contribute 75% of the total herbaceous cover, an increase from 42% in 1996. The increase comes entirely from annual forbs which rose in average cover from 3% in 1996 to 26% in 2001. The biggest increase comes from storksbill which expanded from about one-half of 1% cover in 1996 to 23% cover in 2001. Perennial forbs have declined slightly in sum of nested frequency, but average cover has remained stable at about 10%. These changes are obviously driven by precipitation which was only 47% of normal in March at Morgan (Utah climate summaries 2001). April was normal but May was extremely dry averaging only 8% of normal. Trend for the herbaceous understory is stable for perennial species, although due to the significant increase in annual forbs, trend is considered slightly down.

TREND ASSESSMENT

soil - down slightly (2)

browse - up slightly (4)

herbaceous understory - down slightly (2)

HERBACEOUS TRENDS --
Herd unit 04 , Study no: 16

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	<i>Agropyron cristatum</i>	-	1	-	1	-	.03
G	<i>Agropyron intermedium</i>	-	1	-	1	-	.03
G	<i>Agropyron spicatum</i>	5	*26	3	11	.04	.98
G	<i>Bromus brizaeformis</i> (a)	2	3	1	1	.00	.03
G	<i>Bromus japonicus</i> (a)	349	*212	85	68	11.68	1.27
G	<i>Bromus tectorum</i> (a)	221	*379	56	97	5.80	8.05
G	<i>Elymus salina</i>	-	3	-	1	-	.03
G	<i>Poa bulbosa</i>	-	7	-	2	-	.38
G	<i>Poa secunda</i>	26	*79	12	31	.45	1.33
Total for Annual Grasses		572	594	142	166	17.50	9.36
Total for Perennial Grasses		31	117	15	47	0.49	2.79
Total for Grasses		603	711	157	213	17.99	12.15
F	<i>Achillea millefolium</i>	22	25	12	11	.25	.20
F	<i>Agoseris heterophylla</i>	64	34	24	17	.44	.38
F	<i>Alyssum alyssoides</i> (a)	68	*185	22	57	.31	1.17
F	<i>Allium</i> spp.	9	*45	4	19	.02	.22
F	<i>Ambrosia psilostachya</i>	13	*33	5	13	.11	.49
F	<i>Antennaria parvifolia</i>	-	3	-	1	-	.03
F	<i>Artemisia ludoviciana</i>	63	*80	25	32	1.37	1.18
F	<i>Aster</i> spp.	33	46	10	15	.87	1.12
F	<i>Astragalus</i> spp.	-	1	-	1	-	.00
F	<i>Balsamorhiza sagittata</i>	3	-	1	-	.36	.06
F	<i>Camelina microcarpa</i> (a)	14	6	6	2	.03	.16
F	<i>Calochortus nuttallii</i>	-	-	-	-	-	.00
F	<i>Cirsium undulatum</i>	4	4	2	2	.03	.15
F	<i>Collomia linearis</i> (a)	3	9	1	6	.00	.03
F	<i>Collinsia parviflora</i> (a)	-	*24	-	9	-	.09
F	<i>Draba</i> spp. (a)	-	7	-	3	-	.01
F	<i>Epilobium brachycarpum</i> (a)	-	*104	-	35	-	.49
F	<i>Erodium cicutarium</i> (a)	76	*381	26	88	.43	22.90
F	<i>Erigeron divergens</i>	-	3	-	1	-	.15
F	<i>Galium</i> spp.	4	*20	2	8	.01	.72
F	<i>Gayophytum ramosissimum</i> (a)	167	*7	63	3	1.10	.01
F	<i>Grindelia squarrosa</i>	5	*25	3	11	.21	.25

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	<i>Helianthus annuus</i> (a)	18	*75	7	29	.22	.61
F	<i>Hedysarum boreale</i>	-	5	-	1	-	.00
F	<i>Holosteum umbellatum</i> (a)	70	*31	25	12	.12	.11
F	<i>Lappula occidentalis</i> (a)	15	10	6	4	.08	.07
F	<i>Lactuca serriola</i>	146	*10	61	6	.88	.08
F	<i>Madia glomerata</i> (a)	12	1	5	1	.02	.03
F	<i>Microsteris gracilis</i> (a)	-	*34	-	15	-	.22
F	<i>Phlox longifolia</i>	21	*4	8	2	.09	.01
F	<i>Polygonum douglasii</i> (a)	37	19	16	10	.08	.10
F	<i>Ranunculus testiculatus</i> (a)	28	36	11	16	.05	.17
F	<i>Sisymbrium altissimum</i> (a)	3	9	1	4	.15	.04
F	<i>Taraxacum officinale</i>	2	4	1	2	.00	.03
F	<i>Tragopogon dubius</i>	270	244	78	87	5.87	4.41
F	<i>Verbascum blattaria</i>	5	-	1	-	.00	-
F	<i>Vicia americana</i>	21	15	11	11	.08	.47
Total for Annual Forbs		511	938	189	294	2.62	26.26
Total for Perennial Forbs		685	601	248	240	10.62	10.00
Total for Forbs		1196	1539	437	534	13.25	36.27

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 04 , Study no: 16

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	1	1	-	.63
B	Artemisia arbuscula	12	18	3.07	3.79
B	Artemisia tridentata vaseyana	45	45	8.64	11.14
B	Chrysothamnus nauseosus albicaulis	0	1	-	.15
B	Chrysothamnus nauseosus consimilis	4	1	1.08	.15
B	Chrysothamnus viscidiflorus viscidiflorus	1	4	-	-
B	Gutierrezia sarothrae	15	23	.25	1.42
B	Mahonia repens	5	4	.45	.45
B	Purshia tridentata	1	0	.03	-
B	Rosa woodsii	4	4	.30	.18
B	Symphoricarpos oreophilus	3	4	1.82	1.66
Total for Browse		91	105	15.65	19.59

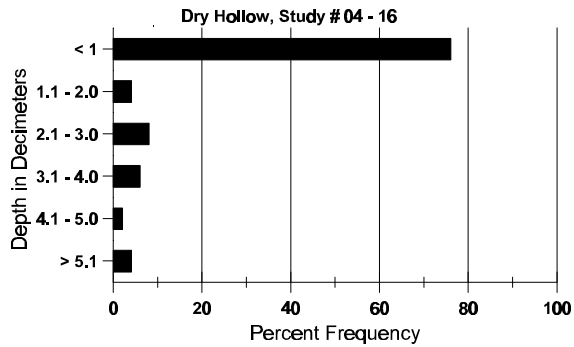
BASIC COVER --
Herd unit 04 , Study no: 16

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	486	478	54.15	61.36
Rock	222	200	5.23	5.51
Pavement	256	285	2.20	4.92
Litter	499	447	64.69	35.12
Cryptogams	20	3	.06	.03
Bare Ground	201	285	4.60	11.05

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 16, Dry Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.5	76.0 (16.1)	7.3	38.7	28.0	33.3	3.4	18.8	214.4	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 04 , Study no: 16

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Rabbit	2	1	-	-
Elk	1	-	-	-
Deer	9	6	44	3 (8)
Cattle	4	3	157	13 (32)

BROWSE CHARACTERISTICS --

Herd unit 04 , Study no: 16

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 alnifolia																		
M	'96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	23	28	1
	'01	-	-	1	-	-	-	-	-	-	1	-	-	-	20	21	31	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'96		100%			00%			00%				+ 0%						
'01		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
												'01	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				
<i>Artemisia arbuscula</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
M	96	23	10	-	-	-	-	-	-	-	33	-	-	-	660	11	27	
	01	25	10	-	-	-	-	-	-	-	35	-	-	-	700	10	20	
D	96	3	-	-	-	-	-	-	-	-	1	-	-	2	60		3	
	01	8	3	-	-	-	-	-	-	-	4	-	-	7	220		11	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		26%			00%			05%			+33%							
'01		23%			00%			12%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	760	Dec:	8%			
												'01	1140		19%			
<i>Artemisia tridentata vaseyana</i>																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	01	17	-	-	-	-	-	-	-	-	16	-	1	-	340		17	
M	96	41	33	-	-	-	-	-	-	-	54	-	20	-	1480	24	40	
	01	63	8	1	-	-	-	-	-	-	72	-	-	-	1440	24	35	
D	96	-	5	-	-	-	-	-	-	-	4	-	1	-	100		5	
	01	7	1	-	-	-	-	-	-	-	4	-	-	4	160		8	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	180		9	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		44%			00%			24%			+10%							
'01		09%			01%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1740	Dec:	6%			
												'01	1940		8%			

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 nauseosus albicaulis																		
D	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	0%			
												'01	20		100%			
Chrysothamnus nauseosus consimilis																		
M	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	30	50	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	31	59	0
D	96	1	-	-	1	-	-	-	-	-	1	-	-	1	40			2
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			25%			-75%							
'01		00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	80	Dec:	50%			
												'01	20		100%			
Chrysothamnus viscidiflorus viscidiflorus																		
M	96	1	-	-	-	-	-	-	-	-	-	-	1	-	20	16	26	1
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100	13	22	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			100%			+80%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
												'01	100		-			
Gutierrezia sarothrae																		
Y	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	96	28	-	-	1	-	-	-	-	-	29	-	-	-	580	10	11	29
	01	71	-	-	-	-	-	-	-	-	71	-	-	-	1420	8	10	71
D	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+56%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	640	Dec:	0%			
												'01	1460		1%			

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				
Mahonia repens																		
Y	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	01	24	-	-	-	-	-	-	-	-	24	-	-	-	480		24	
M	96	72	-	-	-	-	-	-	-	-	72	-	-	-	1440	3	6	72
	01	131	-	-	-	-	-	-	-	-	131	-	-	-	2620	3	3	131
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+48%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1620	Dec:	-			
												'01	3100		-			
Prunus virginiana																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	20	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	0		-			
Purshia tridentata																		
M	96	-	-	-	-	1	-	-	-	-	1	-	-	-	20	17	61	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	53	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		100%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
												'01	0		-			
Rosa woodsii																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
	01	29	-	-	-	-	-	-	-	-	29	-	-	-	580		29	
M	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	15	24	15
	01	8	-	-	2	-	-	-	-	-	10	-	-	-	200	15	21	10
D	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			04%			+31%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	540	Dec:	4%			
												'01	780		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																		
M	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	29	50	3
	01	3	-	-	1	-	-	-	-	-	4	-	-	-	80	30	48	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+25%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			
												'01	80		-			

Trend Study 4-17-01

Study site name: Above Toon Ranch

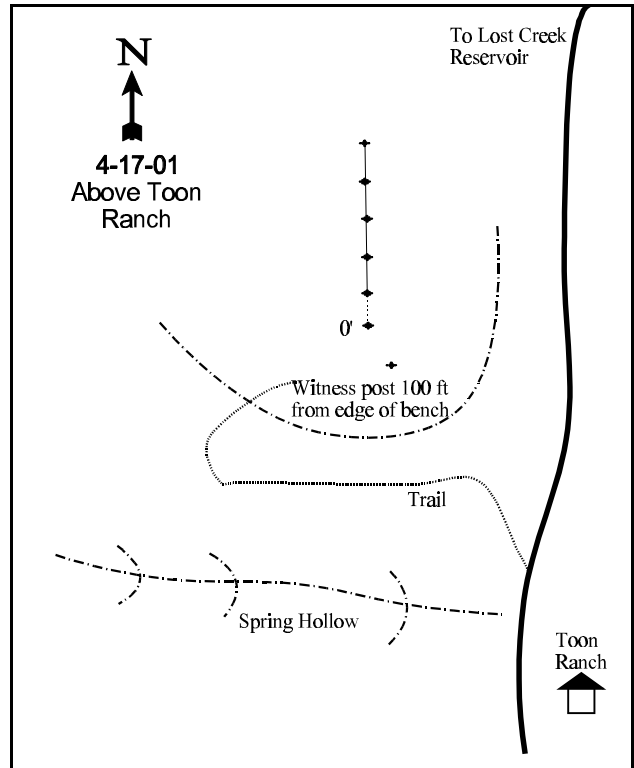
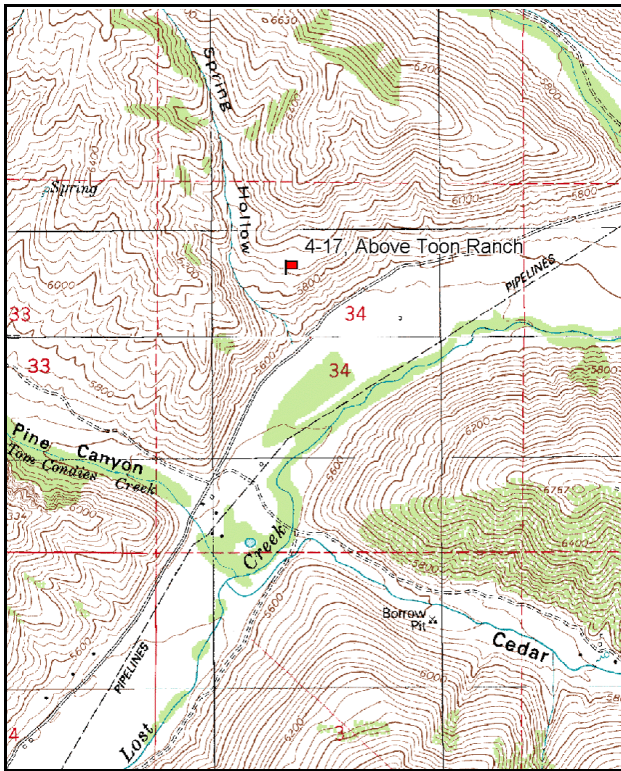
Vegetation type: Big Sagebrush-Grass

Compass bearing: frequency baseline 6 degrees magnetic.

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

LOCATION DESCRIPTION

From Croyden drive up the main road towards Lost Creek Reservoir about 4 miles. Stop at Spring Hollow. Walk up the trail (up Spring Hollow) on the west side of the road until you reach the top of the bench. A witness post will be visible about 100 feet from the edge of the bench. From the witness post walk 100 feet to the north to the 0-foot baseline stake. The baseline runs in a direction of 6 degrees magnetic.



Map Name: Lost Creek Dam

Diagrammatic Sketch

Township 5N, Range 4E, Section 34

UTM 4552803 N 459327 E

DISCUSSION

Trend Study No. 4-17

The Above Toon Ranch study is a new site established in 1996. It samples a gently sloping bench above the Lost Creek Valley which is a natural place for deer to congregate during the winter. The site supports a dense stand of mountain big sagebrush with a mostly cheatgrass understory. Slope on the site is about 19% with a south aspect. Elevation is approximately 6,120 feet. The site is isolated from the road and some of the sagebrush is tall enough to provide some cover. Deer pellet groups were abundant in 1996, with a quadrat frequency of 29%. Some elk and sheep sign was also found that year. A pellet group transect read on the site in 2001, estimated 70 deer days use/acre. One elk pellet group was also encountered. The land owner grazes sheep on the site during the fall and winter but no sheep sign was found in 2001.

The soil is moderately deep with a small amount of rock on the surface and in the profile. A hard clay layer was encountered at about 10 inches, which restricted effective soil depth measurements. As a result, effective rooting depth was estimated at just a little over 11 inches. Soil texture is a loam with a slightly acid soil reaction (pH of 6.5). Parent material appears to be sandstone. There is little bare ground on the site and due to the abundance of cheatgrass, erosion is not a problem. The erosion condition class was determined as stable in 2001.

The site supports a dense stand of mostly mature and vigorous mountain big sagebrush in association with some rabbitbrush. Sagebrush on this site appear to be hybrids of basin big sagebrush (*Artemisia tridentata tridentata*) and mountain big sagebrush (*Artemisia tridentata vaseyana*). Individual plants with more characteristics of mountain big sagebrush are more preferred and invariably are heavily utilized. Density of sagebrush was estimated at nearly 3,000 plants/acre during both sampling periods. Mature plants are large, averaging between 3 and 3½ feet in height. Canopy cover of the sagebrush averaged 28% in 1996, increasing to 33% in 2001. Utilization overall is mostly light. There was a considerable number of dead plants sampled in 1996, but this appears to be natural turnover as percent decadency is low and the stand appears to have reached its maximum density. Seedlings and young appear in numbers adequate to maintain the stand.

Stickyleaf low rabbitbrush is the only other shrub sampled on the site. It has a similar population density as sagebrush, but these shrubs are much smaller and contribute on average less than 10% of the total browse cover. Age class distribution indicates a stable population.

The herbaceous understory is dominated by cheatgrass which accounted for 91% of the total grass cover and 70% of the total herbaceous cover in 1996. It was dense enough to pose a serious fire hazard with an average cover value of 32%. Dry conditions in 2001 have caused cheatgrass to decline significantly in nested frequency with cover dropping from 32% to 12%. It is still abundant however, providing 66% of the total grass cover. Three other species of perennial grass occur on the site with moderate abundance. These include bluebunch wheatgrass, Great Basin wildrye, and Sandberg bluegrass. Forbs are very diverse, yet the only abundant species are western yarrow and American vetch. The majority of the other species encountered are annuals.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the small amount of unprotected bare ground (1%) and the gentle terrain. The browse trend also appears stable. Use is mostly light and vigor generally good. The dense mountain big sagebrush appears to have reached its maximum density, but some further crown development may still occur. High intensity fall grazing with sheep could benefit the understory by reducing sagebrush cover. The herbaceous understory is depleted. Cheatgrass currently dominates by producing 91% of the total grass cover.

2001 TREND ASSESSMENT

Trend for soil is stable. Protective ground cover declined since 1996, but there is still ample vegetation and litter cover to prevent most erosion. The soil erosion condition class was determined as stable in 2001. Trend for mountain big sagebrush is also stable. Utilization is mostly light, vigor good, and percent decadence moderately low at 21%. The population appears to have reached its maximum density for this site but canopy cover has increased slightly since 1996 (28% to 33%). Seedling and young recruitment appear to be adequate to maintain the stand. Trend for the herbaceous understory is stable for perennial grasses and forbs. However, much like Dry Hollow, annual forbs have increased dramatically. Of the 13 annual forbs sampled on the site, 7 have increased significantly in nested frequency. Cover of annual forbs has increased from 2% in 1996 to 6% in 2001. Perennial forbs still dominate the forb component and produce slightly more cover than annual and perennial grasses combined. The most abundant forbs are weedy increasers which include western yarrow, Pacific aster, and American vetch. The annual, cheatgrass, still dominates the grass component of the herbaceous understory. It has declined significantly in nested frequency, while cover also declined from 32% in 1996 to 12% in 2001. It is still abundant however, with a quadrat frequency of 99%. A return to normal precipitation will reverse this trend for cheatgrass. Taking all of these factors into consideration, trend for the herbaceous understory is stable but in poor condition.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable but poor (3)

HERBACEOUS TRENDS --

Herd unit 04 , Study no: 17

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron spicatum	33	40	16	12	.87	1.79
G	Bromus japonicus (a)	8	3	4	1	.04	.00
G	Bromus tectorum (a)	452	*369	99	99	31.50	11.57
G	Elymus cinereus	5	18	3	6	.82	1.60
G	Poa secunda	68	*114	23	34	1.46	2.60
Total for Annual Grasses		460	372	103	100	31.54	11.58
Total for Perennial Grasses		106	172	42	52	3.15	6.00
Total for Grasses		566	544	145	152	34.70	17.58
F	Achillea millefolium	100	*139	30	39	4.02	6.30
F	Agoseris heterophylla	22	7	13	3	.09	.01
F	Alyssum alyssoides (a)	131	*106	47	38	1.25	.74
F	Allium spp.	12	23	6	11	.03	.16
F	Artemisia ludoviciana	1	6	1	2	.63	.03
F	Aster chilensis	77	63	29	23	.66	.94
F	Castilleja linariaefolia	-	4	-	1	-	.03
F	Camelina microcarpa (a)	68	*24	27	9	.26	.12

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Cirsium undulatum	12	7	6	3	.03	.16
F	Collomia linearis (a)	12	*54	5	21	.02	.26
F	Collinsia parviflora (a)	24	*90	12	29	.06	1.00
F	Cryptantha spp.	14	-	5	-	.07	-
F	Descurainia pinnata (a)	6	2	3	2	.02	.01
F	Draba spp. (a)	18	*55	7	19	.06	.24
F	Galium spp.	5	13	3	4	.01	.09
F	Holosteum umbellatum (a)	61	*195	23	69	.33	2.66
F	Lappula occidentalis (a)	5	7	2	5	.01	.19
F	Lactuca serriola	1	-	1	-	.00	-
F	Machaeranthera spp	4	-	2	-	.01	-
F	Microsteris gracilis (a)	-	*79	-	26	-	.82
F	Polygonum douglasii (a)	9	9	2	3	.01	.01
F	Ranunculus testiculatus (a)	-	5	-	1	-	.03
F	Sisymbrium altissimum (a)	6	6	5	4	.02	.04
F	Tragopogon dubius	-	2	-	1	-	.03
F	Veronica biloba (a)	2	3	1	1	.03	.03
F	Vicia americana	289	*250	93	90	2.44	5.84
Total for Annual Forbs		342	635	134	227	2.09	6.19
Total for Perennial Forbs		537	514	189	177	8.02	13.63
Total for Forbs		879	1149	323	404	10.11	19.82

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 04 , Study no: 17

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	86	77	27.64	33.43
B	Chrysothamnus viscidiflorus viscidiflorus	69	53	3.37	2.83
Total for Browse		155	130	31.01	36.27

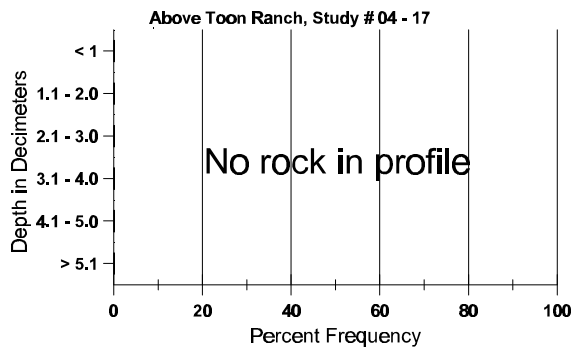
BASIC COVER --
Herd unit 04 , Study no: 17

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	486	466	64.87	66.75
Rock	37	32	.22	.44
Pavement	40	99	.20	.51
Litter	499	488	75.83	57.01
Cryptogams	47	22	.52	.77
Bare Ground	69	129	1.00	6.30

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 17, Above Toon Ranch

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.2	58.4 (12.7)	6.5	41.3	32.7	27.0	3.4	30.9	153.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 04 , Study no: 17

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Sheep	3	-	-	-
Rabbit	2	6	217	N/A
Elk	4	-	9	1 (2)
Deer	29	22	914	70 (174)
Cattle	-	3	-	-

BROWSE CHARACTERISTICS --

Herd unit 04 , 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>Artemisia tridentata vaseyana</i>																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3	
Y	96	9	1	-	-	-	-	-	-	-	9	-	1	-	200		10	
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	96	111	8	-	-	-	-	-	-	111	-	8	-	2380	34	52	119	
	01	80	7	-	9	-	-	1	-	97	-	-	-	1940	41	53	97	
D	96	15	-	-	-	-	-	-	-	10	-	1	4	300		15		
	01	25	3	-	-	-	-	-	-	23	2	1	2	560		28		
X	96	-	-	-	-	-	-	-	-	-	-	-	-	1040		52		
	01	1	-	-	-	-	-	-	-	-	-	-	-	360		18		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		06%			00%			10%			- 6%							
'01		07%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	2880	Dec:	10%				
											'01	2700		21%				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
S	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	96	13	-	-	3	-	-	-	-	16	-	-	-	320		16		
	01	14	-	-	-	-	-	-	-	14	-	-	-	280		14		
M	96	111	-	-	35	-	-	-	-	146	-	-	-	2920	13	21	146	
	01	83	-	-	14	-	-	8	-	105	-	-	-	2100	10	14	105	
D	96	4	-	-	-	-	-	-	-	3	-	-	1	80		4		
	01	4	-	-	-	-	-	-	-	4	-	-	-	80		4		
X	96	-	-	-	-	-	-	-	-	-	-	-	-	60		3		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			.60%			-26%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	3320	Dec:	2%				
											'01	2460		3%				

SUMMARY

HERD UNIT 4 - MORGAN RICH

Twelve trend study sites were read on Unit 4 in 2001. One site at Bennett Creek (4-12) was suspended. Seven of these trend studies sample mountain big sagebrush communities, 3 sites sample Wyoming big sagebrush communities, 1 samples a mixed mountain brush type, and 1 a Gambel oak community.

The major unit wide problem in Unit 4 is the poor condition and composition of the herbaceous understories. Most of the sites have understories dominated by annual grasses and weedy forbs. Due to the rocky nature of many of the sites in association with south aspects, soil temperatures are relatively high. This condition gives winter annuals a competitive advantage against native grasses, often under spring grazing regimes. Eight of the 12 sites sampled have significant amounts of annual grasses in the herbaceous understories. Average soil temperatures of these sites is nearly 71° F (70.6 ° F).

Soil trends are slightly down on many sites. The average soil trend for Unit 4 is 2.6, or slightly below stable. Many of the downward soil trends are the result of a decline in herbaceous cover, especially from annual grasses like cheatgrass. Eight of the 12 sites in Unit 4 support herbaceous understories that contain significant amounts of cheatgrass. Dry conditions during the spring of 2000, and 2001, caused a sharp decline in cover of cheatgrass. Average cover for cheatgrass on these eight sites was 20% in 1996, declining to 6% in 2001.

Browse trends on Unit 4 are generally stable to improving. The average browse trend for Unit 4 is 3.3, or between stable and slightly up. Browse trends were down at Owen's canyon (4-4) due to fire, and slightly down at Echo Canyon (4-2).

Herbaceous trends are generally improving. Average herbaceous trend on Unit 4 is 3.3. Many sites have shown an increase in nested frequency of perennial grasses and a decline in annual grasses like cheatgrass and Japanese brome. Annual forbs, on a few sites, increased dramatically due to the decline in annual grasses from the dry spring of 2001 followed by near normal precipitation in June.

Precipitation data from Morgan indicate above normal precipitation in 1980, 1982-1984, and 1985. Dry conditions prevailed for an extended period from 1987 through 1994. Precipitation was near normal in 1995 and wet in 1996 and 1998. Precipitation was again below normal in 1999, 2000, and 2001. Data from Morgan show that April precipitation in 1996 was 121% of normal. In 2000, April was dry, with only 43% of the normal precipitation received. June of 2000 was also extremely dry at only 27% of normal. Dry conditions prevailed during the spring of 2001. April precipitation at Morgan was normal but May precipitation was only 8% of normal in 2001 (Utah climate summaries 2001). These dry conditions during the spring caused a decline in frequency and cover of annual grasses on many sites.

A summary table of trends follows.

TREND SUMMARY

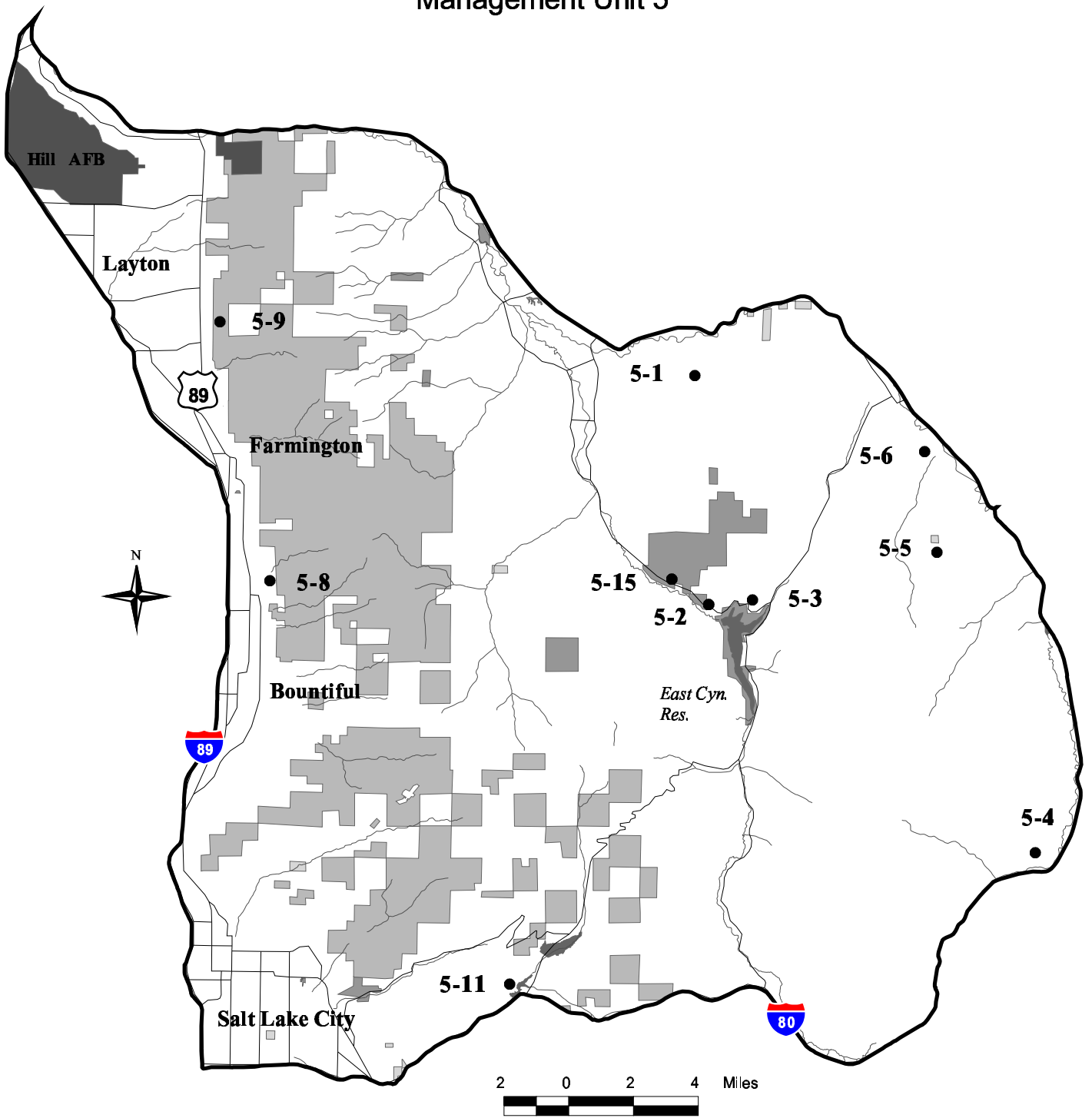
Location	Category	1984	1990	1996	2001
4-1 Heiner's Creek	soil	est	2	4	3
	browse	est	2	4	5
	herbaceous understory	est	3	5	3
4-2 Echo Canyon	soil	est	5	3	2
	browse	est	1	5	2
	herbaceous understory	est	3	5	4
4-3 Tank Canyon	soil	est	3	5	3
	browse	est	1	3	3
	herbaceous understory	est	5	4	4
4-4 Owen's Canyon	soil	est	3	4	2
	browse	est	3	3	1
	herbaceous understory	est	4	4	4
4-6 Harris Canyon	soil	est	1	5	2
	browse	est	3	5	3
	herbaceous understory	est	3	2	3
4-8 Shell Hollow	soil	est	1	5	2
	browse	est	3	3	3
	herbaceous understory	est	4	4	3
4-9 Scott Rees Ranch	soil	est	3	4	3
	browse	est	3	3	3
	herbaceous understory	est	3	2	4
4-12 Bennett Creek	soil		est	3	susp
	browse		est	1	susp
	herbaceous understory		est	2	susp
4-13 Wheatgrass Hollow	soil		est	3	3
	browse		est	3	4
	herbaceous understory		est	3	3

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established, susp = suspended

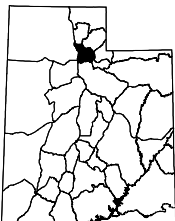
Location	Category	1984	1990	1996	2001
4-14 Chapman Canal	soil	est	3	3	4
	browse	est	3	2	3
	herbaceous understory	est	3	4	3
4-15 Woodruff Creek South	soil			est	2
	browse			est	5
	herbaceous understory			est	4
4-16 Dry Hollow	soil			est	2
	browse			est	4
	herbaceous understory			est	2
4-17 Above Toon Ranch	soil			est	3
	browse			est	3
	herbaceous understory			est	3

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established,
susp = suspended

Management Unit 5



Unit Location



- Transect Location
- ∩ Roads
- ∩ Water Courses
- Forest Service
- BLM
- State of Utah
- Private Land
- Military
- Water Body

WILDLIFE MANAGEMENT UNIT - 5 - EAST CANYON

Boundary Description

Morgan, Summit, Salt Lake, and Davis counties - Boundary begins at the junction of I-80 and I-84 (Echo Junction); south and west on I-80 to Interstate 15; north on I-15 to I-84; east on I-84 to I-80.

Management Unit Description

The East Canyon deer herd unit is located mostly on the east side of the Wasatch Mountains. Topography varies across the unit from fairly deep canyons and steep slopes in the western portion to more gentle open slopes and fewer cliffs in the east. Most of the unit is drained by the Weber River. Several creeks along the north and east edges of the unit drain directly into the river. East Canyon Creek flows into the Weber River. A large impoundment on East Canyon Creek is located approximately in the center of the unit. The highest elevations are along the western boundary on peaks of the Wasatch Range which reach above 9,500 feet. The lowest point is 4,800 feet in the northwest corner where the Weber River flows out of the unit.

The upper limits of normal winter range are generally considered to be about 7,000 feet. Winter range is found in the major drainages and around East Canyon Reservoir. All of the valleys have been developed for agriculture and housing. The major canyons, Weber, East, and Main Canyons, contain housing developments and high-use roads. The northern, eastern, and southern boundaries are formed by Interstate 80. Other more narrow and higher elevation canyons have seasonal roads. The area is highly developed because a majority of the unit is private land. Eighty-three percent of the deer winter range and 76% of the summer range is under private ownership. Not only is the quantity of winter range limited, but the quality is compromised by development and roads. Many deer that summer on the unit migrate over to the Davis County portion of the unit on the Wasatch Face to winter. Winter migration onto the unit from other areas is minimal.

Most of the winter range is encompassed by sagebrush range types. In the original inventory in 1972, King and Olson described almost three-quarters of the winter range as a mixture of black sagebrush on the ridge tops and big sagebrush down the slopes on the deeper soils. This type has a good mix of browse species and can provide substantial forage for wintering deer. The browse type, 20% of the range, is composed mainly of big sagebrush and Gambel oak. Other range types include agricultural lands and burns.

Recently, increased numbers of people and deer have lead to conflicts and degradation of the winter range. Heavy deer and livestock use has resulted in apparent downward trends on much of the range. Soil erosion, removal of perennial herbaceous cover, and heavy use of browse species are the major problems. Highway mortality occurs, but is not as high here as on surrounding units. Harvesting depredating deer is difficult because of access restrictions to private land. Reducing the deer herd to within the carrying capacity of the winter range must be done with the cooperation and support of local interest groups since a majority of the land is privately-owned.

Unit Management Objectives

The management objective is to maintain a target wintering deer herd of approximately 8,500 deer. The Davis and Salt Lake County portion of Unit 5 contains most of the public land in the unit. Winter ranges are adjacent to the heavily populated "Wasatch Front" and are becoming limited due to the impact of urban development. Therefore, the target winter deer herd population objective for this portion of Unit 5 is 3,000. The objective for the Morgan and Summit County portion is a winter population of 5,500 deer. The herd composition for the East Canyon management unit will be 15 bucks per 100 does. Of these bucks, 30% will be 3-point or better (1998 Utah Big Game Management Plan).

The management objective for elk is to maintain a winter herd size of 450. About 250 from the Davis and Salt Lake County portion of the unit with the other 200 from the Morgan & Summit County part. The objective for herb composition is to maintain ratio of 8 bulls per 100 cows. Fifty percent of the bulls will be 2.5 years of age or older (1998 Utah Big Game Management Plan).

The East Canyon deer herd unit, like the neighboring Lost Creek unit, has several management concerns related to the fact that a majority of the unit is under private ownership. The concerns listed in the 1984 trend study report (Giunta et al. 1986) remain today, especially relating to access, range management, and rehabilitation and development on the privately owned winter range. The DWR has purchased winter range in the Redrock Canyon area. The unit remains on the top priority list of units requiring winter habitat acquisition.

Trend Study Site Description

Ten trend studies were established in the East Canyon unit between 1983 and 1985. These 10 studies were reread in 1990. Eight of the ten studies were read again in 1996 and a new study was established in Red Rock Canyon. During the 2001 season, 7 of the eleven trend studies were reread. Individual study site descriptions, maps, and data tables are found below.

Trend Study 5-1-01

Study site name: Geary Hollow

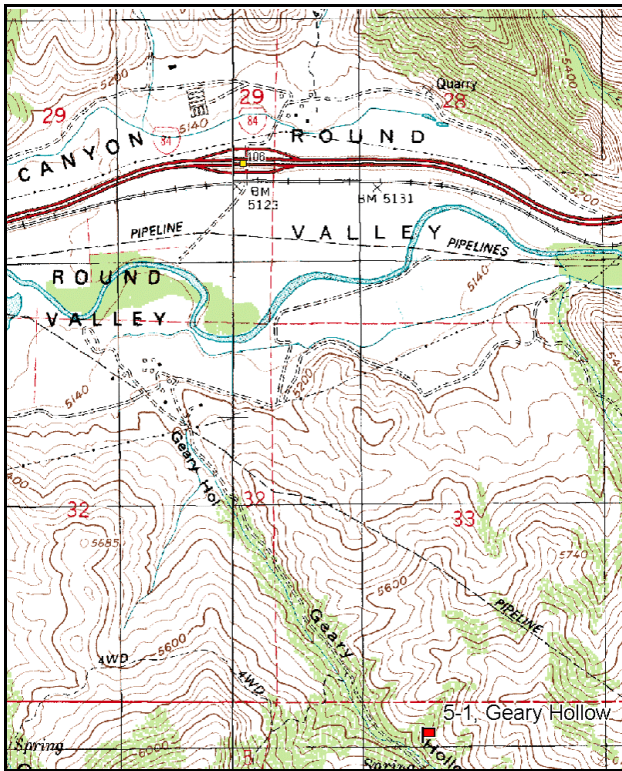
Vegetation type: Oak-Sagebrush

Compass bearing: frequency baseline 126 degrees magnetic.

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

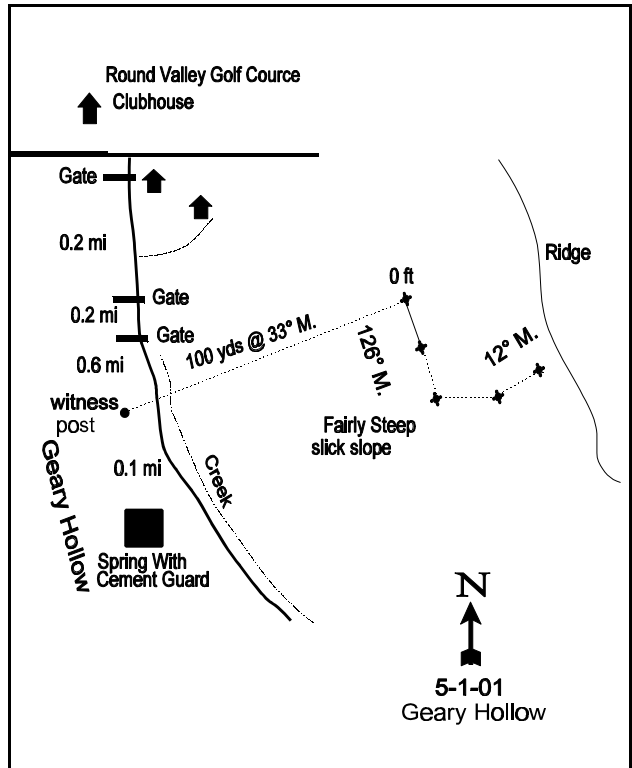
LOCATION DESCRIPTION

From Morgan, travel to Round Valley Golf Course, passing Como Springs. Take the first right past the clubhouse and go through a gate. Proceed up Geary Hollow 0.2 miles to another gate. Proceed through the gate, and travel 0.2 miles to another gate. Proceed 0.6 miles to 5-foot high green steel stake witness post on the right hand side of road. From the witness post walk 100 yards at 33 degrees magnetic to the 0-foot stake of the baseline marked by browse tag #7972. The baseline runs 126 degrees magnetic for 200 feet. At the 200-foot baseline stake line three of the baseline doglegs and runs in a direction of 43 degrees magnetic. Line four doglegs and runs in a direction of 12 degrees magnetic.



Map Name: Devil's Slide

Township 3N, Range 3E, Section 4



Diagrammatic Sketch

UTM 4542016 N 448244 E

DISCUSSION

Trend Study No. 5-1

The Geary Hollow study is located on a steep (50-55%) south, southwest facing slope at an elevation of 5,500 feet. Although purportedly a critical deer winter range, the study area seems most heavily impacted by domestic sheep which were reported on the site in 1984. Deer pellet groups were occasionally observed. A pellet group transect read on the site in 2001 estimated 17 deer days use/acre. Most of the pellet groups were found along game trails leading down slope to the creek. One elk pellet group and 1 cattle pat was also encountered.

The side of the canyon that the study is located has a southwest aspect. It is dry and supports mountain big sagebrush and Gambel oak. It is quite different than the opposite side which has a more easterly aspect. It supports a more dense mixed mountain brush community. Soil is classified as "Henhoit Gravelly Loam," a very deep and well-drained soil derived from a sandstone-quartzite conglomerate. This soil has a reddish brown color and textural analysis indicates a sandy clay loam with a slightly alkaline soil reaction (pH 7.6). Rock and pavement surface cover averages 23%, but increases to 60% or more in the subsoil. Henhoit soil, apart from rocks, becomes more clay-like with increasing depth. Permeability is moderately slow and available water capacity is moderate. The erosion hazard is high (Carley et al. 1980). Soil on the site is moderately deep and very rocky. Effective rooting depth is estimated at 11 inches. Due to the rocky nature of the soil surface and profile, average soil temperature is very high at 75° F at nearly 11 inches in depth. The study area is steep and rocky but has good vegetative and litter cover values. Erosion is most common on trails but is not presently a serious problem. The erosion condition class was determined to be stable to slight in 2001.

Browse composition includes several species typically found on mixed mountain brush sites. Most abundant and productive are Gambel oak and mountain big sagebrush. These are the key management species. Mountain big sagebrush currently forms a relatively limited population with an estimated density of 1,660 plants/acre in 1996 and 1,340 in 2001. This population has remained fairly constant over the years. Age structure reveals that the population is predominantly mature with no seedlings encountered in any year. This is not surprising considering the dominance of cheatgrass in the understory with no safe sites for seedlings to become established. In addition, the extremely high soil temperature causes drying of the soil profile early in the summer.

Gambel oak is a vigorous but a somewhat low-growing population that sustains moderate use in some years. Oak does not appear to be expanding with lower percent decadency and improved vigor noted since 1990. With the increased sample size used in 1996, line 4 did not sample any oak so the density between years will be somewhat lower. Density of mature oak remained stable between 1996 and 2001 at about 2,100 stems/acre. Broom snakeweed is fairly abundant but has declined in density since 1990. Other shrubs include Saskatoon serviceberry, mountain snowberry, stickyleaf low rabbitbrush, white rubber rabbitbrush, and an occasional antelope bitterbrush.

The herbaceous understory is abundant and diverse but dominated by annual grasses and forbs. Perennial grasses consist of a low density stand of bluebunch wheatgrass, Sandberg bluegrass, muttongrass, and Indian ricegrass. Sum of nested frequency for bluebunch wheatgrass has significantly increased since 1990. Cheatgrass and Japanese brome are very dense and completely covered the shrub interspaces in 1996. Average cover was estimated at 38% which accounted for 96% of the grass cover and 88% of the total herbaceous cover. Due to the drier conditions of 2001, cheatgrass and especially Japanese brome declined significantly in nested frequency with cover dropping from 38% to 7%.

Among perennial forbs, peavine, prickly lettuce, yellow salsify, and Louisiana sage are the most abundant species. Annual forbs are abundant and have increased dramatically since 1996. Pale alyssum, Collomia, autumn willow weed, storksbill, bedstraw, tumble mustard, and speedwell combined to produce 53% of the total forb cover.

1984 APPARENT TREND ASSESSMENT

Soil appears stable. Although the area is steep, rocky, and potentially erodible, the current rate of soil loss is within acceptable limits. Vegetative trend appears down slightly because of the apparent decline of mountain big sagebrush and a rather poor quality understory. Any loss of plant diversity should be considered a negative factor.

1990 TREND ASSESSMENT

This lightly used winter range displays a stable, moderately dense stand of mountain big sagebrush in association with a low-growing population of Gambel oak. The oak has decreased in density (40%) since 1984. Fewer, but larger oak of all age classes were counted in 1990. The oak were more lightly to moderately hedged in 1990, but half of the plants have reduced vigor due largely to insect infestation. Cheatgrass remains prominent, but the limited perennial herbaceous species have increased slightly. Soil erosion still occurs in limited areas.

TREND ASSESSMENT

soil - stable (3)

browse - stable, thinning of oak and increase in sagebrush (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The soil trend is stable at this time with abundant vegetative and litter cover. Percent bare ground cover declined slightly and there is no erosion apparent. The mountain big sagebrush density has remained relatively constant over all years, although percent decadency has increased. Gambel oak does not appear to be expanding at this time. Broom snakeweed has increased in density since the initial reading in 1984, but now appears to be stabilized at 2,220 plants/acre. Browse trend is stable. With a significant increase in bluebunch wheatgrass the herbaceous trend is slightly upward. However, cheatgrass and Japanese brome still dominate the site by providing 96% of the grass cover. Forb cover is sparse and adds very little to the herbaceous understory.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly upward, but dominated by annuals (4)

2001 TREND ASSESSMENT

Trend for soil is down due to an increase in percent cover of bare ground and a decline in litter and vegetation cover. However, erosion is not currently a problem. The erosion condition class was determined as stable to slight. Trend for browse is stable for mountain big sagebrush and Gambel oak. Both show light use, good vigor and low decadence. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses declined slightly, but the dominant cheatgrass and Japanese brome declined significantly. Cover of these annual grasses dropped over fivefold from 38% to 7%. The most abundant perennial grass, bluebunch wheatgrass, remained stable in nested frequency. Cover and nested frequency of annual and perennial forbs increased, especially annuals. Unfortunately many of the annual and perennial forbs are low value weedy species.

TREND ASSESSMENT

soil - down (1)

browse - stable (3)

herbaceous understory - up slightly but composition is still poor (4)

HERBACEOUS TRENDS --

Herd unit 05 , Study no: 1

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	<i>Agropyron spicatum</i>	a12	a20	b74	b86	6	11	33	36	1.20	4.80
G	<i>Bromus brizaeformis</i> (a)	-	-	b17	a1	-	-	6	1	.08	.01
G	<i>Bromus japonicus</i> (a)	-	-	b265	a77	-	-	83	34	8.22	.42
G	<i>Bromus tectorum</i> (a)	-	-	b365	a236	-	-	98	78	29.79	6.64
G	<i>Oryzopsis hymenoides</i>	-	-	8	-	-	-	3	-	.39	-
G	<i>Poa bulbosa</i>	-	-	-	1	-	-	-	1	-	.03
G	<i>Poa fendleriana</i>	-	-	3	-	-	-	1	-	.00	-
G	<i>Poa secunda</i>	a-	b11	b30	b10	-	5	11	7	.13	.11
Total for Annual Grasses		0	0	647	314	0	0	187	113	38.10	7.07
Total for Perennial Grasses		12	31	115	97	6	16	48	44	1.72	4.94
Total for Grasses		12	31	762	411	6	16	235	157	39.82	12.02
F	<i>Achillea millefolium</i>	1	1	-	1	1	1	-	1	-	.03
F	<i>Agoseris glauca</i>	-	3	8	5	-	1	3	3	.04	.02
F	<i>Alyssum alyssoides</i> (a)	-	-	96	109	-	-	36	47	.43	1.47
F	<i>Allium</i> spp.	a-	a-	a-	b97	-	-	-	40	-	.71
F	<i>Amsinckia menziesii</i>	a-	a-	a-	b39	-	-	-	15	-	.97
F	<i>Artemisia ludoviciana</i>	b90	a30	a19	a15	36	15	9	6	.48	.52
F	<i>Astragalus</i> spp.	8	-	1	-	3	-	1	-	.00	-
F	<i>Balsamorhiza sagittata</i>	-	3	-	-	-	1	-	-	-	-
F	<i>Camelina microcarpa</i> (a)	-	-	a2	b44	-	-	1	23	.01	.34
F	<i>Castilleja</i> spp.	-	-	4	1	-	-	2	1	.03	.03
F	<i>Cirsium undulatum</i>	a1	b12	a2	ab12	1	9	1	4	.01	.81
F	<i>Collomia grandiflora</i> (a)	-	-	a-	b14	-	-	-	6	-	.13
F	<i>Collomia linearis</i> (a)	-	-	a9	b43	-	-	4	20	.02	.54
F	<i>Collinsia parviflora</i> (a)	-	-	-	14	-	-	-	4	-	.07
F	<i>Crepis acuminata</i>	-	-	-	2	-	-	-	1	-	.03
F	<i>Cryptantha</i> spp.	2	-	-	7	1	-	-	3	-	.01
F	<i>Cymopterus</i> spp.	-	-	-	3	-	-	-	2	-	.06
F	<i>Descurainia pinnata</i> (a)	-	-	-	3	-	-	-	2	-	.01
F	<i>Draba</i> spp. (a)	-	-	a-	b17	-	-	-	7	-	.08

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Epilobium brachycarpum</i> (a)	-	-	a-	b93	-	-	-	37	-	1.11
F	<i>Erodium cicutarium</i> (a)	-	-	a7	b48	-	-	4	17	.04	1.79
F	<i>Galium aparine</i> (a)	-	-	a14	b101	-	-	6	35	.03	1.47
F	<i>Hackelia patens</i>	-	3	5	6	-	1	4	3	.19	.39
F	<i>Holosteum umbellatum</i> (a)	-	-	a39	b59	-	-	16	22	.08	.50
F	<i>Lathyrus brachycalyx</i>	a-	a1	a12	b52	-	1	7	24	.11	.80
F	<i>Lappula occidentalis</i> (a)	-	-	a1	b10	-	-	1	6	.00	.42
F	<i>Lactuca serriola</i>	a-	a3	b28	b33	-	1	14	17	.09	.36
F	<i>Machaeranthera canescens</i>	a-	a-	b13	a-	-	-	6	-	.03	-
F	<i>Microsteris gracilis</i> (a)	-	-	a-	b40	-	-	-	17	-	.33
F	<i>Polygonum douglasii</i> (a)	-	-	-	5	-	-	-	2	-	.03
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	6	-	-	-	3	-	.06
F	<i>Scutellaria antirrhinoides</i>	-	-	-	6	-	-	-	2	-	.07
F	<i>Sisymbrium altissimum</i> (a)	-	-	a4	b21	-	-	2	9	.06	.73
F	<i>Thlaspi montanum</i>	a-	a-	a-	b12	-	-	-	5	-	.22
F	<i>Tragopogon dubius</i>	75	100	94	85	32	45	42	42	1.52	1.14
F	<i>Veronica biloba</i> (a)	-	-	a5	b62	-	-	2	25	.01	1.75
F	<i>Zigadenus paniculatus</i>	-	1	-	-	-	1	-	-	-	-
Total for Annual Forbs		0	0	177	689	0	0	72	282	0.68	10.89
Total for Perennial Forbs		177	157	186	376	74	76	89	169	2.54	6.21
Total for Forbs		177	157	363	1065	74	76	161	451	3.23	17.10

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 05 , Study no: 1

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	5	4	.96	.06
B	Artemisia tridentata vaseyana	50	46	10.23	7.46
B	Chrysothamnus nauseosus albicaulis	2	0	.38	.03
B	Chrysothamnus viscidiflorus viscidiflorus	4	3	.18	.38
B	Gutierrezia sarothrae	37	21	1.69	.49
B	Quercus gambelii	43	42	9.25	5.39
B	Symphoricarpos oreophilus	8	7	2.91	3.81
Total for Browse		149	123	25.60	17.64

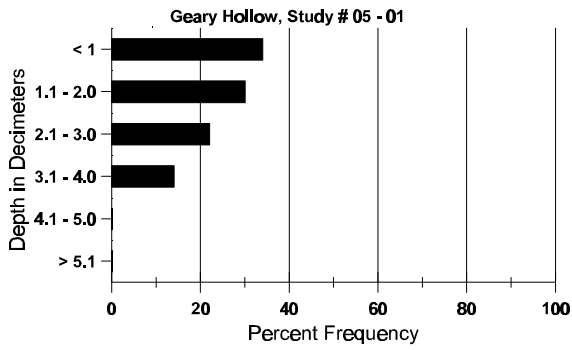
BASIC COVER --
Herd unit 05 , Study no: 1

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	387	358	1.50	6.75	63.76	51.31
Rock	239	253	19.50	20.75	14.53	17.57
Pavement	71	200	4.75	7.75	1.61	6.43
Litter	398	353	65.75	58.25	60.35	34.94
Cryptogams	3	-	0	0	.00	0
Bare Ground	70	187	8.50	6.50	1.63	12.53

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 01, Geary Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.0	75.4 (10.9)	7.6	45.7	21.0	33.3	2.6	13.0	124.8	.6

Stoniness Index



PELLET GROUP FREQUENCY -- Herd unit 05 , Study no: 1

Type	Quadrat Frequency	
	'96	'01
Elk	-	1
Deer	5	4
Cattle	-	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
9	1 (2)
226	17 (43)
9	-

BROWSE CHARACTERISTICS --

Herd unit 05 , Study no: 1

A G R E	Y 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				
Amelanchier alnifolia																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	133	10	7	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	2	-	-	1	-	-	-	4	-	-	-	80	22	38	4
	01	-	-	3	-	-	1	-	-	-	4	-	-	-	80	20	27	4
D	84	-	-	4	-	-	-	-	-	-	-	-	4	-	266			4
	90	-	1	2	-	-	1	-	-	-	-	-	-	4	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			67%			-33%							
'90		25%			75%			100%			-62%							
'96		20%			60%			00%			+17%							
'01		00%			67%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec:	67%			
												'90	266		100%			
												'96	100		0%			
												'01	120		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>Artemisia tridentata vaseyana</i>															
Y	84	-	7	-	-	-	-	-	-	7	-	-	466		7
	90	4	-	-	-	-	-	-	-	4	-	-	266		4
	96	9	2	-	-	-	-	-	-	11	-	-	220		11
	01	4	-	-	-	-	-	-	-	4	-	-	80		4
M	84	-	5	6	-	-	-	-	-	11	-	-	733	18 15	11
	90	14	5	-	-	-	-	-	-	19	-	-	1266	24 26	19
	96	29	19	7	2	-	-	-	-	57	-	-	1140	36 50	57
	01	49	1	-	-	-	-	2	-	52	-	-	1040	26 34	52
D	84	-	2	-	-	-	-	-	-	2	-	-	133		2
	90	1	1	-	-	-	-	-	-	2	-	-	133		2
	96	5	4	2	4	-	-	-	-	9	-	2	300		15
	01	8	3	-	-	-	-	-	-	10	-	-	220		11
X	84	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	560		28
	01	-	-	-	-	-	-	-	-	-	-	-	220		11
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
	'84	70%		30%		00%		+20%							
	'90	24%		00%		00%		- 0%							
	'96	30%		11%		07%		-19%							
	'01	06%		00%		01%									
Total Plants/Acre (excluding Dead & Seedlings)										'84	1332	Dec:	10%		
										'90	1665		8%		
										'96	1660		18%		
										'01	1340		16%		
<i>Chrysothamnus nauseosus albicaulis</i>															
M	84	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	90	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	96	2	-	-	-	-	-	-	-	2	-	-	40	20 17	2
	01	-	-	-	-	-	-	-	-	-	-	-	0	27 53	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
	'84	00%		00%		00%									
	'90	00%		00%		00%									
	'96	00%		00%		00%									
	'01	00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	-		
										'90	0		-		
										'96	40		-		
										'01	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				
Chrysothamnus viscidiflorus viscidiflorus																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	5	-	-	1	-	-	-	-	-	6	-	-	-	120	10	20	6
	'01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	17	25	3
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			14%			-57%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	140		14%			
												'01	60		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				
Gutierrezia sarothrae												
S	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	0		0	
Y	84	2	2	-	-	-	-	-	266		4	
	90	29	-	-	-	-	-	-	1933		29	
	96	11	-	-	2	-	-	-	260		13	
	01	7	-	-	-	-	-	-	140		7	
M	84	6	-	-	-	-	-	-	400	15 12	6	
	90	24	-	-	-	-	-	-	1600	9 10	24	
	96	93	-	-	5	-	-	-	1960	12 11	98	
	01	39	-	-	-	-	-	-	780	10 10	39	
D	84	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	133		2	
	96	-	-	-	-	-	-	-	0		0	
	01	4	-	-	-	-	-	-	80		4	
X	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		20%		00%		00%		+82%				
'90		00%		00%		02%		-39%				
'96		00%		00%		00%		-55%				
'01		00%		00%		04%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	666	Dec:	0%
									'90	3666		4%
									'96	2220		0%
									'01	1000		8%
Purshia tridentata												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	0	6	16	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		00%						
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	0	Dec:	-
									'90	0		-
									'96	0		-
									'01	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				
Quercus gambelii																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
Y	84	-	34	-	-	-	-	-	-	-	34	-	-	-	2266		34	
	90	33	25	2	8	-	-	-	-	-	44	19	4	1	4533		68	
	96	28	2	3	-	-	-	-	-	-	33	-	-	-	660		33	
	01	93	-	-	4	-	-	5	-	-	102	-	-	-	2040		102	
M	84	4	84	35	1	-	-	-	-	-	124	-	-	-	8266	23	9	124
	90	4	3	-	-	-	-	-	-	-	1	6	-	-	466	32	23	7
	96	25	73	8	-	2	-	-	-	-	108	-	-	-	2160	26	50	108
	01	84	8	-	5	-	-	5	3	-	105	-	-	-	2100	25	17	105
D	84	-	1	12	-	-	-	-	-	-	13	-	-	-	866		13	
	90	9	16	3	-	-	-	-	-	-	7	13	2	6	1866		28	
	96	1	-	7	-	-	-	-	-	-	7	-	-	1	160		8	
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		70%			27%			00%			-40%							
'90		43%			05%			13%			-57%							
'96		52%			12%			.67%			+30%							
'01		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	11398	Dec:	8%			
												'90	6865		27%			
												'96	2980		5%			
												'01	4240		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																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	3	-	-	2	-	-	-	-	-	5	-	-	-	100			5
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	1	-	-	-	-	-	-	-	-	-	1	66	22	23	1
	'96	8	1	-	1	-	-	-	-	-	10	-	-	-	200	21	49	10
	'01	8	-	-	-	-	-	5	-	-	13	-	-	-	260	30	37	13
D	'84	-	-	2	-	-	-	-	-	-	-	-	2	-	133			2
	'90	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			100%			- 1%							
'90		50%			50%			50%			+56%							
'96		07%			00%			00%			-13%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	100%			
												'90	132		50%			
												'96	300		0%			
												'01	260		0%			

Trend Study 5-2-01

Study site name: Tucson Hollow.

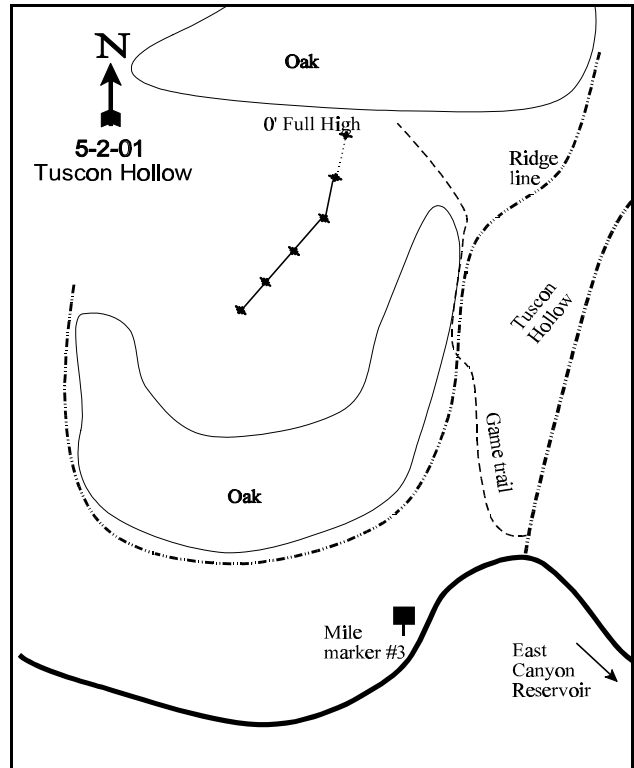
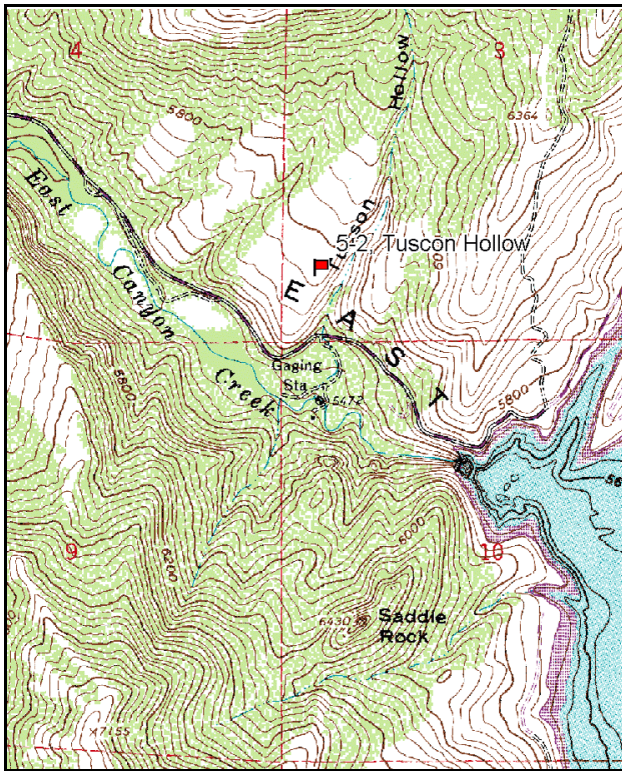
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 204 degrees magnetic.

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

LOCATION DESCRIPTION

From the dam at East Canyon Reservoir, proceed 0.2 miles northwest past Tucson Hollow, and stop near mile marker 3. Walk up the slope following a game trail (to the northeast) to the plateau. Walk through the oak stand bordering the ridge line continuing northeast to an opening in the oak. Look for a full high fence post on the north side of the opening. This full high fence post is the 0-foot stake. The baseline runs 208 degrees magnetic. At the 200-foot baseline stake the baseline doglegs and runs 229 degrees magnetic.



Map Name: East Canyon Reservoir

Diagrammatic Sketch

Township 2N, Range 3E, Section 3

UTM 4530600 N 448928 E

DISCUSSION

Trend Study No. 5-2

The Tucson Hollow study is located on a nearly level bench just north and east of East Canyon Reservoir. It was originally placed in a nearby thick patch of Gambel oak brush. Because there was very little apparent utilization in the dense oak, the site was moved just south of the original study in 1996. The site now samples a big sagebrush/grass opening about 25 to 30 acres in size surrounded on 3 sides by oak clones. Aspect on the site is south with a slope of 3%. Elevation is about 5,800 feet. In 1990, three winter-killed deer were found in the immediate vicinity as well as several antler drops. Deer and elk pellet groups are scattered throughout the area. Quadrat frequency of deer pellet groups was 17% in 1996 and 2001. In addition, a pellet group transect read on site in 2001, estimated 31 deer days use/acre (76 ddu/ha). Most of the deer pellet groups encountered were from spring use.

Soil is "Manila Loam," a classification that occurs only on localized mountain slopes. Soil textural analysis indicates a clay loam soil with a slightly acidic soil reaction (6.5 pH). This soil has limited crop and pasture capability and is highly susceptible to "slippage." It is moderately deep with a reddish-brown color. Few rocks were encountered in the soil profile and the effective rooting depth was estimated at almost 13 inches. Water permeability is slow and available water capacity is high, as is the erosion hazard. The site has a good vegetative and litter cover that precludes most erosion. The erosion condition class was determined as stable in 2001.

The site supports a variety of browse species but sagebrush and stickyleaf low rabbitbrush provide over two thirds of the shrub cover. Sagebrush on the site displays characteristics of both basin big sagebrush (*Artemisia tridentata tridentata*) and mountain big sagebrush (*Artemisia tridentata vaseyana*). All sagebrush was classified as Basin big sagebrush which had an estimated density of 1,400 plants/acre in 1996. Seventy-six percent of the plants were classified as mature with a percent decadency of 19%. No seedlings were encountered. Average plant height was 26 inches with a crown width of 35 inches. Density remained similar in 2001 at 1,220 plants/acre. Use was light, vigor good on most plants, and percent decadence remained low at 15%.

Stickyleaf low rabbitbrush had an estimated density of 1,620 plants/acre in 1996, increasing slightly to 1,740 plants/acre in 2001. Almost all plants were classified as mature. The shrub species with the highest density was Oregon grape with an estimated density of 18,740 plants/acre in 2001. These plants are very small measuring only 4 to 5 inches in height with a 6 inch crown. It is a mostly mature population with no utilization visible. Antelope bitterbrush, Saskatoon serviceberry, and chokecherry are scattered throughout the site and exhibit moderate to heavy hedging. Bitterbrush shows the heaviest use with most all available plants exhibiting a clubbed growth form. They provided 19% of the browse cover in 1996 and 16% in 2001. However, bitterbrush occurs at a relatively low density of about 200 plants/acre. At this low density heavy use is inevitable considering the low numbers of other highly palatable browse like serviceberry and elderberry. Other browse include a few white rubber rabbitbrush and snowberry.

The herbaceous understory is productive with good diversity. However, cheatgrass and Japanese brome dominate the understory, making up 81% of the grass cover and 54% of the total herbaceous cover in 1996. Due to the dry and spring conditions of 2001, cheatgrass and Japanese brome have declined significantly in nested frequency and percent cover has dropped nearly sevenfold from 19% to 3%. In response to the decline in annual grasses, perennial grasses increased substantially. Common species include Sandberg bluegrass, Kentucky bluegrass, bluebunch wheatgrass, and Great Basin wildrye.

Forbs are diverse with 26 species encountered in 1996 and 34 species in 2001. Some of the larger forbs include silvery lupine, balsamroot, oneflower helianthella, yellow salsify, and Pacific aster. Other forbs are in relatively low numbers and contribute little to overall herbaceous understory cover.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable with abundant vegetative and litter cover. Bare ground cover is estimated at less than 4%. Erosion was not evident in 1996. Browse species do not appear to be expanding at this time with most exhibiting mature stable populations. The abundant annual grasses will out-compete browse seedlings for early season soil moisture most years, not allowing them to become easily established. Some browse show heavy utilization, but these are the species that occur in low densities. The herbaceous understory is dominated by annual species, primarily cheatgrass and Japanese brome, which contribute 54% of the herbaceous cover. Removing these species from the understory would be difficult. There are some perennial grasses present that are more desirable, but they only contribute 13% of the total herbaceous cover.

2001 TREND ASSESSMENT

Trend for soil is stable with abundant herbaceous vegetation and litter cover to protect the soil. The erosion condition class was also determined as stable. Trend for browse is stable for basin big sagebrush but down for the less abundant but more preferred bitterbrush. Sagebrush provides 34% of the browse cover with 1,220 plants/acre estimated. Bitterbrush provides only 16% of the browse cover with only 180 plants/acre estimated. Overall, the browse trend is considered stable. Reproduction for both species is nonexistent this year and only bitterbrush growing out of reach to browsing, produced any flowers this year. Unutilized annual leaders of bitterbrush averaged just over 3 inches which is slightly above the unit average. Trend for the herbaceous understory is up with sum of nested frequency for perennial grasses and forbs more than doubling since 1996. In addition, cheatgrass and Japanese brome declined significantly and average cover of these annual grasses dropped from 19% to 3%. Sum of nested frequency for perennial grasses and forbs more than doubled with the decrease in annual cover and their subsequent reduced competition for limited resources, primarily water.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up (5)

HERBACEOUS TRENDS --
Herd unit 05 , Study no: 2

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	<i>Agropyron dasystachyum</i>	-	4	-	2	-	.03
G	<i>Agropyron intermedium</i>	-	3	-	2	-	.06
G	<i>Agropyron spicatum</i>	33	33	12	12	1.09	1.66
G	<i>Bromus japonicus</i> (a)	344	*114	85	48	14.94	.69
G	<i>Bromus tectorum</i> (a)	216	*136	53	53	4.38	2.17
G	<i>Elymus cinereus</i>	2	1	2	1	.01	.63
G	<i>Melica bulbosa</i>	-	5	-	1	-	.15
G	<i>Poa bulbosa</i>	-	*41	-	12	-	1.50
G	<i>Poa pratensis</i>	19	*71	7	21	.25	2.20
G	<i>Poa secunda</i>	141	*315	50	78	3.16	19.95
Total for Annual Grasses		560	250	138	101	19.32	2.86
Total for Perennial Grasses		195	473	71	129	4.51	26.21
Total for Grasses		755	723	209	230	23.84	29.07
F	<i>Achillea millefolium</i>	49	61	17	21	1.00	1.93
F	<i>Agoseris glauca</i>	-	*16	-	7	-	.08
F	<i>Alyssum alyssoides</i> (a)	17	*65	7	29	.08	.73
F	<i>Allium</i> spp.	-	*137	-	57	-	1.44
F	<i>Artemisia ludoviciana</i>	-	1	-	1	-	.03
F	<i>Aster chilensis</i>	27	*50	11	17	2.05	1.79
F	<i>Astragalus convallarius</i>	3	*15	3	7	.05	.25
F	<i>Balsamorhiza macrophylla</i>	11	14	3	6	.91	2.16
F	<i>Balsamorhiza sagittata</i>	-	5	-	1	-	.81
F	<i>Camelina microcarpa</i> (a)	3	*17	2	7	.01	.13
F	<i>Cirsium undulatum</i>	24	*4	12	2	.33	.07
F	<i>Collomia linearis</i> (a)	5	6	1	2	.00	.03
F	<i>Comandra pallida</i>	17	24	9	11	.21	.42
F	<i>Collinsia parviflora</i> (a)	-	*117	-	34	-	1.07
F	<i>Crepis acuminata</i>	6	14	2	6	.06	.57
F	<i>Cynoglossum officinale</i>	4	4	3	1	.21	.15
F	<i>Descurainia pinnata</i> (a)	28	*	12	-	.59	-
F	<i>Draba</i> spp. (a)	2	10	1	3	.00	.04
F	<i>Epilobium brachycarpum</i> (a)	-	3	-	2	-	.01
F	<i>Erodium cicutarium</i> (a)	-	5	-	1	-	.15
F	<i>Galium aparine</i> (a)	23	29	10	11	.17	.61

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Gayophytum ramosissimum (a)	57	*-	23	-	.55	-
F	Helianthella uniflora	12	19	5	7	1.76	1.92
F	Heterotheca villosa	-	5	-	1	-	1.58
F	Holosteum umbellatum (a)	18	25	5	7	.40	.66
F	Lappula occidentalis (a)	5	*48	2	14	.15	.14
F	Lactuca serriola	29	22	12	9	.13	.76
F	Lithospermum ruderales	-	-	-	-	.03	-
F	Lomatium spp.	8	-	3	-	.04	-
F	Lupinus argenteus	28	37	13	13	1.93	3.34
F	Machaeranthera canescens	12	*-	5	-	.05	-
F	Phlox longifolia	-	*22	-	8	-	.09
F	Polygonum douglasii (a)	51	*6	24	3	.19	.01
F	Ranunculus testiculatus (a)	-	7	-	2	-	.01
F	Senecio integerrimus	-	2	-	1	-	.03
F	Sisymbrium altissimum (a)	13	*33	6	18	.27	1.25
F	Taraxacum officinale	-	*12	-	7	-	.16
F	Tragopogon dubius	41	*153	23	66	.55	4.56
F	Vicia americana	21	*117	11	43	.10	2.57
Total for Annual Forbs		222	371	93	133	2.45	4.88
Total for Perennial Forbs		292	734	132	292	9.46	24.78
Total for Forbs		514	1105	225	425	11.92	29.66

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 05 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	2	3	.18	.00
B	Artemisia tridentata tridentata	46	39	6.76	7.79
B	Chrysothamnus nauseosus albicaulis	2	0	.38	-
B	Chrysothamnus viscidiflorus viscidiflorus	43	45	6.92	8.61
B	Gutierrezia sarothrae	0	1	-	.03
B	Mahonia repens	41	42	2.50	1.93
B	Purshia tridentata	8	6	4.13	3.76
B	Symphoricarpos oreophilus	6	4	1.06	.91
Total for Browse		148	140	21.95	23.06

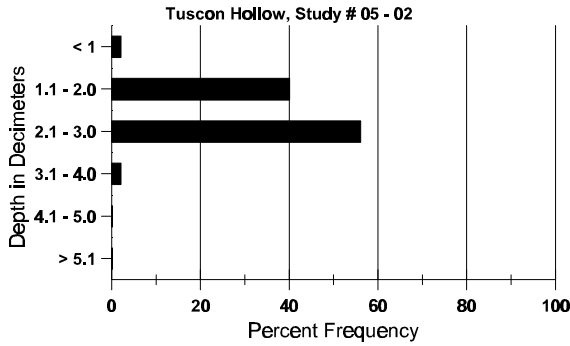
BASIC COVER --
Herd unit 05 , Study no: 2

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	481	474	57.73	72.55
Rock	62	32	1.45	1.56
Pavement	74	15	.71	.32
Litter	499	475	68.56	52.19
Cryptogams	3	-	.01	0
Bare Ground	133	82	3.37	3.33

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 02, Tucson Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.5	66.8 (14.7)	6.5	33.9	37.1	29.0	4.2	29.8	304.0	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 05 , Study no: 2

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Rabbit	6	1	26	N/A
Elk	5	1	-	-
Deer	17	17	400	31 (76)
Cattle	-	1	-	-

BROWSE CHARACTERISTICS --

Herd unit 05 , Study no: 2

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 alnifolia																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
M	96	-	1	1	-	-	-	-	-	-	-	-	2	-	40	27	29	2
	01	-	-	2	-	-	-	-	-	-	-	-	2	-	40	34	28	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'96		50%			50%			00%				+33%						
'01		00%			67%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	-			
												'01	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>Artemisia tridentata tridentata</i>																		
Y	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	39	13	-	1	-	-	-	-	-	52	-	1	-	1060	26	35	
	01	50	2	-	-	-	-	-	-	-	52	-	-	-	1040	31	38	
D	96	4	9	-	-	-	-	-	-	-	8	-	-	5	260		13	
	01	8	1	-	-	-	-	-	-	-	4	-	1	4	180		9	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	860		43	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	400		20	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		31%			00%			09%			-13%							
'01		05%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1400	Dec:	19%			
												'01	1220		15%			
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	2	-	-	-	-	-	-	-	-	1	-	1	-	40	53	68	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			33%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			
												'01	0		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	74	1	-	3	-	-	-	-	-	78	-	-	-	1560	20	37	
	01	82	-	-	-	-	-	-	-	-	82	-	-	-	1640	21	33	
D	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		01%			00%			00%			+ 7%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1620	Dec:	2%			
												'01	1740		5%			

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>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	9	0
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	60		-			
<i>Mahonia repens</i>																		
S	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	96	51	-	-	17	-	-	-	-	-	68	-	-	-	1360			68
	01	34	-	-	-	-	-	-	-	-	34	-	-	-	680			34
M	96	295	-	-	71	-	-	-	-	-	366	-	-	-	7320	5	6	366
	01	506	-	-	397	-	-	-	-	-	903	-	-	-	18060	4	5	903
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+54%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	8680	Dec:	-			
												'01	18740		-			
<i>Prunus virginiana</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	15	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	0		-			
<i>Purshia tridentata</i>																		
M	96	-	-	2	-	-	8	-	-	-	10	-	-	-	200	38	63	10
	01	-	1	-	-	-	2	-	-	1	4	-	-	-	80	30	66	4
D	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	3	-	-	2	3	-	-	2	100			5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			100%			00%			-10%							
'01		11%			89%			22%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	200	Dec:	0%			
												'01	180		56%			

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				
Sambucus cerulea																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	93	81	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	0		-			
Symphoricarpos oreophilus																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	96	8	-	2	-	-	-	-	-	-	10	-	-	-	200	21	30	10
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140	24	41	7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			17%			00%			-42%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	240	Dec:	-			
												'01	140		-			

Trend Study 5-3-01

Study site name: East Canyon Reservoir.

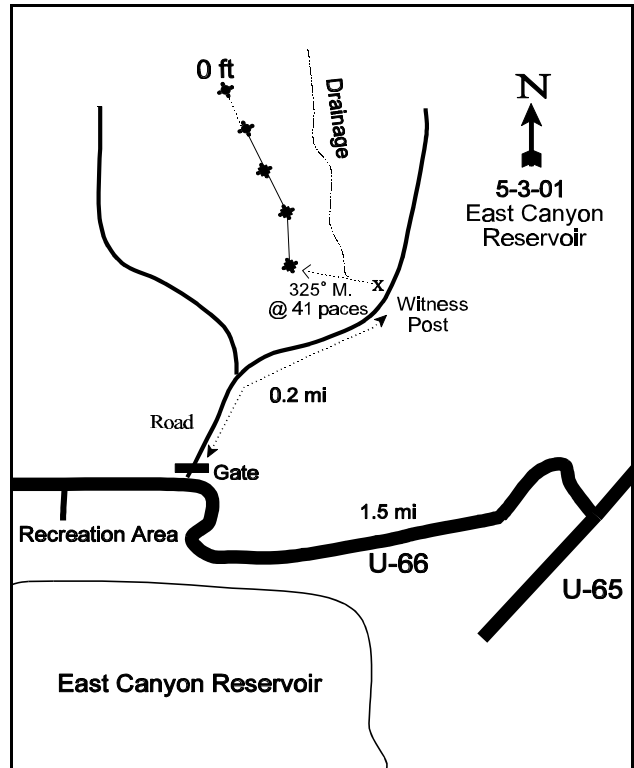
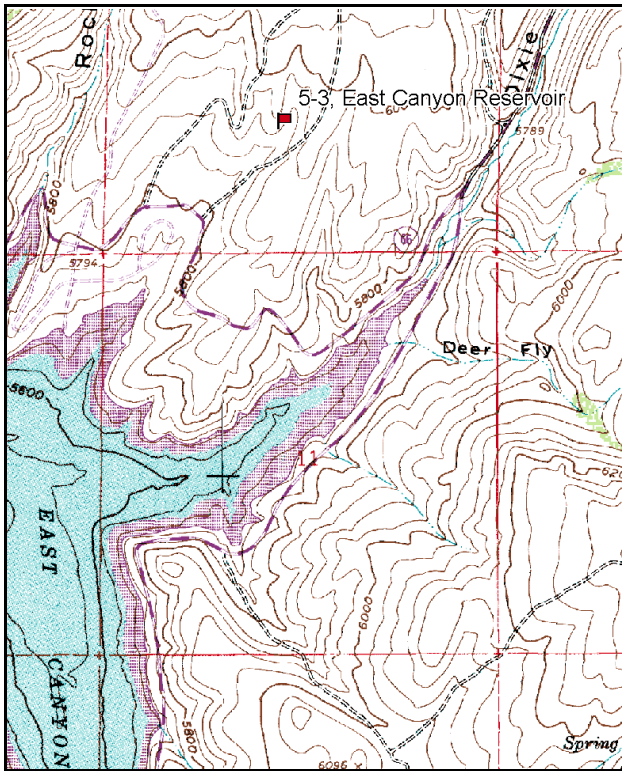
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 186 degrees magnetic.

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

LOCATION DESCRIPTION

Begin to note mileage at the junction of U-65 and U-66. Proceed towards Porterville on U-66 1.15 miles to a gate on the right. There should be a picnic/campground area on left side of road. Proceed through gate on foot (gate locked), travel 0.2 miles to the witness post on the left hand side of the road. From the witness post the 400-foot baseline stake is 41 paces at 325 degrees magnetic. The 0-foot baseline stake is 400 feet to the northwest. The 0-foot stake of the baseline is marked by browse tab #7968. The baseline runs 186 degrees. The baseline doglegs at the 300-foot baseline stake and runs 232 degrees magnetic.



Map Name: East Canyon Reservoir

Diagrammatic Sketch

Township 2N, Range 3E, Section 2

UTM 4530848 N 451110 E

DISCUSSION

Trend Study No. 5-3

The East Canyon Reservoir study is located immediately north of East Canyon Reservoir. Slope varies from 20-30% with an east, southeast aspect and elevation of approximately 5,800 feet. The range type is mountain big sagebrush-grass in association with a substantial amount of antelope bitterbrush. These two shrubs comprise the key management species. Deer pellet groups were abundant in 1996, with the level of hedging on the key browse species having been moderate to heavy. The presence of three winter-killed deer in 1990, provides some evidence of the areas attraction to deer. A pellet group transect read on site in 2001, estimated 79 deer days use/acre (195 ddu/ha). Sheep sign was also abundant and a flock of sheep was on site one week prior to the 2001 reading on June 20th. Sage grouse pellets were also encountered within the pellet group transect.

Soil classification for this site is similar to that described for study number 5-2, Tucson Hollow. "Manila Loam" is a soil with excellent potential for growth and forage production. It's disadvantages are a rather high potential for erosion and subsurface slippage. Although only slowly permeable to water, the Manila soil volume shrinks and swells greatly in response to setting or drying (Carley et al. 1980). Soil at the site has a loam texture with a slightly acidic soil reaction (6.3 pH). Effective rooting depth was estimated at 11 inches with an average temperature of 69°F at this depth. Litter and vegetation cover are abundant and provide sufficient protective ground cover to prevent most erosion. The erosion condition class was determined as stable in 2001.

Mountain big sagebrush and antelope bitterbrush are the key browse species. Mountain big sagebrush is moderately hedged with good vigor and lower percent decadency than reported in 1984 and 1990. Sagebrush density has remained relatively stable since 1984, averaging about 1,800 plants/acre. Reproduction is marginal with few seedlings encountered in 1996 and no seedlings found in 2001. Young plants accounted for 15% of the population in 1996, declining to 6% in 2001. The poor recruitment is mostly due to the dense cheatgrass and bulbous bluegrass cover.

Antelope bitterbrush has a low density of only about 100 plants/acre. Due to their low numbers and high preference, use has been heavy during all sampling periods. Recruitment is also poor with no seedlings or young plants encountered in 1996 or 2001. Oregon grape was encountered for the first time in 1996. This is due to the greatly increased sample size used which more accurately reflects browse densities. Most plants were classified as mature, with some young and seedlings included. Other browse species occurring in low densities include prickly pear cactus, white rubber rabbitbrush, stickyleaf low rabbitbrush, Saskatoon serviceberry, and Wood's rose.

The herbaceous understory is abundant and diverse. However, the composition is dominated by weedy species. Grass cover is dominated by annual and low value perennials including cheatgrass, Japanese brome, and bulbous bluegrass. Other perennial species include Great Basin wildrye, Sandberg bluegrass, intermediate wheatgrass, and Kentucky bluegrass. Forbs are very diverse with few species commonly occurring. Many species are small annuals that add very little to the herbaceous cover. Forb composition includes few desirable species, certainly far less than what this site is capable of.

1984 APPARENT TREND ASSESSMENT

Soil appears to be stable, even though there is limited erosion in some of the shrub interspaces. The degree of soil loss, however is not great enough to explain or have a significant bearing on current vegetative conditions. Vegetative trend appears to be in a state of decline for the key browse species. The herbaceous understory is poor.

1990 TREND ASSESSMENT

Compared to the heavily hedged, declining condition of the key browse species reported for this site in 1984, there have been no significant changes in the density of big sagebrush or bitterbrush. Although the percentage of decadent plants, especially sagebrush, is still high, it is lower than in 1984. Bitterbrush retains a heavily hedged growth form, while the sagebrush are more moderately browsed growth form. Young plants make up a healthy percentage of both populations. Sagebrush canopy cover averages 11%. Distribution of perennial grasses was very patchy in 1984. Although annual species remain prevalent, the frequency of perennial grasses, mostly Sandberg bluegrass, have increased significantly. There is thick vegetative and litter cover provided by the herbaceous understory. Soil erosion is minimal.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Soil trend is slightly upward with a decrease in percent bare ground cover since 1990. Vegetative and litter cover are abundant which helps reduce erosion potential. Density of the key browse species, mountain big sagebrush and antelope bitterbrush, have stayed relatively stable over the years. Utilization has remained nearly the same while percent decadency has decreased. This leads to a slightly upward browse trend. Although sum of nested frequency for grasses and forbs has increased since 1990, most species present are undesirable. Cheatgrass and bulbous bluegrass are the dominate herbaceous species at this time and will likely continue to be in the future.

TREND ASSESSMENT

soil - slightly upward (4)

browse - slightly upward (4)

herbaceous understory - stable, but poor (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground increased and litter cover declined. However, herbaceous vegetation cover increased 19% and the ratio of nested frequency for protective ground cover to bare ground increased slightly. In addition, the soil erosion condition class was determined as stable. Trend for browse is stable. Density of the key species, mountain big sagebrush and antelope bitterbrush are similar to 1996. Use is similar and vigor is normal on most plants. Recruitment is poor but percent decadence of both species is low. Trend for the herbaceous understory is stable but the composition is poor. Sum of nested frequency for perennial grasses has increased, while that of perennial forbs has declined. Sum of nested frequency for cheatgrass declined significantly, whereas frequency of the low value perennial, bulbous blue grass, nearly doubled. More preferred perennial grasses are not abundant but intermediate wheatgrass and Kentucky bluegrass did increase significantly in nested frequency. Sum of nested frequency for perennial forbs declined 47%, while cover dropped more than fourfold. There are a few preferred species with most of the forbs being weedy increasers.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 05 , Study no: 3

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron intermedium	a7	a10	a9	b22	2	3	3	10	.18	.91
G	Agropyron smithii	-	-	-	4	-	-	-	2	-	.53
G	Agropyron spicatum	a3	a18	b48	a21	1	8	17	9	2.04	.34
G	Bromus japonicus (a)	-	-	41	62	-	-	19	25	.39	.32
G	Bromus tectorum (a)	-	-	b283	a135	-	-	83	48	7.92	3.98
G	Carex spp.	-	-	3	7	-	-	1	2	.03	.03
G	Elymus cinereus	a-	a-	b29	b24	-	-	10	8	2.53	3.04
G	Poa bulbosa	a-	b41	c149	d267	-	17	45	80	7.90	26.96
G	Poa pratensis	ab19	a3	a6	b50	7	2	3	15	.04	2.20
G	Poa secunda	a21	b59	a27	ab34	8	23	11	13	.58	.79
G	Vulpia octoflora (a)	-	-	6	1	-	-	2	1	.53	.00
Total for Annual Grasses		0	0	330	198	0	0	104	74	8.84	4.31
Total for Perennial Grasses		50	131	271	429	18	53	90	139	13.33	34.84
Total for Grasses		50	131	601	627	18	53	194	213	22.17	39.16
F	Achillea millefolium	a26	ab35	c62	bc53	9	15	28	25	1.19	.86
F	Agoseris glauca	-	-	-	1	-	-	-	1	-	.00
F	Alyssum alyssoides (a)	-	-	4	7	-	-	2	3	.01	.04
F	Allium spp.	-	-	1	3	-	-	1	1	.00	.00
F	Arabis spp.	-	-	4	-	-	-	2	-	.03	-
F	Artemisia ludoviciana	c51	bc45	a17	ab26	17	17	6	10	.51	.73
F	Aster chilensis	a38	a36	b89	b89	14	14	35	34	3.00	.69
F	Astragalus spp.	ab5	a-	b12	a-	2	-	7	-	.52	-
F	Cirsium undulatum	ab17	ab27	b41	a9	11	14	18	4	1.10	.10
F	Collomia linearis (a)	-	-	a12	b30	-	-	6	15	.03	.10
F	Collinsia parviflora (a)	-	-	a3	b21	-	-	1	11	.00	.08
F	Cruciferae	-	4	-	-	-	2	-	-	-	-
F	Descurainia pinnata (a)	-	-	-	6	-	-	-	3	-	.04
F	Draba spp. (a)	-	-	a-	b54	-	-	-	21	-	.15
F	Epilobium brachycarpum (a)	-	-	-	8	-	-	-	3	-	.01
F	Erodium cicutarium (a)	-	-	22	33	-	-	8	13	.16	.80
F	Erigeron pumilus	b54	b51	c125	a2	25	24	53	1	3.91	.00
F	Gayophytum ramosissimum(a)	-	-	b43	a-	-	-	20	-	.15	-
F	Haplopappus acaulis	-	-	1	-	-	-	1	-	.00	-
F	Hedysarum boreale	-	-	2	1	-	-	1	1	.15	.00

Type	Species	Nestled Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Holosteum umbellatum (a)	-	-	_a 9	_b 78	-	-	5	37	.02	.31
F	Lappula occidentalis (a)	-	-	6	-	-	-	2	-	.03	-
F	Lactuca serriola	-	1	1	-	-	1	1	-	.00	-
F	Lithospermum ruderales	_b 24	_b 31	_b 16	_a 1	13	17	12	1	1.06	.00
F	Lomatium spp.	-	-	2	4	-	-	1	2	.00	.01
F	Lupinus argenteus	_a -	_a -	_b 11	_b 22	-	-	5	10	.10	.35
F	Microsteris gracilis (a)	-	-	-	2	-	-	-	1	-	.00
F	Oenothera caespitosa	3	2	3	2	2	2	1	1	.15	.00
F	Polygonum douglasii (a)	-	-	_b 35	_a 14	-	-	17	7	.08	.03
F	Ranunculus testiculatus (a)	-	-	-	3	-	-	-	1	-	.00
F	Sphaeralcea coccinea	16	13	15	9	6	5	8	5	.55	.05
F	Taraxacum officinale	-	-	2	-	-	-	1	-	.00	-
F	Tragopogon dubius	19	18	19	4	8	9	11	2	.25	.01
F	Viguiera multiflora	_a -	_b 17	_{ab} 7	_a 1	-	8	3	1	.04	.00
F	Zigadenus paniculatus	-	-	-	2	-	-	-	2	-	.04
Total for Annual Forbs		0	0	134	256	0	0	61	115	0.50	1.59
Total for Perennial Forbs		253	280	430	229	107	128	195	101	12.63	2.88
Total for Forbs		253	280	564	485	107	128	256	216	13.13	4.47

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 05 , Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	64	53	14.37	18.14
B	Chrysothamnus nauseosus albicaulis	1	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	12	13	.33	.18
B	Mahonia repens	22	21	.83	.45
B	Opuntia spp.	6	5	.03	-
B	Purshia tridentata	4	5	2.40	1.94
Total for Browse		109	98	17.98	20.71

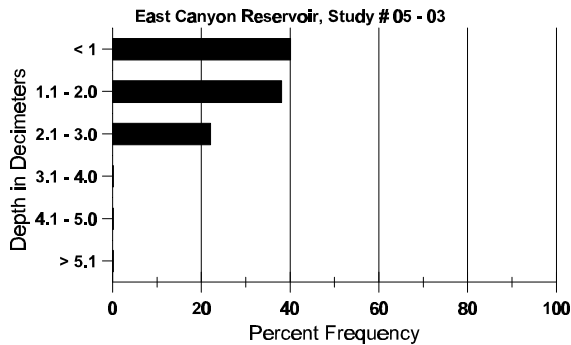
BASIC COVER --
Herd unit 05 , Study no: 3

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	373	374	3.50	6.00	50.76	60.62
Rock	148	129	5.25	6.75	5.53	3.97
Pavement	120	149	.50	2.00	1.27	1.48
Litter	398	369	79.50	71.00	61.27	49.72
Cryptogams	11	46	.50	0	.13	.95
Bare Ground	138	134	10.75	14.25	4.19	8.60

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 03, East Canyon Reservoir

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.8	69.2 (11.4)	6.3	48.7	28.0	23.3	2.4	20.6	163.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 05 , Study no: 3

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Sheep	-	4	200	N/A
Grouse	-	1	17	N/A
Elk	5	-	-	-
Deer	32	26	1027	79 (195)
Cattle	-	-	9	1 (2)

BROWSE CHARACTERISTICS --

Herd unit 05 , 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>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	60	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	51	55	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	400			12
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	66			2
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	96	13	1	-	-	-	-	-	-	-	14	-	-	-	280			14
	01	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
M	84	-	11	6	-	-	-	-	-	-	17	-	-	-	566	25	24	17
	90	5	11	-	-	-	-	-	-	-	16	-	-	-	533	29	38	16
	96	39	19	1	1	-	-	1	-	-	58	-	3	-	1220	30	45	61
	01	39	13	-	3	-	1	-	-	-	56	-	-	-	1120	32	47	56
D	84	-	11	29	-	1	-	-	-	-	39	-	-	2	1366			41
	90	9	12	13	-	-	-	-	-	-	26	-	-	8	1133			34
	96	8	10	1	1	-	-	-	-	-	15	-	1	4	400			20
	01	12	5	1	-	-	-	-	-	-	13	-	-	5	360			18
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	660			33
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	460			23
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		42%			58%			03%			-13%							
'90		44%			25%			15%			+ 9%							
'96		32%			02%			08%			-17%							
'01		23%			03%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1998	Dec:	68%			
												'90	1732		65%			
												'96	1900		21%			
												'01	1580		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		1	2				
Chrysothamnus nauseosus albicaulis												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	1	-	-	-	-	-	33	26	28	1
	96	1	-	-	-	-	-	-	20	-	-	1
	01	1	-	-	-	-	-	-	20	-	-	1
D	84	-	-	1	-	-	-	-	33			1
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		100%		00%		+ 0%				
'90		100%		00%		00%		-39%				
'96		00%		00%		00%		+ 0%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	33	Dec:	100%			
						'90	33		0%			
						'96	20		0%			
						'01	20		0%			
Chrysothamnus viscidiflorus viscidiflorus												
Y	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	1	-	-	-	-	-	33	14	15	1
	96	14	-	-	1	-	-	-	300	15	27	15
	01	15	-	-	-	-	-	-	300	12	17	15
D	84	1	-	-	-	-	-	-	33			1
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		100%		+ 0%				
'90		100%		00%		100%		+90%				
'96		00%		00%		06%		+ 0%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	33	Dec:	100%			
						'90	33		0%			
						'96	320		0%			
						'01	320		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			
Mahonia repens																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	32	-	-	-	-	-	-	-	-	32	-	-	-	640		32
	01	28	-	-	-	-	-	3	-	-	31	-	-	-	620		31
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	107	-	-	9	-	-	-	-	-	116	-	-	-	2320	5	6
	01	167	-	-	6	-	-	19	-	-	192	-	-	-	3840	3	4
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		00%			00%			00%									
'90		00%			00%			00%									
'96		00%			00%			00%			+34%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	2960		-		
												'01	4460		-		

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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66	10	13	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	13	-	-	-	-	-	-	-	-	12	-	1	-	260	5	15	13
	01	8	-	-	-	-	-	-	-	-	8	-	-	-	160	5	14	8
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+ 0%							
'90		00%			00%			00%			+83%							
'96		00%			00%			05%			-53%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	66		100%			
												'96	380		0%			
												'01	180		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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	2	-	1	-	-	-	-	3	-	-	-	100			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	1	1	-	-	-	-	-	-	2	-	-	-	66	20	9	2
	90	-	1	2	-	-	-	-	-	-	3	-	-	-	100	35	47	3
	96	-	-	1	-	-	5	-	-	-	6	-	-	-	120	35	80	6
	01	-	-	-	-	-	4	-	-	-	4	-	-	-	80	33	61	4
D	84	-	-	4	-	-	-	-	-	-	4	-	-	-	133			4
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	66			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	1	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		17%			83%			00%			+25%							
'90		25%			75%			00%			-55%							
'96		00%			100%			00%			-17%							
'01		20%			80%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	67%			
												'90	266		25%			
												'96	120		0%			
												'01	100		20%			
Rosa woodsii																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	24	17	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			

Trend Study 5-4-01

Study site name: Wanship.

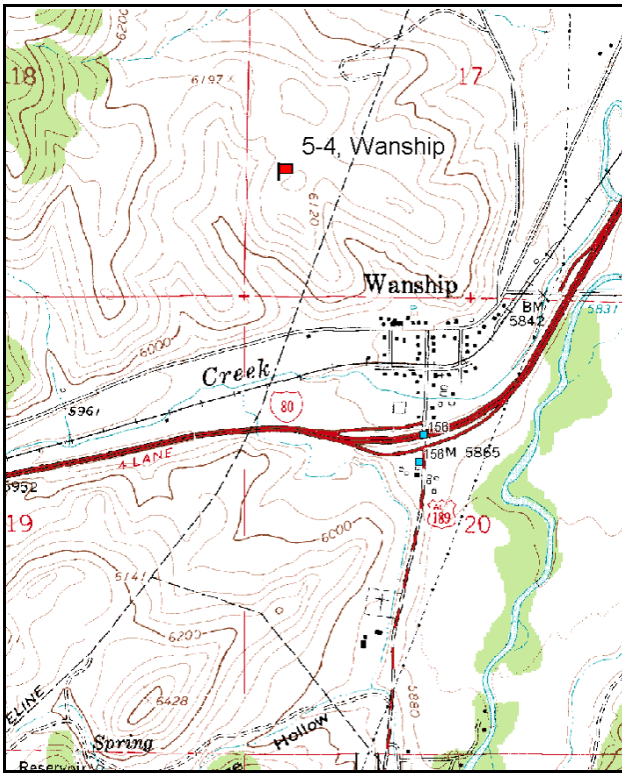
Vegetation type: Forage Kochia.

Compass bearing: frequency baseline 161 degrees magnetic.

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

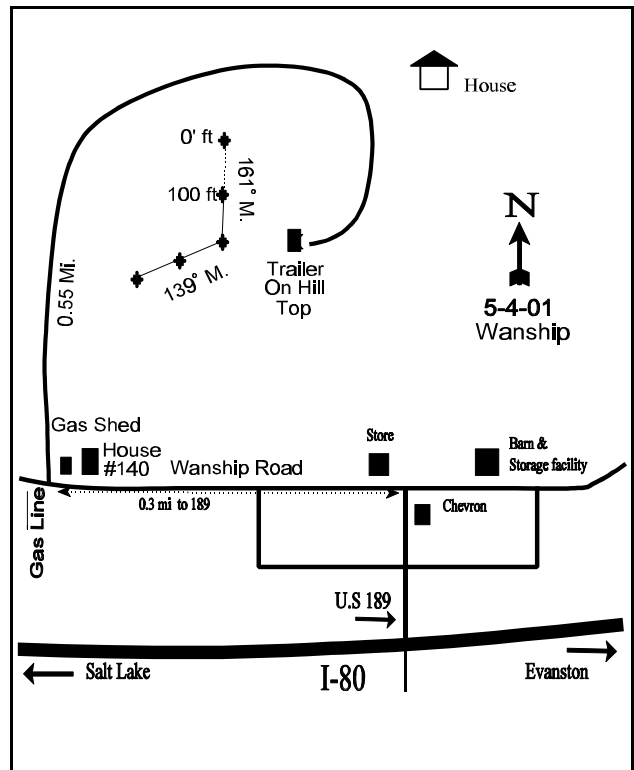
LOCATION DESCRIPTION

From the I-80 overpass in Wanship, proceed north on 189 to the "T" junction in town with Buck's Chevron on the right. Turn left and go 0.3 miles. Turn right here and go up the draw 0.55 miles to a house on top of the hill. The owner of this home would like to be contacted when the site is read. From the fork in the road take a bearing of 220 degrees magnetic and walk 36 paces to the baseline. The 0-foot stake of the baseline is marked by browse tag #7955. The baseline runs 161 degrees magnetic. The baseline doglegs at the 200-foot baseline stake and runs 193 degrees magnetic.



Map Name: Wanship

Township 1N, Range 5E, Section 17



Diagrammatic Sketch

UTM 4518294 N 465163 E

DISCUSSION

Trend Study No. 5-4

The Wanship study samples a tract of mountain big sagebrush/grass that extends north of Wanship and west of the Weber River. The site is located on a bench just north of Wanship. Slope is approximately 3% with a west southwest aspect. The site was established in 1984 and reread in 1990. A wildfire burned the entire area sometime after the 1990 reading which eliminated most of the browse. This is an area that customarily winters several hundred deer. Deer use during the winter of 1983-84 was light because of deep crusted snow and that deer were supplementary fed a pelleted ration alfalfa at feeding stations located along the frontage road near Wanship. There were numerous deer pellet groups encountered in 1996, indicating that deer still use the area. Quadrat frequency of deer pellet groups was moderately high at 36%. Some livestock sign was also apparent but likely from the previous fall. Gopher activity was noted. A pellet group transect read on site in 2001 estimated 67 deer, 24 elk and 13 cow days use/acre (165 ddu/ha, 60 edu/ha, and 32 cdu/ha). A nearby land owner said that there were nearly 50 deer wintering in the area and he counted over 100 elk on the ridge just west of the site during the 2000/2001 winter. He also said that cattle heavily graze the area later in the summer.

Soil at the site appears fairly deep but rocky on the surface. Effective rooting depth was estimated at only 9 inches but it is likely deeper and not restrictive to roots due to the presence of mountain big sagebrush. Soil textural analysis indicates a loam soil with a relatively high soil temperature of 78°F at 8 inches. Color is a dark reddish-gray resulting from what apparently is basalt parent material. There is not much bare ground due to the abundant vegetative and litter cover. Erosion is not severe because of the gentle terrain and soil permeability. The soil erosion condition class was determined as stable in 2001.

The key browse species is mountain big sagebrush. It had a density of over 3,000 plants/acre in 1984 and 1990. A fire burned the site sometime after the 1990 reading and eliminated most of the sagebrush. Burned stumps encountered in 1996 were classified as dead. In 1996, density of sagebrush was estimated at 2,880 plants/acre, 98% of which were young. The few mature plants encountered measured only 9 inches in height. Mountain big sagebrush displayed no utilization. As one would expect, the rate of decadency declined from 61% in 1990 to 0% in 1996. Density remained similar in 2001 at 2,500 plants/acre. The population is mostly mature (94%), utilization moderate to heavy with vigor good. Mature plants are small in stature measuring only 11 inches in height.

Antelope bitterbrush density was low in the past and all were eliminated by the fire. Prostrate summer cypress was included in the seed mixture and has established extremely well. Estimated density was 11,980 plants/acre in 1996. Mature plants measured 7 inches in height and 11 inches in width. Utilization was mostly light, although some plants exhibited moderate use. Density remained stable in 2001, but use was moderate to heavy on most plants. Vigor remains good. Some white rubber rabbitbrush and stickyleaf low rabbitbrush have resprouted, but they are not abundant. Other species encountered include Saskatoon serviceberry, broom snakeweed, pricklypear cactus, and gray horsebrush.

The seeded herbaceous understory has established extremely well after the fire. Several seeded grasses, including crested and intermediate wheatgrass and orchard grass have become established. Native grasses, bluebunch wheatgrass and Sandberg bluegrass, have persisted and are abundant. Other grasses include sheep fescue, bulbous bluegrass, and bottlebrush squirreltail. Cheatgrass was abundant in 1996 but declined significantly in nested frequency and cover in 2001.

Forbs are diverse but perennial species are deficient. Seeded Alfalfa and small burnet, occur only occasionally, yet they were very robust and vigorous in 1996. Alfalfa has persisted but no small burnet was

encountered in 2001. Many annual forbs were encountered with most being very small in stature. They may decline over time with the competition from perennial species. This soil has a high temperature and likely becomes very dry in the upper horizons during the summer which may be a limiting factor to shallow rooted plants.

1984 APPARENT TREND ASSESSMENT

The overall impression one gets of this area is stability. This is a good winter range site that shows relatively little erosion in spite of a rather thin ground cover. Mountain big sagebrush dominates the site and will most likely continue to do so.

1990 TREND ASSESSMENT

The increased decadence and poor vigor of mountain big sagebrush and bitterbrush indicate a declining vegetative trend for this heavily used winter range. Virtually all the bitterbrush and 25% of the sagebrush have a heavily hedged growth form. Vigor is poor on many of the shrubs. There is limited reproduction. There are large bare areas in the understory but less cheatgrass than observed on similar sites. The frequency of bluebunch wheatgrass is almost unchanged. The ground cover indicates a decrease in the amount of litter cover and an increase in bare soil.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - stable but poor (3)

1996 TREND ASSESSMENT

Soil trend is slightly upward with a decrease in bare ground cover and an increase in litter cover. The gentle terrain combined with vegetative and litter cover will prohibit most erosion. The fire that burned this site was beneficial to the mountain big sagebrush population. Percent decadency has decreased with nearly the same density as reported in the past. It is unclear at this point if the mountain big sagebrush was seeded or if came from the existing seed bank. Prostrate summer cypress is the most abundant browse with some moderate use apparent. Increaser or invader browse species are in low abundance and do not appear to be expanding at this time. Browse trend is up. Both seeded grasses and forbs are abundant and vigorous providing some competition for annual, weedy plants. Cheatgrass is still abundant but with a stunted growth form this season. Herbaceous trend is up due to the vigorous seeded species that have become established.

TREND ASSESSMENT

soil - slightly upward (4)

browse - up (5)

herbaceous understory - up slightly (4)

2001 TREND ASSESSMENT

Trend for soil is down slightly but still in good condition. Percent cover for bare ground doubled since 1996. This occurred with an accompanying decline in litter cover. Herbaceous vegetation cover increased as many seeded and native grasses increased significantly in nested frequency. Erosion is not currently a problem and the soil erosion condition class was determined to be stable. Trend for browse continues to be stable. Mountain big sagebrush remains at a similar density compared to 1996. However, most plants are now mature. Use is moderate to heavy but plants are vigorous and there are no decadent individuals. The

dominant browse is the seeded, prostrate summer cypress which provides 54% of the shrub cover with a stable density of 11,500 plants/acre. Use is heavier than in 1996, but vigor is normal. Trend for the herbaceous understory is up. Sum of nested frequency for perennial grasses has increased with a significant increase in the frequency of crested and intermediate wheatgrass and Sandberg bluegrass. Nested frequency of the annual, cheatgrass, also declined significantly. Sum of nested frequency for perennial forbs declined slightly. However, perennial forbs contribute to only 6% of the total herbaceous cover.

TREND ASSESSMENT

soil - down slightly (2)

browse - stable (3)

herbaceous understory - up (5)

HERBACEOUS TRENDS --

Herd unit 05 , Study no: 4

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	a-	a-	b ₁₀₃	c ₁₉₂	-	-	47	73	5.33	16.42
G	Agropyron dasystachyum	-	-	-	3	-	-	-	1	-	.03
G	Agropyron intermedium	a-	a-	b ₂₄	c ₇₉	-	-	18	31	1.51	3.19
G	Agropyron spicatum	25	27	35	12	14	14	16	8	1.13	.81
G	Bromus tectorum (a)	-	-	b ₃₁₅	a ₅₅	-	-	92	26	6.34	.28
G	Dactylis glomerata	a-	a-	b ₁₁	a ₁	-	-	6	1	.21	.03
G	Festuca ovina	-	-	2	-	-	-	1	-	.00	-
G	Poa bulbosa	-	-	1	4	-	-	1	2	.03	.01
G	Poa secunda	b ₁₈₇	d ₃₀₇	a ₉₂	c ₂₃₅	77	97	36	83	2.00	5.69
G	Sitanion hystrix	b ₁₅	b ₂₁	a ₁	a ₁	10	12	1	1	.00	.01
Total for Annual Grasses		0	0	315	55	0	0	92	26	6.34	0.28
Total for Perennial Grasses		227	355	269	527	101	123	126	200	10.24	26.19
Total for Grasses		227	355	584	582	101	123	218	226	16.58	26.47
F	Allium acuminatum	b ₁₈	a ₅	a-	b ₁₆	6	2	-	7	-	.03
F	Alyssum alyssoides (a)	-	-	b ₁₈₈	a ₁₄₁	-	-	60	58	1.45	.63
F	Antennaria rosea	6	5	-	-	3	4	-	-	-	-
F	Arabis spp.	-	3	-	-	-	1	-	-	-	-
F	Astragalus cibarius	-	-	1	3	-	-	1	2	.00	.18
F	Astragalus convallarius	-	-	-	4	-	-	-	2	-	.01
F	Astragalus utahensis	7	1	11	-	4	1	4	-	.21	-
F	Cirsium spp.	-	-	3	-	-	-	1	-	.00	-
F	Collomia linearis (a)	-	-	1	2	-	-	1	1	.00	.00
F	Comandra pallida	-	-	-	4	-	-	-	1	-	.03
F	Collinsia parviflora (a)	-	-	a ₃	b ₇₆	-	-	3	30	.01	.32

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Crepis acuminata</i>	-	2	-	1	-	2	-	1	-	.15
F	<i>Cryptantha</i> spp.	6	-	-	-	2	-	-	-	-	-
F	<i>Cymopterus longipes</i>	a-	a10	c54	b32	-	4	30	17	.49	.21
F	<i>Draba</i> spp. (a)	-	-	a-	b105	-	-	-	38	-	.41
F	<i>Epilobium brachycarpum</i> (a)	-	-	-	2	-	-	-	1	-	.00
F	<i>Erodium cicutarium</i> (a)	-	-	-	1	-	-	-	1	-	.03
F	<i>Erigeron pumilus</i>	2	3	1	-	2	1	1	-	.03	-
F	<i>Gayophytum ramosissimum</i> (a)	-	-	b14	a-	-	-	7	-	.03	-
F	<i>Holosteum umbellatum</i> (a)	-	-	213	185	-	-	69	73	1.45	.76
F	<i>Lupinus argenteus</i>	-	-	-	5	-	-	-	2	-	.18
F	<i>Medicago sativa</i>	a-	a-	b18	b10	-	-	8	5	.82	.95
F	<i>Microsteris gracilis</i> (a)	-	-	-	3	-	-	-	1	-	.03
F	<i>Penstemon</i> spp.	3	-	-	-	2	-	-	-	-	-
F	<i>Phlox longifolia</i>	a-	a-	b25	ab10	-	-	9	4	.29	.07
F	<i>Polygonum douglasii</i> (a)	-	-	3	-	-	-	1	-	.00	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	b263	a217	-	-	86	74	2.44	2.87
F	<i>Sanguisorba minor</i>	a-	a-	b16	a-	-	-	8	-	1.29	-
F	<i>Schoenrambe linifolia</i>	-	-	3	1	-	-	1	1	.03	.00
F	<i>Sisymbrium altissimum</i> (a)	-	-	1	-	-	-	1	-	.03	-
F	<i>Tragopogon dubius</i>	4	-	3	5	2	-	1	2	.03	.03
Total for Annual Forbs		0	0	686	732	0	0	228	277	5.44	5.07
Total for Perennial Forbs		46	29	135	91	21	15	64	44	3.20	1.86
Total for Forbs		46	29	821	823	21	15	292	321	8.65	6.94

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 05 , Study no: 4

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	58	52	1.08	2.00
B	Chrysothamnus nauseosus albicaulis	3	3	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	27	27	2.05	1.51
B	Gutierrezia sarothrae	1	3	-	.15
B	Kochia prostrata	95	95	7.61	4.27
B	Opuntia spp.	3	3	.15	-
B	Tetradymia canescens	1	1	-	-
Total for Browse		188	184	10.89	7.97

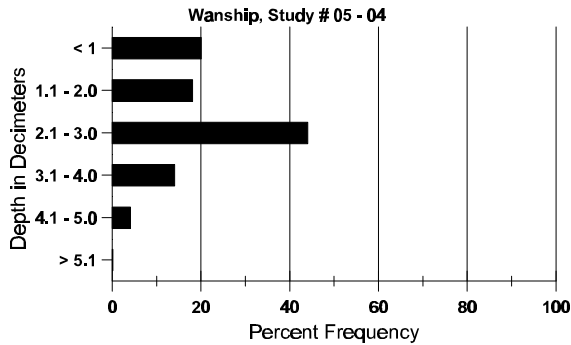
BASIC COVER --
Herd unit 05 , Study no: 4

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	392	367	3.00	15.75	37.70	44.98
Rock	248	168	9.00	9.00	11.57	9.17
Pavement	218	164	16.25	14.75	3.39	2.23
Litter	397	352	64.00	41.00	44.87	27.26
Cryptogams	52	40	.25	5.25	.47	.86
Bare Ground	280	284	7.50	14.25	11.60	24.70

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 04, Wanship

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.2	78.0 (8.3)	6.6	44.9	28.7	23.4	2.7	15.4	185.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 05 , Study no: 4

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Sheep	2	-	-	-
Rabbit	10	-	70	N/A
Elk	3	9	313	24 (60)
Deer	36	34	870	67 (165)
Cattle	1	1	157	13 (32)

BROWSE CHARACTERISTICS --

Herd unit 05 , 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							
Amelanchier alnifolia												
M	'84	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	0	24	28	0
	'01	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
	'84	00%		00%		00%						
	'90	00%		00%		00%						
	'96	00%		00%		00%						
	'01	00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	-			
						'90	0		-			
						'96	0		-			
						'01	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				
Artemisia tridentata vaseyana																		
S	'84	24	1	-	-	-	-	-	-	-	25	-	-	-	833		25	
	'90	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	'96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	'84	3	6	-	-	-	-	-	-	-	9	-	-	-	300		9	
	'90	5	2	-	-	-	-	-	-	-	6	1	-	-	233		7	
	'96	141	-	-	-	-	-	-	-	-	141	-	-	-	2820		141	
	'01	2	4	1	-	-	-	-	-	-	7	-	-	-	140		7	
M	'84	-	17	27	-	-	-	-	-	-	44	-	-	-	1466	33 43	44	
	'90	3	18	7	-	-	-	-	-	-	21	3	2	2	933	26 36	28	
	'96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9 9	3	
	'01	7	43	65	-	-	3	-	-	-	116	-	2	-	2360	11 13	118	
D	'84	-	15	38	-	-	-	-	-	-	42	-	3	8	1766		53	
	'90	10	29	16	2	-	-	-	-	-	32	6	4	15	1900		57	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	560		28	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		36%			61%			10%			-13%							
'90		53%			25%			25%			- 6%							
'96		00%			00%			00%			-13%							
'01		38%			55%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	3532	Dec:	50%			
												'90	3066		62%			
												'96	2880		0%			
												'01	2500		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				
Chrysothamnus nauseosus albicaulis												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	60	13	14	3
	01	2	-	-	-	-	-	-	40	21	17	2
D	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	0			0
	01	-	1	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		00%		+ 0%				
'01		33%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%			
						'90	0		0%			
						'96	60		0%			
						'01	60		33%			
Chrysothamnus viscidiflorus viscidiflorus												
Y	84	10	-	-	-	-	-	-	10	-	-	10
	90	1	-	-	-	-	-	-	33			1
	96	-	-	-	-	-	-	-	0			0
	01	2	-	-	-	-	-	-	40			2
M	84	8	-	-	-	-	-	-	266	13	12	8
	90	14	5	1	3	-	-	-	766	11	12	23
	96	41	-	-	-	-	-	-	820	12	22	41
	01	28	-	-	-	-	-	-	560	12	22	28
D	84	-	-	-	-	-	-	-	0			0
	90	7	-	-	1	-	-	-	266			8
	96	-	-	-	-	-	-	-	0			0
	01	5	1	-	-	-	-	-	120			6
X	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%		+44%				
'90		16%		03%		63%		-23%				
'96		00%		00%		00%		-12%				
'01		03%		00%		03%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	599	Dec:	0%			
						'90	1065		25%			
						'96	820		0%			
						'01	720		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				
Gutierrezia sarothrae																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	8	11	1
	'01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	7	11	4
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+80%							
'01		00%			00%			20%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	20		0%			
												'01	100		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			
Kochia prostrata																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	161	4	-	-	-	-	-	-	-	165	-	-	-	3300		165
	01	51	37	-	-	-	-	-	-	-	85	3	-	-	1760		88
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	376	50	-	6	-	-	-	-	-	432	-	-	-	8640	7	11
	01	140	279	52	9	2	3	-	-	-	485	-	-	-	9700	6	9
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	2	-	-	-	-	-	-	-	-	1	-	1	-	40		2
	01	-	2	-	-	-	-	-	-	-	2	-	-	-	40		2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		00%			00%			00%									
'90		00%			00%			00%									
'96		09%			00%			.16%			- 4%						
'01		56%			10%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%			
											'90	0		0%			
											'96	11980		0%			
											'01	11500		0%			

A G R E	Y 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.																		
Y	'84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	'90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	'96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	5	-	-	-	-	-	-	-	-	5	-	-	-	166	3	10	5
	'96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	4	8	4
	'01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	5	11	3
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	4	-	-	-	-	-	-	-	-	-	-	-	4	133			4
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+91%							
'90		00%			00%			36%			-67%							
'96		00%			00%			00%			-33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	0%			
												'90	365		36%			
												'96	120		0%			
												'01	80		0%			
Purshia tridentata																		
M	'84	-	-	4	-	-	-	-	-	-	4	-	-	-	133	29	40	4
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	1	-	-	-	-	-	-	-	-	-	1	33			1
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			-75%							
'90		00%			100%			100%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	0%			
												'90	33		100%			
												'96	0		0%			
												'01	0		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				
Tetradymia canescens																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	1	-	-	-	-	-	-	-	-	-	-	-	1	11	18	1	
	'01	1	-	-	-	-	-	-	-	-	-	-	-	1	12	34	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	00%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%			+ 0%							
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	20		-			

Not Read

Trend Study 5-5-96

Study site name: Upper Franklin Canyon.

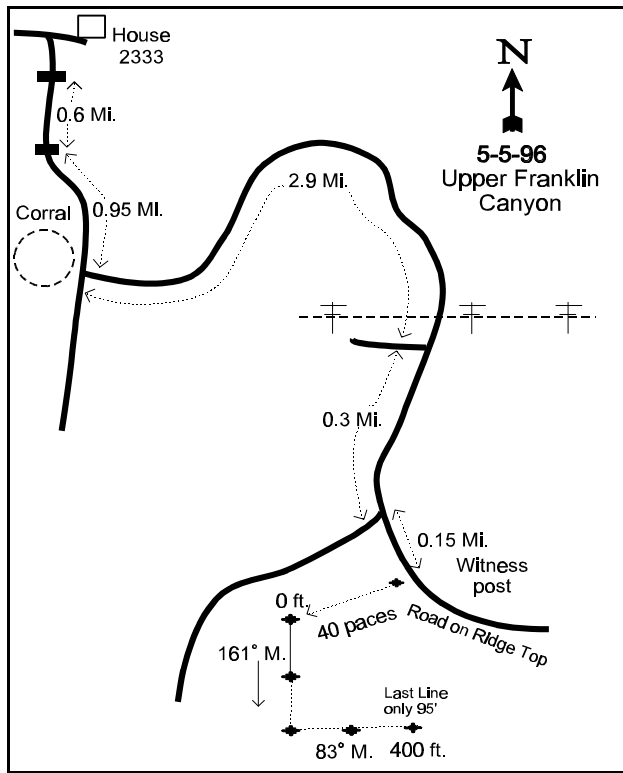
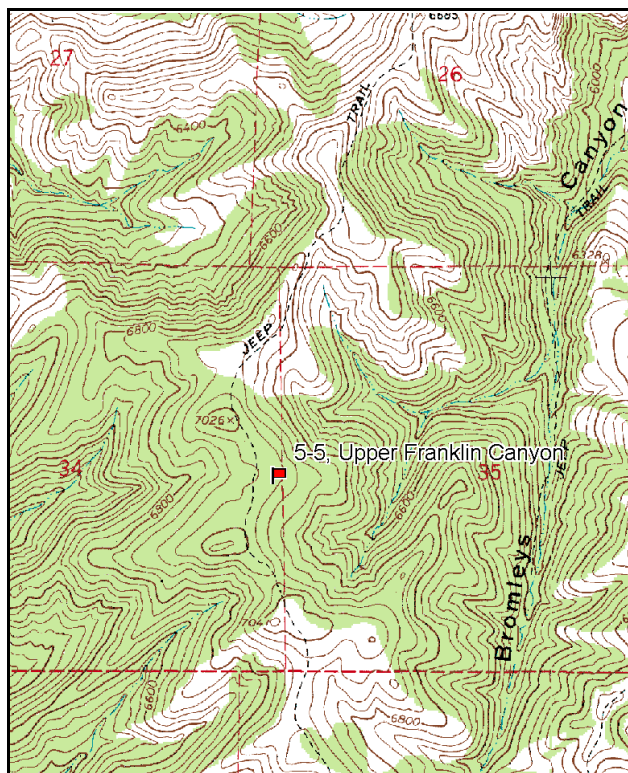
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 161 degrees magnetic.

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

LOCATION DESCRIPTION

From Main Street and south Henefer Road, proceed 2.1 miles southeast on Cemetery Road to the entrance of Franklin Canyon. A house (number 2333) is nearby. Proceed south 0.6 miles up Franklin Canyon to a cattleguard. Continue south for 0.95 miles to a large corral, and turn left onto a small dirt road. Proceed 2.9 miles (staying on main road) to a fork. Stay straight (left) and proceed 0.3 miles to another fork. Take a left and proceed on this ridge top road for 0.15 miles to a witness post on the right hand side of the road. From the witness post walk 40 paces in a south west direction to the 0-foot baseline stake. The 0-foot baseline stake is marked by browse tag #7954. The baseline doglegs at the 200-foot baseline stake and runs in a direction of 83 degrees magnetic.



Map Name: Coalville

Diagrammatic Sketch

Township 3N, Range 4E, Section 34

UTM 4533201 N 460264 E

DISCUSSION

Trend Study No. 5-5

***This site was not read in 2001 and will be reevaluated in 2006. Access to the area only occurs through private land at the mouth of Franklin Canyon. We were denied permission to enter the area in 2001.

The Upper Franklin Canyon study samples rather high elevation (6,960 ft.) winter range near the divide between Franklin and Bromley Canyons. Slope on the site varies from 25% to 50% with a south, southwest aspect. The slope likely remains open and available to deer during all but the harshest of winters. Both deer and elk pellet groups occurred frequently in 1996. Two antler drops were observed in 1990. Livestock use includes sheep in spring and summer with no evidence of cattle in 1996. The range type is mixed mountain brush.

Soil textural analysis indicates a clay loam soil with an effective rooting depth of 14 inches. The soil is reddish colored with cobblestone throughout the profile. The soil is moderately deep, well-drained, and residually derived from a sedimentary conglomerate formation. One characteristic appears certain, runoff is rapid and the erosion hazard is correspondingly high. Game trails are abundant with bare ground found on these trails as well as within the shrub interspaces. There are no active gullies present, but soil is apparently moving downslope and accumulating on the uphill slope of shrubs, trails, and grasses. Percent bare ground has remained relatively stable since 1990 at 28% in 1996.

Three browse species are of key importance because of their preference and productivity. In order of productivity (percent cover) they include true mountain mahogany, serviceberry, and mountain snowberry. True mountain mahogany is the largest browse species with a tree like growth form. These plants are heavily utilized with noticeable high-lining. Many mature plants are tall enough to have some unavailable portions which helps maintain a satisfactory level of vigor and seed production. Estimated density for true mountain mahogany was 740 plants/acre in 1996. Decadent plants were classified in 1984 and 1990, but none were categorized as decadent in 1996. A substantial number of young mahogany suggest that this species will be able to maintain itself. Saskatoon serviceberry had an estimated density of 540 plants/acre in 1996, with 63% classified as mature and 26% classified as young. Percent decadency has declined since 1990 from 50% of the population to only 11% in 1996. Heavy utilization has declined as well. Mountain snowberry is less productive and generally not as palatable. It displays mostly light use with a density that appears stable.

Mountain big sagebrush provides additional browse forage. It was reported in 1990, that the mountain big sagebrush was very heavily utilized and excessively decadent. In 1996, the population has shifted from entirely decadent, to a population with a healthy age structure. However, it only contributes <1% of the total browse cover. Utilization has also shifted from heavy in 1984 and 1990 to light in 1996. Other browse species include stickyleaf low rabbitbrush, broom snakeweed, and slenderbush eriogonum.

Grasses are important to this site, but consist primarily as large pedestaled bunches, separated by eroded bare ground. Although, unlike much of the surrounding area, this site has a healthy stand of bluebunch wheatgrass with cheatgrass occurring in relatively low numbers. Sandberg bluegrass is also moderately abundant. Other grasses include muttongrass, Indian ricegrass, sedge, and Japanese Brome.

Many of the more abundant forbs are either annual species or biennial increasers. Stickseed and pale alyssum provide the bulk of the herbaceous cover. There was no use of either the forbs or grasses noted in 1996.

1984 APPARENT TREND ASSESSMENT

Poor soil conditions and rapid erosion result in an apparent declining soil trend and also strongly influence vegetative conditions. Vegetative trend appears to be declining due to heavy use and the inability of some species to adequately reproduce. Two of the key browse species appear to be stable. However, mountain big sagebrush seems to be disappearing.

1990 TREND ASSESSMENT

Trend for soil is down. Percent cover of bare ground has nearly doubled from 17% to 30%. Percent cover of litter has also declined substantially. Trend for browse is down slightly due to more heavy use, increased percent decadence and a decline in density of some of the key species, serviceberry, mountain big sagebrush, and true mountain mahogany. Drought conditions of the past several years are the main cause of this trend. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs has remained similar to 1984 estimates.

TREND ASSESSMENT

soil - down (1)

browse - down slightly (2)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Soil trend is stable with no noticeable accelerated erosion present in 1996. Some erosion will likely always occur on this site due to the soil characteristics and steep slope. Bare ground cover has remained similar to 1990 estimates while cover of litter, rock, and pavement have declined slightly. Browse trend is up with fewer decadent plants reported in 1996 and a lower proportion of heavily utilized plants. Browse populations appear to be stable and becoming more healthy than in the past. Grass composition is more desirable than surrounding sites that are dominated by cheatgrass. Bluebunch wheatgrass provides a bulk of the herbaceous understory cover. Forbs are dominated by annual species and do not provide much forage at this time. Herbaceous understory trend appears stable.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 05 , Study no: 5

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron spicatum	266	233	249	95	89	83	11.23
G	Bromus japonicus (a)	-	-	1	-	-	1	.03
G	Bromus tectorum (a)	-	-	173	-	-	61	2.61
G	Carex spp.	-	-	3	-	-	1	.03
G	Oryzopsis hymenoides	12	11	3	5	5	2	.24
G	Poa fendleriana	a-	a-	b13	-	-	7	.13
G	Poa secunda	a104	b183	b150	48	73	59	1.87
Total for Annual Grasses		0	0	174	0	0	62	2.64
Total for Perennial Grasses		382	427	418	148	167	152	13.50
Total for Grasses		382	427	592	148	167	214	16.15
F	Achillea millefolium	-	-	2	-	-	1	.15
F	Agoseris glauca	-	-	7	-	-	3	.01
F	Alyssum alyssoides (a)	-	-	279	-	-	89	2.21
F	Arabis spp.	-	3	6	-	2	3	.01
F	Astragalus cibarius	-	-	6	-	-	3	.04
F	Aster spp.	-	-	4	-	-	2	.01
F	Caulanthus crassicaulis	-	-	3	-	-	1	.00
F	Camelina microcarpa (a)	-	-	22	-	-	12	.20
F	Chaenactis douglasii	3	9	8	3	5	4	.07
F	Cirsium spp.	b78	b79	a41	40	43	23	1.05
F	Comandra pallida	2	3	6	2	2	2	.03
F	Crepis acuminata	-	2	5	-	1	3	.04
F	Cruciferae	-	3	-	-	1	-	-
F	Cryptantha spp.	b76	a9	a5	39	4	2	.06
F	Cymopterus spp.	-	1	7	-	1	3	.04
F	Eriogonum brevicaule	b10	ab6	a-	6	4	-	-
F	Erigeron pumilus	2	3	2	1	3	1	.00
F	Erigeron strigosus	-	-	6	-	-	3	.06
F	Haplopappus acaulis	4	2	-	1	1	-	-
F	Hackelia patens	a-	b66	b80	-	35	31	2.95
F	Holosteum umbellatum (a)	-	-	11	-	-	6	.03
F	Lappula occidentalis (a)	-	-	4	-	-	2	.01
F	Lactuca serriola	a-	a4	b24	-	1	11	.08
F	Penstemon humilis	22	17	21	10	8	15	.32

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	Phlox hoodii	6	9	7	4	5	4	.09
F	Ranunculus testiculatus (a)	-	-	175	-	-	62	.91
F	Taraxacum officinale	-	1	-	-	1	-	-
F	Tragopogon dubius	_b 16	_{ab} 7	_a 5	9	4	2	.04
F	Unknown forb-perennial	-	1	-	-	1	-	-
F	Veronica biloba (a)	-	-	68	-	-	29	.24
Total for Annual Forbs		0	0	559	0	0	200	3.61
Total for Perennial Forbs		219	225	245	115	122	117	5.10
Total for Forbs		219	225	804	115	122	317	8.72

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 05 , Study no: 5

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier alnifolia	21	3.29
B	Artemisia tridentata vaseyana	12	.06
B	Cercocarpus montanus	30	3.50
B	Chrysothamnus viscidiflorus viscidiflorus	32	2.63
B	Eriogonum microthecum	2	.03
B	Gutierrezia sarothrae	6	.64
B	Mahonia repens	27	.77
B	Symphoricarpos oreophilus	14	2.04
Total for Browse		144	13.00

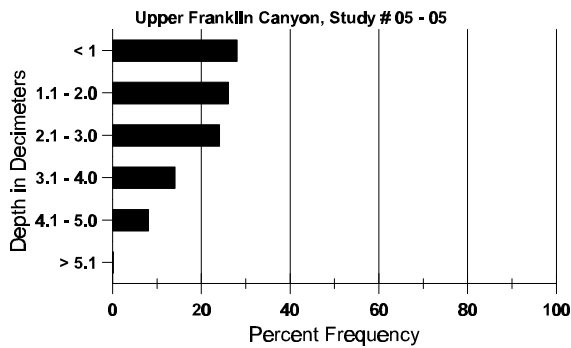
BASIC COVER --
Herd unit 05 , Study no: 5

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	372	4.50	8.00	34.61
Rock	257	17.50	17.25	13.70
Pavement	184	5.50	6.25	2.02
Litter	384	54.75	38.00	34.22
Cryptogams	69	1.25	.75	1.11
Bare Ground	276	16.50	29.75	28.37

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 05, Upper Franklin Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.3	65.8 (14.3)	7.9	40.6	32.1	27.4	2.5	3.0	28.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 05 , Study no: 5

Type	Quadrat Frequency '96
Rabbit	1
Elk	23
Deer	12

BROWSE CHARACTERISTICS --

Herd unit 05 , Study no: 5

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 alnifolia</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	3	1	1	-	-	-	-	6	-	-	-	200		6	
	96	3	1	1	2	-	-	-	-	-	7	-	-	-	140		7	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	6	-	-	1	-	-	-	7	-	-	-	233	33	17	7
	96	2	1	8	3	2	1	-	-	-	17	-	-	-	340	34	48	17
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	12	-	-	-	-	-	-	12	-	1	-	433		13	
	96	-	-	2	-	-	1	-	-	-	2	-	1	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		08%			85%			04%			-38%							
'96		15%			48%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	866		50%			
												'96	540		11%			
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	24	1	-	-	-	-	-	-	-	25	-	-	-	500		25	
M	84	-	-	5	-	-	-	-	-	-	5	-	-	-	166	24	24	5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	17	1	1	-	-	-	-	-	-	19	-	-	-	380	21	32	19
D	84	-	3	14	-	-	-	-	-	-	12	-	4	1	566		17	
	90	1	1	5	-	-	-	-	-	-	6	-	1	-	233		7	
	96	-	1	2	-	-	-	-	-	-	1	-	-	2	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	420		21	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		17%			83%			22%			-70%							
'90		14%			71%			14%			+75%							
'96		06%			06%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	765	Dec:	74%			
												'90	233		100%			
												'96	940		6%			

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				
Cercocarpus montanus																		
S	84	16	-	-	-	-	-	-	-	-	16	-	-	-	533		16	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	7	16	-	-	-	-	-	-	23	-	-	-	766		23	
	90	1	-	2	-	-	-	-	-	1	4	-	-	-	133		4	
	96	2	10	2	-	-	2	-	-	-	16	-	-	-	320		16	
M	84	-	-	79	-	-	-	-	-	-	79	-	-	-	2633	64	27	79
	90	-	-	1	-	1	1	-	-	1	4	-	-	-	133	56	38	4
	96	1	3	13	-	1	3	-	-	-	21	-	-	-	420	32	42	21
D	84	-	-	17	-	-	-	-	-	-	17	-	-	-	566		17	
	90	-	-	1	-	1	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	140		7		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		06%			94%			00%			-92%							
'90		20%			70%			00%			+55%							
'96		38%			54%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	3965	Dec:	14%			
												'90	332		20%			
												'96	740		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				
Chrysothamnus viscidiflorus viscidiflorus																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	10	-	-	-	-	-	-	-	-	10	-	-	-	333		10	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	84	25	-	-	-	-	-	-	-	-	25	-	-	-	833	12 13	25	
	90	25	12	7	1	-	1	-	-	-	44	-	2	-	1533	13 17	46	
	96	79	6	-	2	-	-	-	-	-	87	-	-	-	1740	13 26	87	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	4	-	-	-	-	-	-	-	2	-	3	-	166		5	
	96	1	-	-	-	-	-	-	-	-	-	-	1	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+56%							
'90		26%			13%			08%			- 9%							
'96		07%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	899	Dec:	0%				
											'90	2032		8%				
											'96	1840		1%				
Eriogonum microthecum																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	33	2 13	1	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	13 18	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		100%			00%			00%			+18%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	33		-				
											'96	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				
Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	9	-	-	-	-	-	-	-	-	9	-	-	-	300	5	5	9
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	6	12	5
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%			-68%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	499		7%			
												'96	160		0%			
Mahonia repens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	94	-	-	-	-	-	-	-	-	94	-	-	-	3133		94	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	47	-	-	-	-	-	-	-	-	47	-	-	-	1566		47	
	90	332	-	-	-	-	-	-	-	-	331	-	1	-	11066		332	
	96	72	-	-	-	-	-	-	-	-	72	-	-	-	1440		72	
M	84	111	-	-	-	-	-	-	-	-	111	-	-	-	3700	4	5	111
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	170	-	-	6	-	-	-	-	-	176	-	-	-	3520	3	6	176
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+53%							
'90		00%			00%			.60%			-55%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	5266	Dec:	0%			
												'90	11099		0%			
												'96	4960		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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	1	19	-	-	-	-	-	-	-	20	-	-	-	666		20	
	90	1	-	-	-	-	-	2	-	-	3	-	-	-	100		3	
	96	8	-	-	4	-	-	1	-	-	13	-	-	-	260		13	
M	84	-	16	-	-	-	-	-	-	-	16	-	-	-	533	22 12	16	
	90	3	2	-	4	-	-	2	-	-	11	-	-	-	366	22 20	11	
	96	1	3	-	5	-	-	-	-	-	9	-	-	-	180	18 36	9	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		97%			00%			00%			-58%							
'90		13%			00%			00%			- 8%							
'96		13%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1199	Dec:	0%			
												'90	499		7%			
												'96	460		4%			

Not Read

Trend Study 5-6-96

Study site name: Franklin Canyon.

Vegetation type: Big Sagebrush.

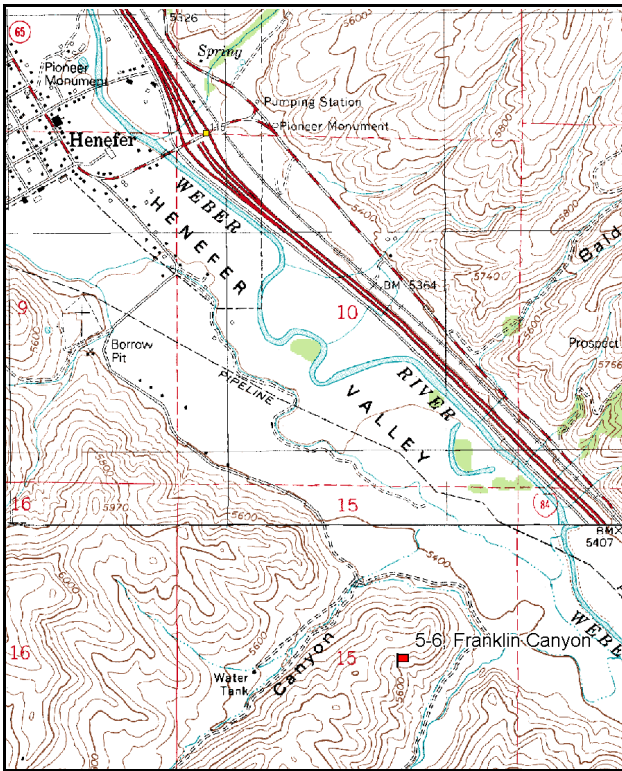
Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

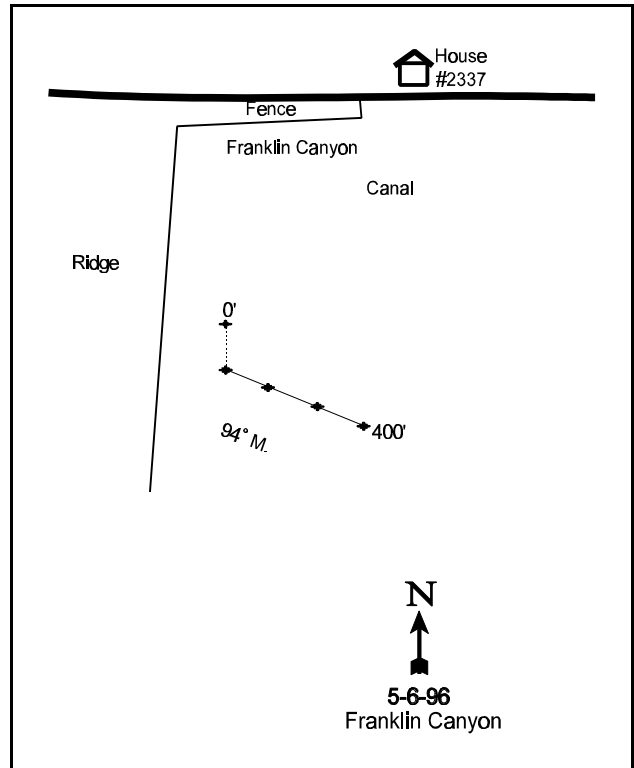
From Henefer, proceed south on the cemetery road to a farm house (No. 2333) at the mouth of Franklin Canyon. Turn right and travel up the canyon for 0.2 miles to a small grove of narrowleaf cottonwoods on the canal bank. From here walk approximately 125 yards on an azimuth of 260 degrees magnetic to the corner post on a fence line. Walk due west along the fence line past 4 large, wooden cross-braces. After the fourth brace, continue on past 3 metal fenceposts. From here walk 30 paces on an azimuth of 180 degrees the 0-foot stake of the baseline. The 0-foot stake of the baseline is marked with browse tag #7948.

Contact land owner for permission.



Map Name: Coalville

Township 3N, Range 4E, Section 15



Diagrammatic Sketch

UTM 4538214 N 459628 E

DISCUSSION

Trend Study No. 5-6

***This site was not read in 2001 and will be reevaluated in 2006. Access to the area occurs only through private land at the mouth of Franklin Canyon. We were denied permission to enter the area in 2001.

The Franklin Canyon study samples critical deer winter range near the lower end of Franklin Canyon. The site is mountain big sagebrush/grass range that has been seriously depleted by heavy livestock and some deer use in the past. Those plants on the west and south exposures (physiologically drier) appear to have the individuals most affected. Exposure at the site is east southeast with a 20-25% slope and elevation of 5,440 feet. Although big sagebrush/grass is widespread in lower Franklin Canyon, range condition varies widely. It was reported in 1990, that there were many pellet groups, heavy browse use, several antler drops, and at least 12 winter-killed deer in the area. Utilization on browse has declined since that time, although there are still many deer pellet groups in the area. Water is available about 1/4 of a mile downslope in the canal. In 1996, sheep were grazing the site and appeared to have been there for most of the spring.

Soil is rocky and classified as a sandy clay loam. Color is light brown with an effective rooting depth less than 8 inches. Soil temperature was measured at 70°F at 8 inches in depth. The soil profile has a high amount of cobblestone with some gravel as well. Current erosion is light due to the extensive litter and vegetation cover. Percent bare ground cover is low which limits most erosion.

The key browse species in this area is mountain big sagebrush. Slopes in the area with a southerly aspect are drier and dominated by cheatgrass. They contain abundant dead big sagebrush. This is usually representative of populations with winter injury in association with prolonged drought. Slopes with more northern and eastern aspects have much healthier stands of both big sagebrush and rabbitbrush. Utilization of sagebrush was extremely heavy in 1984. Vigor was poor on 15% of the plants sampled and over half (54%) of the population was decadent. Use was more moderate in 1990 but vigor was classified as poor on 43% of the sagebrush sampled and nearly 60% (57%) were decadent. In 1996, use was mostly light, vigor good and percent decadence low at only 4%. Density was estimated at 920 plants/acre in 1996, down from 2,466 plants/acre in 1990. Dead plants first sampled in 1996, number 1,100 plants/acre. It appears that most of the decadent plants sampled in 1990 are now dead.

Broom snakeweed shows an increase in density with many young plants sampled in 1996. White rubber rabbitbrush density has also increased to an estimated 940 plants/acre in 1996. Other species scattered around the site include Saskatoon serviceberry, prickly pear cactus, and mountain snowberry.

Understory composition, density, and production are dominated by cheatgrass brome and a variety of annual forbs. Sandberg bluegrass sum of nested frequency is nearly the same as measured in 1990, with other grasses occurring rarely. Perennial or biennial forbs occur occasionally. The most prevalent are yellow salsify, lupine, Utah milkvetch, thistle, and Louisiana sagebrush. Annual forbs include storksbill, pale alyssum, *Holosteum*. This study site has a high fire hazard due to the abundance of dry cheatgrass.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable only because of a dense litter cover. Soil depth and/or fertility are not the factors limiting development of a more desirable and productive plant community. Vegetative trend appears down due to excessive utilization of the major browse species and past depletion of perennial understory plants and their subsequent replacement by annual invaders. This has been exacerbated by the dry, steep aspect. Under these conditions, a destructive fire is a very real possibility.

1990 TREND ASSESSMENT

Density of mountain big sagebrush has increased 30%. However, age classifications indicate some changes in the population. In 1984, there were 466 mature sagebrush/acre and a high percentage of decadent plants. The 1990 reading found a stand with 266 mature sagebrush/acre and abundant seedlings. Sagebrush canopy cover averages 6%. Density depends on aspect. The shrubs are all dead on the south slopes (refer to discussion above on wintering injuries to sagebrush). Classified as moderately hedged in 1990, compared to the heavily hedged growth form noted in 1984, the sagebrush still have reduced vigor and a low amount of new growth. The data shows some improvements in the herbaceous vegetation, especially the large increase in the frequency of perennial grass. The ground cover changes indicate a decline in the percentage of litter cover and an increase in bare soil. The dense cheatgrass cover provides ephemeral protection. There is little evidence of soil erosion.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - up slightly but dominated by annuals (4)

1996 TREND ASSESSMENT

Soil trend is stable with very little bare ground cover. Although litter cover has declined since 1990, there is abundant vegetative cover to prevent erosion at this time. Browse trend is still down, even though there are fewer decadent plants reported in 1996 and a lower proportion of heavily utilized plants classified. Fifty-four percent of the population is dead. Browse populations appear to be gaining stability and may be more healthy than in the past. Grass composition is dominated by cheatgrass. Forbs are dominated by annual species and do not provide much forage at this time. Herbaceous understory trend is stable.

TREND ASSESSMENT

soil - stable (3)

browse - slightly downward (2)

herbaceous understory - stable, but still very poor (3)

HERBACEOUS TRENDS --

Herd unit 05 , Study no: 6

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	ab12	a4	b15	6	2	9	.26
G	Bromus tectorum (a)	-	-	381	-	-	100	16.79
G	Oryzopsis hymenoides	2	-	3	1	-	2	.16
G	Poa secunda	a7	b227	b228	4	84	79	8.21
G	Vulpia octoflora (a)	-	-	3	-	-	1	.00
Total for Annual Grasses		0	0	384	0	0	101	16.79
Total for Perennial Grasses		21	231	246	11	86	90	8.64
Total for Grasses		21	231	630	11	86	191	25.44

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	<i>Alyssum alyssoides</i> (a)	-	-	191	-	-	67	.68
F	<i>Artemisia ludoviciana</i>	a ⁹	ab ¹³	b ²⁶	3	5	10	.46
F	<i>Astragalus cibarius</i>	a ⁻	a ⁻	b ¹⁵	-	-	5	.07
F	<i>Astragalus utahensis</i>	a ⁵	a ⁵	b ²⁸	3	3	16	.76
F	<i>Camelina microcarpa</i> (a)	-	-	3	-	-	1	.00
F	<i>Cirsium</i> spp.	a ⁻	a ⁸	b ³⁷	-	4	21	1.10
F	<i>Collomia linearis</i> (a)	-	-	5	-	-	3	.04
F	<i>Collinsia parviflora</i> (a)	-	-	14	-	-	6	.03
F	<i>Cymopterus</i> spp.	a ⁻	a ⁻	b ³³	-	-	17	.08
F	<i>Draba</i> spp. (a)	-	-	29	-	-	12	.06
F	<i>Erodium cicutarium</i> (a)	-	-	187	-	-	69	3.17
F	<i>Erigeron eatonii</i>	-	-	3	-	-	1	.00
F	<i>Erigeron pumilus</i>	1	-	-	1	-	-	-
F	<i>Erigeron strigosus</i>	a ⁻	a ⁻	b ¹⁵	-	-	6	.42
F	<i>Grindelia squarrosa</i>	-	-	4	-	-	2	.03
F	<i>Holosteum umbellatum</i> (a)	-	-	161	-	-	58	.44
F	<i>Lactuca serriola</i>	a ⁻	a ⁻	b ¹²⁴	-	-	56	.70
F	<i>Lomatium</i> spp.	-	4	-	-	2	-	-
F	<i>Lupinus sericeus</i>	ab ⁴³	b ⁷³	a ²⁹	20	33	16	1.61
F	<i>Machaeranthera canescens</i>	a ⁻	a ⁻	b ²²	-	-	11	.08
F	<i>Phlox longifolia</i>	-	-	3	-	-	1	.00
F	<i>Polygonum douglasii</i> (a)	-	-	5	-	-	2	.01
F	<i>Ranunculus testiculatus</i> (a)	-	-	2	-	-	1	.00
F	<i>Sisymbrium altissimum</i> (a)	-	-	19	-	-	7	.55
F	<i>Sphaeralcea coccinea</i>	-	-	-	-	-	-	.00
F	<i>Taraxacum officinale</i>	a ⁻	a ⁻	b ²²	-	-	10	.29
F	<i>Tragopogon dubius</i>	a ²⁹	a ¹³	b ¹⁹⁴	16	8	79	1.53
F	<i>Vicia americana</i>	-	-	1	-	-	1	.00
Total for Annual Forbs		0	0	616	0	0	226	5.00
Total for Perennial Forbs		87	116	556	43	55	252	7.20
Total for Forbs		87	116	1172	43	55	478	12.21

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 05 , Study no: 6

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia tridentata vaseyana	26	1.99
B	Chrysothamnus nauseosus albicaulis	30	3.64
B	Chrysothamnus viscidiflorus viscidiflorus	5	.38
B	Gutierrezia sarothrae	18	.64
B	Opuntia spp.	6	.07
Total for Browse		85	6.72

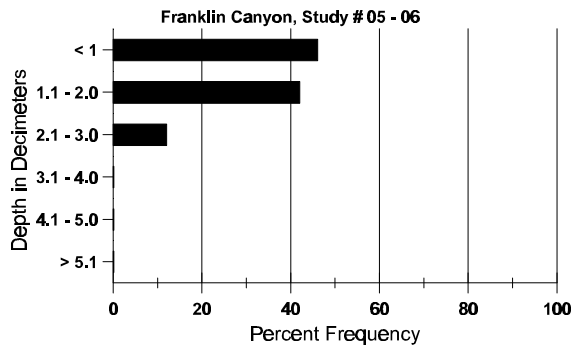
BASIC COVER --
Herd unit 05 , Study no: 6

Cover Type	Nested Frequency	Average Cover %		
		'96	'84	'90
Vegetation	396	1.00	2.50	55.50
Rock	169	.50	1.25	4.57
Pavement	245	4.75	11.50	3.75
Litter	397	92.50	76.50	46.90
Cryptogams	59	.25	.25	.53
Bare Ground	178	1.00	8.00	1.74

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 06, Franklin Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
7.6	70.2 (8.1)	7.2	56.7	22.0	21.3	2.8	26.6	166.4	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 05 , Study no: 6

Type	Quadrat Frequency '96
Sheep	3
Rabbit	1
Deer	52
Cattle	9

BROWSE CHARACTERISTICS --

Herd unit 05 , Study no: 6

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 alnifolia																	
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'90	-	-	-	-	1	-	-	-	-	-	-	-	1	66		1
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
'84		00%			00%			00%									
'90		100%			00%			00%									
'96		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%		
												'90	66		100%		
												'96	0		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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	69	-	-	-	-	-	-	-	-	69	-	-	-	4600			69
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	90	9	3	-	-	-	-	-	-	-	12	-	-	-	800			12
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	84	-	1	6	-	-	-	-	-	-	7	-	-	-	466	29	35	7
	90	-	4	-	-	-	-	-	-	-	2	2	-	-	266	22	23	4
	96	37	2	-	-	-	-	-	-	-	27	-	-	-	780	25	29	39
D	84	-	1	13	-	-	-	-	-	-	10	-	3	1	933			14
	90	2	16	3	-	-	-	-	-	-	5	-	-	16	1400			21
	96	1	-	-	-	1	-	-	-	-	1	-	-	1	40			2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1100			55
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		08%			73%			15%			+30%							
'90		62%			08%			43%			-63%							
'96		07%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	1732	Dec:	54%				
											'90	2466		57%				
											'96	920		4%				
<i>Chrysothamnus nauseosus albicaulis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	3	1	-	-	-	-	-	-	-	4	-	-	-	266			4
	96	4	-	-	2	-	-	-	-	-	6	-	-	-	120			6
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	37	1	-	3	-	-	-	-	-	40	-	1	-	820	25	37	41
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		25%			00%			00%			+72%							
'96		02%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	266		-				
											'96	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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	3	1	-	-	-	-	-	-	-	1	-	3	-	266	11	14	4
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	11	17	5
D	84	-	3	9	-	-	-	-	-	-	-	12	-	-	800		12	
	90	5	10	1	-	-	-	-	-	-	5	-	-	11	1066		16	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		25%			75%			00%			+40%							
'90		55%			05%			70%			-91%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	800	Dec:	100%			
												'90	1332		80%			
												'96	120		0%			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	87	-	-	-	-	-	-	-	-	87	-	-	-	1740		87	
Y	84	-	3	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	82	-	-	-	-	-	-	-	-	82	-	-	-	1640		82	
M	84	1	4	-	-	-	-	-	-	-	1	4	-	-	333	11	16	5
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	9	8	4
	96	21	-	-	-	-	-	-	-	-	21	-	-	-	420	7	11	21
D	84	-	-	11	-	-	-	-	-	-	-	11	-	-	733		11	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		37%			58%			00%			-63%							
'90		00%			00%			00%			+78%							
'96		00%			00%			.95%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1266	Dec:	58%			
												'90	466		0%			
												'96	2100		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				
Opuntia spp.																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66	7	6	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180	4	11	9
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		100%			00%			00%			+50%							
'90		00%			00%			50%			+34%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	132		50%			
												'96	200		10%			
Symphoricarpos oreophilus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	57	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

Trend Study 5-8-01

Study site name: Barnard Creek.

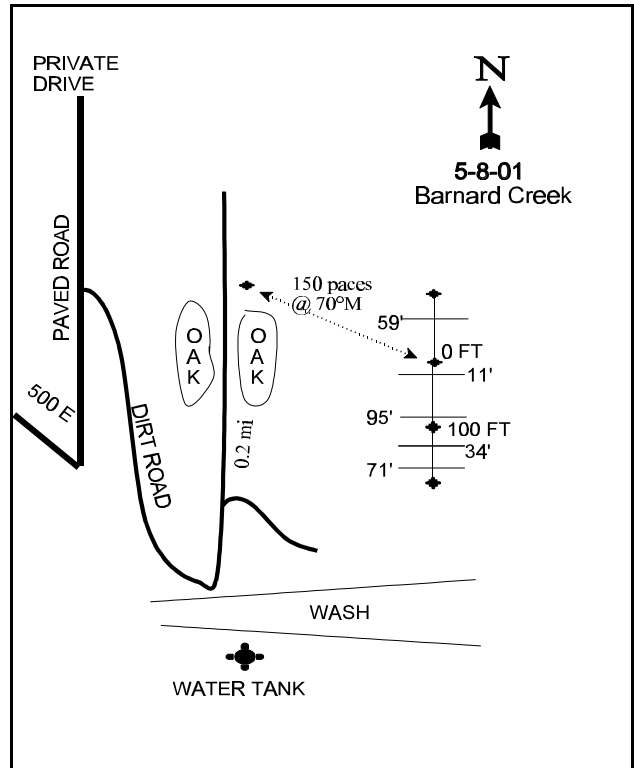
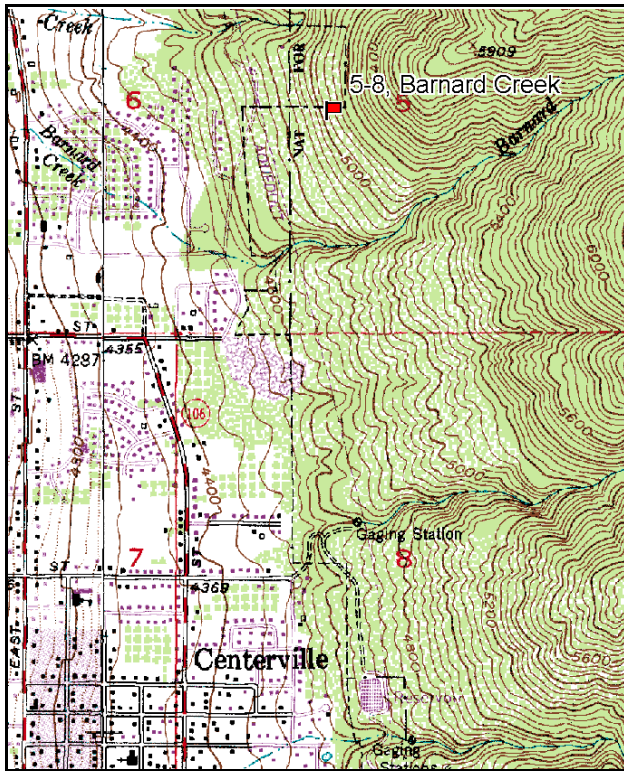
Vegetation type: Bitterbrush.

Compass bearing: frequency baseline 166 degrees magnetic.

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

LOCATION DESCRIPTION

From U-106 in Centerville (400 East) take Barnard Street (1200 North) east to Oak Ridge Drive. Turn left on Oak Ridge to 500 East and stop. Take a bearing of 53 degrees magnetic from the northwest corner of this intersection to locate the transect up the first hill below a band of oak and boulders. Continue along Oak Ridge Drive for 0.2 miles, take a hairpin turn to the right and go 0.2 miles along the Weber Basin Pipeline to a fork in the road. Take the left fork and go 0.2 miles around a bend to a fork. Continue left on a two track 0.2 miles to a witness post on the right just after a patch of oak. The transect is 150 paces up the slope at a bearing of 70 degrees magnetic. The 0-foot baseline has browse tag #58 attached. The baseline runs 166 degrees magnetic. The 300 foot line runs off the 0-foot baseline stake at a bearing of 360 degrees magnetic.



Map Name: Bountiful Peak

Diagrammatic Sketch

Township 2N, Range 1E, Section 5

UTM 4531803 N 427123 E

DISCUSSION

Trend Study No. 5-8

The Barnard Creek study is located on critical deer winter range on the Wasatch Face above Centerville. It samples an isolated bitterbrush population on a steep, west facing slope at an elevation of 5,000 feet. The transect is about 1,000 feet from the nearest residence. The transect is located on private land near the National Forest Service boundary. Deer use is heavy and the range has shown some signs of intense utilization during past readings. Some elk also appear to winter on this slope. A pellet group transect read on the site in 2001, estimated 46 deer and 5 elk days use/acre (114 ddu/ha and 12 edu/ha).

The soil is moderately deep and gravelly with an effective rooting depth of over 33 inches. It has a deep layer of litter and organic matter built up under the shrubs. The soil has a sandy loam texture with a neutral soil reaction (7.0 pH). Average soil temperature at about 18 inches is only 53° F. Phosphorous is low at only 5.7 ppm. This could be a limiting factor as values less than 10 ppm can limit plant growth and development. The soil is easily disturbed and erosion potential is high. Vegetation and litter cover are high and help limit most erosion. The erosion condition class was determined as stable in 2001. There is easy access for ORVs and their frequent use has led to increased erosion and possibly harassment of wintering big game animals.

Antelope bitterbrush and mountain big sagebrush are the key species on the study area. Bitterbrush is the dominant browse species, providing 83% of the browse cover in 1996 and 76% in 2001. The bitterbrush plants are large and vigorous with an average height of nearly 4 feet and a crown of about 6 feet. Although many are partly decadent, there is good annual leader growth which averaged 2.3 inches in 2001. These plants were heavily hedged in 1985 and most show moderate hedging since then. No reproduction of the bitterbrush is apparent but is not critical at this time for they are long-lived and in good vigor. They can also reproduce by layering. Mountain big sagebrush is of secondary importance. It has been only lightly hedged and exhibits good vigor. However, reproduction has been poor since 1990.

The herbaceous understory is totally dominated by cheatgrass which provided 97% of the total grass cover and 86% of the total herbaceous cover in 1996. During the 2000 reading, cheatgrass produced 93% of the grass cover and 78% of the total herbaceous cover. Average cover of cheatgrass is high averaging over 30%, which creates a substantial fire hazard. The density of perennial grasses is extremely low. Perennial grasses presently include bluebunch wheatgrass, purple threeawn, Sandberg bluegrass, and sand dropseed. A variety of forbs can be found, but they are not abundant. Common species include Pale alyssum, storksbill, hairy goldaster, Douglas knotweed, and Louisiana sage. There is a general lack of herbaceous forage which would important to deer in the spring.

1985 APPARENT TREND ASSESSMENT

The vegetative trend appears stable to slowly downward. Most of the key browse species are old, but very vigorous. It would be desirable to see more reproduction among the key browse species. An increase in perennial herbaceous vegetation is also desirable, but unlikely to occur because of the erosion problem. The soil condition will continue to decline, especially in the face of increasing ORV use.

1990 TREND ASSESSMENT

Contrary to the downward trends indicated for the low density browse component on this foothill winter range study, the mountain big sagebrush and bitterbrush populations appear relatively stable. An increased density of the moderately hedged, vigorous bitterbrush was found, including several young plants. Mountain big sagebrush has continued to decline in density, but 54% of the population were classified as young plants.

Sagebrush canopy cover in the oak brush openings is about 2%. The understory is dominated by cheatgrass and storksbill. Perennial grasses and forbs remain uncommon or scarce. Good ground cover helps limit erosion.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down slightly and in very poor condition (2)

1996 TREND ASSESSMENT

Although the soil on this site is highly erodible, there is little evidence of recent erosion. Vegetative and litter cover are adequate at this time to hold the soil in place, except in extreme cases. With percent bare ground, rock, and pavement cover decreasing, soil trend is slightly upward. The key browse species are antelope bitterbrush which makes up 83% of the browse cover and mountain big sagebrush which contributes 16% of the browse cover. Bitterbrush utilization is light to moderate with apparently good vigor. There were no seedlings or young found but percent decadence is low at only 3%. The browse trend is stable. The herbaceous understory is sparse with the exception of cheatgrass. Cheatgrass provides much of the vegetative cover, consequently also much of the litter cover. Fire potential is very high on this site with abundant fine fuels to carry the fire. Herbaceous understory trend is stable, but in poor condition because of the high proportion of weedy species.

TREND ASSESSMENT

soil - slightly upward (4)

browse - stable (3)

herbaceous understory - stable, but very poor (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Average cover of bare ground increased slightly while litter cover declined. However, vegetation cover increased and there is ample protective ground cover to prevent most erosion. In addition, the erosion condition class was determined as stable. Trend for the key browse species, antelope bitterbrush, is stable. Utilization is moderate to heavy but vigor is normal and percent decadence low. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses and forbs has increased and the nested frequency of annual cheatgrass has declined significantly. The herbaceous understory is still in very poor condition however. Perennial grasses and forbs are still limited and cheatgrass still dominates the site by providing 78% of the total herbaceous cover. Cheatgrass has an average cover value of 31% which creates a substantial fire hazard. A fire in this area would totally eliminate bitterbrush and sagebrush and leave the area totally useless as big game winter range.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up slightly but still dominated by cheatgrass (4)

HERBACEOUS TRENDS --

Herd unit 05 , Study no: 8

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
G	Agropyron spicatum	8	3	15	14	3	2	7	9	.67	.90
G	Aristida purpurea	-	2	5	9	-	1	3	4	.09	.36
G	Bromus tectorum (a)	-	-	_b 392	_a 378	-	-	100	100	36.54	30.96
G	Festuca myuros (a)	-	-	-	5	-	-	-	2	-	.03
G	Poa bulbosa	_a 3	_a -	_a -	_b 18	1	-	-	9	-	.20
G	Poa fendleriana	3	3	-	-	2	1	-	-	-	-
G	Poa secunda	_a -	_a -	_b 12	_c 32	-	-	7	14	.10	.66
G	Sporobolus cryptandrus	_a -	_{ab} 12	_{ab} 4	_b 8	-	4	2	5	.30	.27
G	Stipa comata	-	2	-	-	-	1	-	-	-	-
Total for Annual Grasses		0	0	392	383	0	0	100	102	36.54	30.99
Total for Perennial Grasses		14	22	36	81	6	9	19	41	1.16	2.40
Total for Grasses		14	22	428	464	6	9	119	143	37.70	33.39
F	Agoseris glauca	-	-	-	1	-	-	-	1	-	.03
F	Alyssum alyssoides (a)	-	-	_b 29	_a 8	-	-	12	3	.10	.06
F	Allium spp.	_b 11	_a -	_a 2	_c 52	6	-	1	26	.00	.38
F	Ambrosia psilostachya	-	-	9	1	-	-	4	1	.27	.00
F	Artemisia ludoviciana	_b 49	_a 21	_a 11	_a 11	15	10	5	4	.36	.33
F	Aster chilensis	_c 63	_a -	_a -	_b 8	29	-	-	6	-	.03
F	Chenopodium album (a)	-	6	-	-	-	3	-	-	-	-
F	Cynoglossum officinale	-	-	3	-	-	-	1	-	.00	-
F	Descurainia pinnata (a)	-	-	-	2	-	-	-	2	-	.01
F	Draba spp. (a)	-	-	_a -	_b 59	-	-	-	23	-	.26
F	Epilobium brachycarpum (a)	_b 24	_a -	_a 4	_a 11	13	-	2	4	.01	.12
F	Erigeron caespitosus	5	3	-	-	2	1	-	-	-	-
F	Erodium cicutarium (a)	_b 18	_a -	_a -	_c 79	7	-	-	32	-	1.77
F	Euphorbia spp.	-	-	3	1	-	-	1	1	.00	.00
F	Gilia spp. (a)	-	-	-	5	-	-	-	2	-	.03
F	Helianthus annuus (a)	-	6	-	7	-	3	-	4	-	.02
F	Heterotheca villosa	40	46	38	38	20	19	16	20	3.22	3.36
F	Holosteum umbellatum (a)	-	-	-	18	-	-	-	8	-	.41
F	Isatis tinctoria	_a -	_a -	_b 9	_c 31	-	-	6	16	.31	1.13
F	Lactuca serriola	_a -	_b 28	_a 2	_a -	-	14	1	-	.00	-
F	Linaria dalmatia	_a -	_a -	_a 1	_b 6	-	-	1	3	.15	.36
F	Machaeranthera spp	-	-	1	-	-	-	1	-	.00	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
F	Phlox longifolia	-	-	-	4	-	-	-	2	-	.01
F	Polygonum douglasii (a)	-	-	_b 28	_a -	-	-	13	-	.14	-
F	Portulaca oleracea	-	3	-	-	-	1	-	-	-	-
F	Salsola iberica (a)	-	8	-	2	-	4	-	1	-	.03
F	Tragopogon dubius	_a -	_a 1	_b 17	_a 2	-	1	9	1	.17	.06
F	Unknown forb-perennial	3	-	-	-	1	-	-	-	-	-
F	Verbascum blattaria	-	-	2	-	-	-	1	-	.00	-
Total for Annual Forbs		42	20	61	191	20	10	27	79	0.26	2.74
Total for Perennial Forbs		171	102	98	155	73	46	47	81	4.52	5.72
Total for Forbs		213	122	159	346	93	56	74	160	4.79	8.46

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 05 , Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	25	27	2.73	5.09
B	Gutierrezia sarothrae	8	2	.06	-
B	Opuntia spp.	2	2	-	-
B	Purshia tridentata	27	36	14.06	16.55
Total for Browse		62	67	16.86	21.65

BASIC COVER --

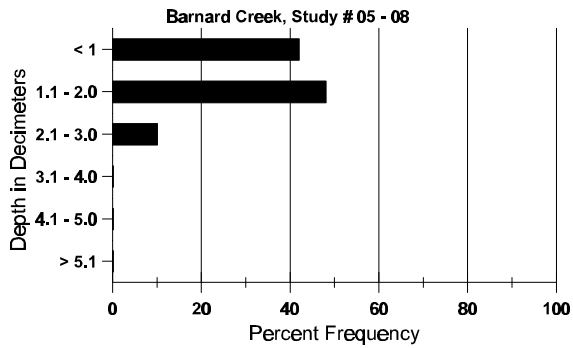
Herd unit 05 , Study no: 8

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'85	'90	'96	'01
Vegetation	393	382	7.25	4.75	55.25	60.27
Rock	180	157	5.00	6.50	5.85	5.56
Pavement	137	179	12.50	13.25	3.92	4.43
Litter	394	374	38.00	61.25	55.74	48.18
Cryptogams	22	7	0	0	.12	.06
Bare Ground	52	137	37.25	14.25	.56	6.14

SOIL ANALYSIS DATA --
 Herd Unit 05, Study no: 08, Barnard Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
33.5	53.0 (18.1)	7.0	60.9	19.1	20.0	1.1	5.7	118.4	.3

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 05 , Study no: 8

Type	Quadrat Frequency	
	'96	'01
Deer	20	19
Elk	-	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
600	46 (114)
61	5 (12)

BROWSE CHARACTERISTICS --

Herd unit 05 , Study no: 8

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 tridentata vaseyana																		
S	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	4	12	-	-	-	-	-	-	-	15	-	1	-	1066	26 40	16	
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133	13 22	2	
	96	21	4	-	2	-	-	-	-	-	27	-	-	-	540	19 35	27	
	01	29	-	-	-	-	-	-	-	-	29	-	-	-	580	27 40	29	
D	85	-	1	2	-	-	-	-	-	-	2	-	1	-	200		3	
	90	1	2	-	1	-	-	-	-	-	4	-	-	-	266		4	
	96	4	2	-	-	-	-	-	-	-	5	-	-	1	120		6	
	01	9	-	-	-	-	-	-	-	-	8	-	-	1	180		9	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	440		22	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	500		25	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		65%			10%			10%			-35%							
'90		23%			00%			00%			-21%							
'96		18%			00%			03%			+13%							
'01		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1332	Dec:	15%			
												'90	865		31%			
												'96	680		18%			
												'01	780		23%			

A G R E	Y 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				
Gutierrezia sarothrae																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140	13	19	7
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	11	14	4
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			-60%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-				
											'90	0		-				
											'96	200		-				
											'01	80		-				
Opuntia spp.																		
M	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66	7	17	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	6	12	2
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	10	17	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	66	Dec:	-				
											'90	0		-				
											'96	40		-				
											'01	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				
Purshia tridentata																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	-	-	1	-	-	-	-	-	-	1	-	-	-	66	36	51	1
	90	2	3	-	-	-	-	-	-	-	5	-	-	-	333	50	66	5
	96	9	20	-	-	-	-	-	-	-	29	-	-	-	580	43	73	29
	01	13	33	13	-	-	-	-	-	-	58	1	-	-	1180	40	67	59
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			100%			00%			+83%							
'90		50%			00%			00%			+34%							
'96		70%			00%			00%			+51%							
'01		56%			21%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	0%			
												'90	399		0%			
												'96	600		3%			
												'01	1220		3%			

Trend Study 5-9-01

Study site name: Davis Co. Rifle Range.

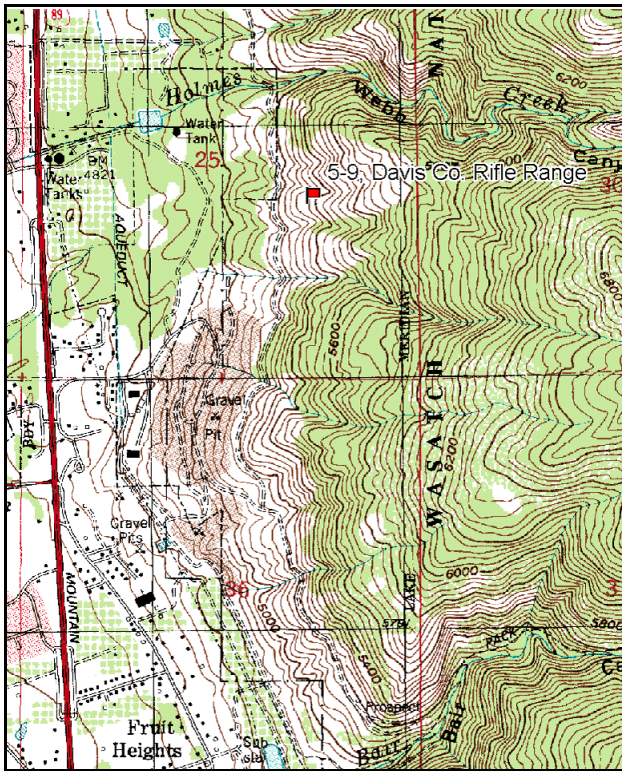
Vegetation type: Bitterbrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

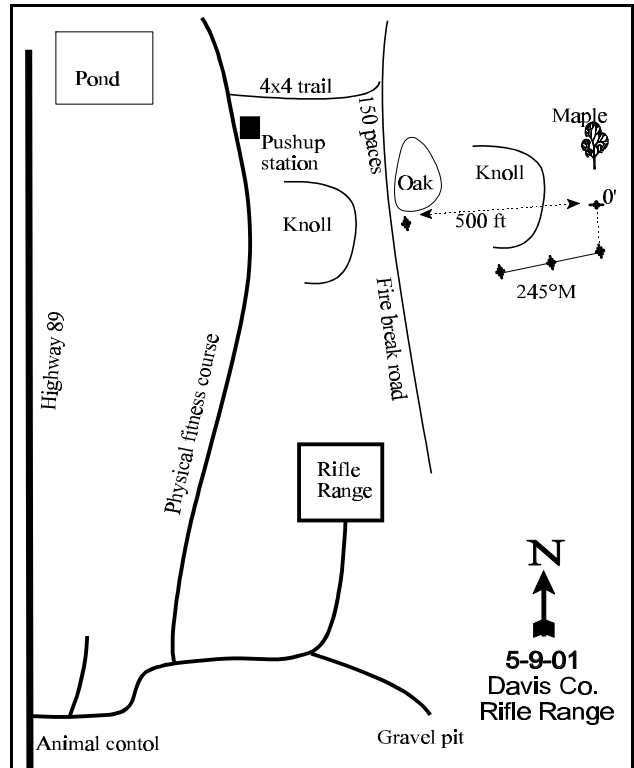
LOCATION DESCRIPTION

Take Highway 89 into Davis County. Turn east up the road toward the Animal Control and the Davis County Rifle Range. Go east past the Animal Control Center to a dirt road marked "Par Course". Follow this road 0.45 miles north to a well-developed trail going east. Walk up the trail to a fire break road, then follow the fire break road south 150 paces to a rebar witness post 10 feet south of an oak clone. From the witness post, head due east 500 feet up a bare ridge, then across to a lone maple. A rebar tagged #7081 marks the 0-foot baseline. The baseline doglegs west (245 degrees magnetic) after 100 feet.



Map Name: Kaysville

Township 4N, Range 1W, Section 25



Diagrammatic Sketch

UTM 4544690 N 424627 E

DISCUSSION

Trend Study No. 5-9

The Davis County Rifle Range trend study is located on a slope above gravel pits and the Davis County Rifle range. This transect samples an area of open, mixed brush range. The 40% slope has a western exposure with an elevation of 5,600 feet. Like other Forest Service land along the Wasatch Front, livestock grazing has been discontinued in order to protect the watershed values. Although there are many roads, the distance to housing developments is greater here than other transects along the Wasatch Front. Therefore, human pressure is relatively low. Deer pellet groups were very abundant in 1985 and 1990. A pellet group transect read on the site in 2001 estimated 67 deer use days/acre (165 ddu/ha). Most of the deer pellet groups appear to be from late winter use with some from early spring. Some coyote scat was seen on site but not encountered within the pellet group transect.

The soil is in the highly erosion-susceptible Ridd series (USDA 1968). It is underlain by bedrock at a depth of 25 to 40 inches. Effective rooting depth was estimated at 37 inches in 2001. The soil is a rocky sandy loam with a majority of the surface protected by vegetation, litter and a buildup of organic matter. Some erosion is apparent in the form of pedestalling of soil around shrubs, flow patterns, rills, and some localized soil movement. The erosion condition class was determined as slight in 2001.

Moderate quantities of quality browse forage are available on this slope. Antelope bitterbrush dominates the browse component by providing 68% of the browse cover in 2001. It is highly preferred and displayed heavy hedging in 1985. Utilization was moderate to heavy in 1990 and 2001. The plants are large and vigorous and there was adequate regeneration during past readings but no seedlings or young were encountered in 2001.

Mountain big sagebrush is moderately abundant but produces only 24% of the browse cover with an average cover value of 6% in 2001. The population was moderate to heavily browsed in 1985. It displayed poor vigor on 18% of the plants sampled and percent decadence was high at 41%. Utilization has been light since and vigor improved. The only other browse sampled includes small numbers of Wyeth eriogonum, broom snakeweed, and prickly pear cactus.

The herbaceous understory is dominated by cheatgrass which provided nearly half (46%) of the grass cover. The low value perennial, bulbous bluegrass is also abundant. It produces an average of 14% cover. Preferred perennial grasses occur in low numbers, with mutton bluegrass and bluebunch wheatgrass being the most common.

Forbs are diverse and moderately abundant. However, composition is poor with annuals providing 83% of the forb cover in 2001. The most abundant annual is storksbill which currently provides 80% of the forb cover. The only common perennial is the weedy yellow salsify. Utilization of all herbaceous species is generally light.

1985 APPARENT TREND ASSESSMENT

As with many locations along the Wasatch Front, there appears to be a slow decline in the browse component of each community. The grasses are lightly utilized and increasing faster than the slow-reproducing sagebrush and bitterbrush. The soil is relatively stable.

1990 TREND ASSESSMENT

The data comparisons from this site illustrate the slow decline of browse, especially big sagebrush, found in most places along the Wasatch Front. The mountain big sagebrush has decreased in density. Sagebrush canopy cover averages 2%. However, vigor is fair and recent lighter use has resulted in lightly hedged growth forms on the mature plants. Young plants of sagebrush and bitterbrush were found. The bitterbrush is more heavily hedged and it has declined slightly in density. It remains to be seen if the young plants can replace the steady loss of older shrubs on this moderately to heavily used winter range. There is competition in the understory from the abundant cheatgrass and small bluegrasses. As in 1985, yellow salsify is the only common perennial forb. Litter cover is high due to the abundance of annuals. Considerable soil movement occurs on the 40% slope. Active gullies cross the site.

TREND ASSESSMENT

soil - stable but poor (3)

browse - down slightly (2)

herbaceous understory - stable, but dominated by annuals (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Percent cover for bare ground declined slightly but litter cover also declined. There is adequate protective ground cover on the site to prevent most erosion. Some erosion is inevitable considering the terrain. Trend for the key browse, bitterbrush and mountain big sagebrush is up slightly for sagebrush and stable for bitterbrush. Sagebrush has increased slightly in density and displays a decline in percent decadence. Reproduction is poor but young plants currently account for 8% of the population. Bitterbrush remains at a similar density. Utilization remains moderate to heavy but vigor is good and percent decadence has declined to only 8%. Annual leader growth averages 2 inches which is nearly an inch below the unit average. Recruitment is poor with no young plants sampled. Dry conditions combined with competition from the weedy understory are likely having a negative effect of seedling establishment. However, these are long lived plants and a return to normal precipitation patterns could reverse this trend. Overall, the browse trend is considered stable. Trend for the herbaceous understory is down slightly. Sum of nested frequency of perennials has increased slightly but the increase comes primarily from bulbous bluegrass, a low value increaser. Cheatgrass, bulbous bluegrass, and the annual forb storksbill totally dominate the herbaceous understory by providing 86% of the total herbaceous cover. Nested frequency of mutton bluegrass, the most abundant preferred perennial, declined significantly. Bluebunch wheatgrass also declined in nested frequency.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down slightly and dominated by annuals (2)

HERBACEOUS TRENDS --
Herd unit 05 , Study no: 9

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'01	'85	'90	'01	'01
G	Agropyron spicatum	28	38	27	11	17	14	1.51
G	Bromus brizaeformis (a)	-	-	25	-	-	10	.12
G	Bromus tectorum (a)	-	-	293	-	-	88	15.16
G	Carex spp.	-	-	3	-	-	1	.03
G	Festuca myuros (a)	-	-	6	-	-	2	.03
G	Poa bulbosa	_a 58	_b 136	_c 222	20	48	69	13.56
G	Poa secunda	_c 202	_b 118	_a 84	70	50	28	2.18
Total for Annual Grasses		0	0	324	0	0	100	15.32
Total for Perennial Grasses		288	292	336	101	115	112	17.30
Total for Grasses		288	292	660	101	115	212	32.62
F	Agoseris glauca	_b 25	_a -	_a 3	13	-	1	.00
F	Alyssum alyssoides (a)	-	-	47	-	-	21	.11
F	Allium spp.	_b 35	_a -	_a 11	18	-	4	.05
F	Astragalus spp.	5	-	-	3	-	-	-
F	Cirsium undulatum	3	5	10	1	3	4	.36
F	Collomia linearis (a)	-	-	1	-	-	1	.00
F	Crepis acuminata	_b 10	_a 2	_{ab} 8	7	2	4	.15
F	Cymopterus spp.	33	16	12	14	7	6	.10
F	Epilobium brachycarpum (a)	_b 112	-	_a 12	47	-	5	.02
F	Erigeron caespitosus	3	-	-	1	-	-	-
F	Erodium cicutarium (a)	_a 10	-	_b 194	5	-	64	7.44
F	Hackelia patens	-	-	3	-	-	1	.03
F	Holosteum umbellatum (a)	-	-	60	-	-	23	.17
F	Larrea divaricata	-	-	3	-	-	2	.03
F	Lomatium spp.	-	-	4	-	-	3	.05
F	Polygonum douglasii (a)	-	-	7	-	-	3	.01
F	Tragopogon dubius	_b 146	_a 51	_a 44	65	25	18	.75
F	Unknown forb-perennial	3	-	-	1	-	-	-
Total for Annual Forbs		122	0	321	52	0	117	7.76
Total for Perennial Forbs		263	74	98	123	37	43	1.55
Total for Forbs		385	74	419	175	37	160	9.31

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 05 , Study no: 9

Type	Species	Strip Frequency	Average Cover %
		'01	'01
B	Artemisia tridentata vaseyana	33	6.01
B	Eriogonum heracleoides	7	.79
B	Gutierrezia sarothrae	14	1.24
B	Opuntia polyacantha	2	.00
B	Purshia tridentata	26	16.82
B	Quercus gambelii	0	.03
Total for Browse		82	24.90

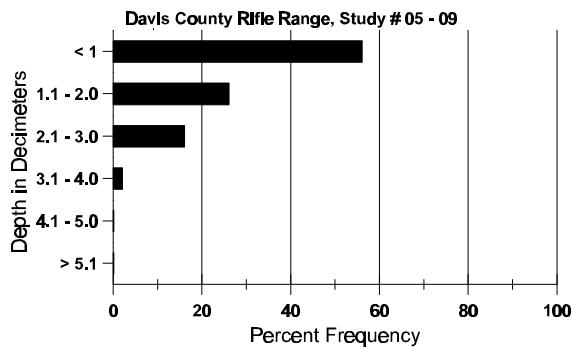
BASIC COVER --
Herd unit 05 , Study no: 9

Cover Type	Nested Frequency	Average Cover %		
	'01	'85	'90	'01
Vegetation	386	9.50	4.75	63.66
Rock	87	3.25	1.75	2.98
Pavement	166	11.75	12.00	8.18
Litter	374	53.50	73.25	53.75
Cryptogams	1	0	.50	.00
Bare Ground	111	22.00	7.75	4.78

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 09, Davis County Rifle Range

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
37.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 05 , Study no: 9

Type	Quadrat Frequency	Pellet Transect	
		Pellet Groups per Acre	Days Use per Acre (ha)
	'01	'01	'01
Rabbit	4	26	N/A
Deer	13	870	67 (165)

BROWSE CHARACTERISTICS --

Herd unit 05 , 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 vaseyana																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	2	1	-	-	-	-	-	-	-	2	-	1	-	200			3
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	01	3	-	-	1	-	-	-	-	-	4	-	-	-	80			4
M	85	4	2	1	-	-	-	-	-	-	7	-	-	-	466	24	26	7
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	16	26	4
	01	41	4	-	1	-	-	-	-	-	46	-	-	-	920	21	33	46
D	85	-	4	3	-	-	-	-	-	-	5	-	2	-	466			7
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	01	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	380			19
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		41%			24%			18%			-30%							
'90		00%			00%			00%			+25%							
'01		08%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1132	Dec:	41%			
												'90	798		33%			
												'01	1060		6%			

A G R E	Y 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 heracleoides</i>																		
Y	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133	10	13	2
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200	7	17	3
	01	8	-	-	1	-	-	-	-	-	8	1	-	-	180	8	16	9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+ 0%							
'90		00%			00%			00%			-32%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	266	Dec:	-			
												'90	266		-			
												'01	180		-			
<i>Gutierrezia sarothrae</i>																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	11	-	-	-	-	-	-	-	-	9	2	-	-	733		11	
	90	11	-	-	-	-	-	-	-	-	11	-	-	-	733		11	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	20	-	-	-	-	-	-	-	-	16	4	-	-	1333	11	13	20
	90	11	-	-	-	-	-	-	-	-	11	-	-	-	733	12	20	11
	01	18	1	-	-	-	-	-	-	-	19	-	-	-	380	13	19	19
D	85	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	3	-	-	-	-	-	-	-	-	2	-	-	1	60		3	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	580		29	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			03%			-31%							
'90		00%			00%			00%			-70%							
'01		05%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	2132	Dec:	3%			
												'90	1466		0%			
												'01	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				
Leptodactylon pungens																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	23	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'90		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'01	0		-			
Opuntia polyacantha																		
M	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200	8	10	3
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133	7	10	2
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9	19	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			-34%							
'90		00%			00%			00%			-55%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	200	Dec:	-			
												'90	133		-			
												'01	60		-			
Purshia tridentata																		
Y	85	1	3	1	-	-	-	-	-	-	5	-	-	-	333			5
	90	4	1	-	-	-	-	-	-	-	5	-	-	-	333			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	-	-	15	-	-	-	-	-	-	15	-	-	-	1000	43	24	15
	90	2	4	-	-	-	-	-	-	-	6	-	-	-	400	45	43	6
	01	15	15	3	-	1	1	-	-	-	35	-	-	-	700	41	84	35
D	85	-	-	3	-	-	-	-	-	-	-	-	3	-	200			3
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	133			2
	01	-	2	1	-	-	-	-	-	-	3	-	-	-	60			3
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		13%			83%			13%			-44%							
'90		38%			15%			00%			-12%							
'01		47%			13%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1533	Dec:	13%			
												'90	866		15%			
												'01	760		8%			

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				
Quercus gambelii																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	36	37	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'85		00%			00%			00%										
'90		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'01	0		-			

Suspended

Trend Study 5-11-96

Study site name: Mountain Dell Reservoir.

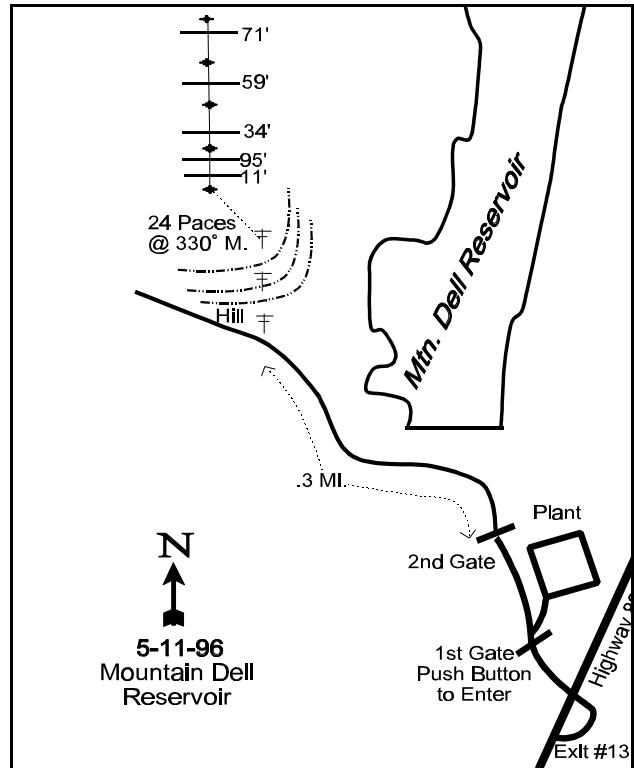
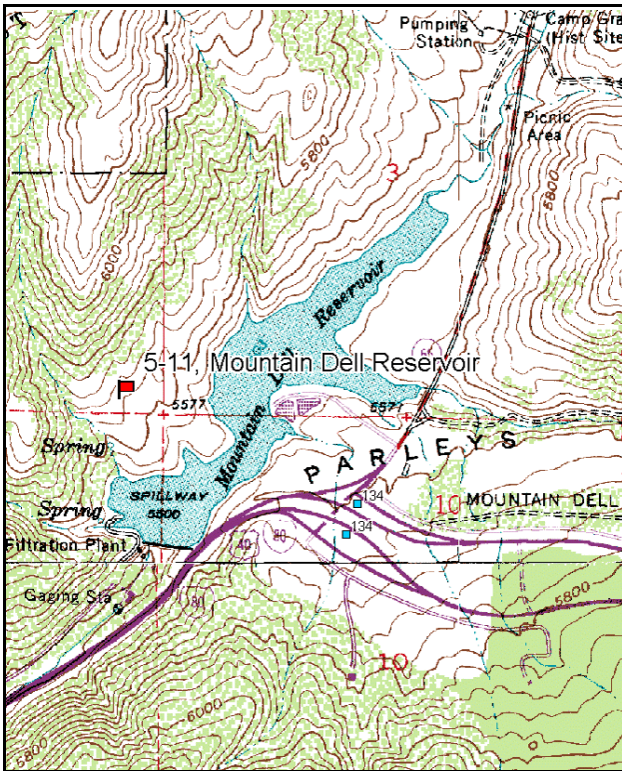
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 130 degrees magnetic.

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

LOCATION DESCRIPTION

On I-80 heading up Parleys Canyon, take exit 133 to Mountain Dell Dam. You will come to a gate where you will need to push the button to open the gate and drive down to the water purification plant to get a key for the second gate. To get to the site you must obtain permission from Parleys Water Purification Plant (Ph # 583-2186). From the west end of Mountain Dell Dam at the second gate, proceed northwesterly for 0.30 miles to a point where a single aerial telephone line with power poles crosses the road. From this point, walk northerly (i.e., uphill) to the third telephone pole. From the third telephone pole, the 0-foot baseline stake is located 24 paces away on an azimuth of 330 degrees magnetic, towards a large clump-like Hawthorn (*Crataegus*) bush. The 0-foot baseline stake has a red browse tag # 32901 attached.



Map Name: Mountain Dell

Diagrammatic Sketch

Township 15, Range 2E, Section 4

UTM 4511722 N 439040 E

DISCUSSION

Trend Study No. 5-11

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006.

The Mountain Dell Reservoir study site is on a sagebrush/grass slope bordered by Gambel oakbrush located immediately north of Mountain Dell Reservoir. All of Mountain Dell drainage is owned by Salt Lake City and makes up part of the collection system for the city's culinary water. Grazing of domestic livestock is prohibited, as is off-road vehicle use. The study is at an elevation of approximately 5,900 feet on a north-northeasterly aspect with a 10% to 20% slope. Deer use the area primarily as spring-fall range and during mild winters. Elk and moose can also be observed in the area.

Soil is deep and well drained with a clay loam texture. Litter and vegetative cover are excellent, as is organic matter content. No evidence of accelerated erosion is present. Effective rooting depth was estimated at 23 inches with an average temperature of 46° F at 18 inches in depth. Little unprotected bare ground is found on the site and percent bare soil was estimated at only 3% in 1996. Overall soil condition is good to excellent.

Mountain big sagebrush is the key browse species. It accounted for 81% of the total browse cover in 1996. Mountain big sagebrush density was estimated at 2,740 plants/acre in 1996, which is quite similar to the 1990 estimate of 2,599 plants/acre. Percent decadency has declined since 1990, with most plants classified as lightly hedged. The mountain big sagebrush population appears stable. Overall vigor is good. With the increased sample size used in 1996, several other browse species were encountered. Antelope bitterbrush is scattered through the site with an estimated density of 120 plants/acre. Utilization is moderate with good vigor. Oregon grape has an estimated density of 1,480 plants/acre. These plants are small in stature averaging 6 inches in height with a 7 inch crown. Other browse include saskatoon serviceberry, wyeth eriogonum, chokecherry, wood's rose, and blueberry elder. A short distance to the north, bitterbrush is more abundant.

With total exclusion from livestock grazing, grasses and forbs have become very abundant and diverse. Diversity of grasses and forbs is high with more than 56 species sampled on the 5 belts. Grasses are quite diverse, but there are about 5 times more forbs species. Annual forbs and grasses are rare and limited to an occasional hairy brome, a few mustards, and a fair amount of catchweed bedstraw. Utilization of grasses and forbs is uniformly light.

1983 APPARENT TREND ASSESSMENT

Soil condition continues to improve. The city's watershed management objectives are probably being met. Vegetative trend is debatable and depends on objectives. The trend seems to be toward an increasing level of grass/forb dominance. Although the data is inconclusive; shrub density, vigor, and reproduction, especially of mountain big sagebrush, seems to be declining in the face of herbaceous competition.

1990 TREND ASSESSMENT

The mountain big sagebrush on this lightly used, 5,600 foot elevation winter range is very vigorous and productive. Although the number of mature sagebrush decreased from 1,633 to 1,200 plants/acre, there is abundant reproduction. The population was classified as 57% seedlings in 1990. Sagebrush canopy cover averages 16%. The understory supports a dense and diverse stand of valuable grasses and forbs. Kentucky bluegrass, bluebunch wheatgrass, pacific aster, western yarrow, and showy goldeneye are common species. There is complete ground cover of vegetation and litter, leaving only 1% bare soil.

TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Soil trend continues to be stable with abundant vegetative and litter cover. No recent erosion is apparent. Browse tend is slightly upward with a decline in the number of mountain big sagebrush classified as decadent. Other browse species, such as chokecherry and antelope bitterbrush show utilization, but these plants are scattered throughout the site. The understory still supports a dense and diverse herbaceous understory of valuable grasses and forbs. Kentucky bluegrass, cheatgrass, Pacific aster, western yarrow, and showy goldeneye are common species. Herbaceous trend is stable.

TREND ASSESSMENT

soil - stable (3)

browse - slightly upward (4)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 05 , Study no: 11

T y p e	Species	Nested Frequency			Quadrat Frequency			Average
		'83	'90	'96	'83	'90	'96	Cover %
G	Agropyron dasystachyum	-	7	-	-	2	-	-
G	Agropyron intermedium	-	-	2	-	-	1	.03
G	Agropyron spicatum	a-	b93	a-	-	36	-	-
G	Agropyron trachycaulum	a-	a-	b37	-	-	15	2.03
G	Bromus brizaeformis (a)	-	-	3	-	-	1	.03
G	Bromus japonicus (a)	-	-	229	-	-	68	4.84
G	Bromus tectorum (a)	-	-	24	-	-	7	.54
G	Carex spp.	b46	a-	a-	21	-	-	-
G	Elymus cinereus	b24	a3	a2	10	3	1	.15
G	Elymus spp.	16	3	-	5	1	-	-
G	Poa pratensis	c347	a230	b284	96	78	80	25.28
G	Unknown grass - perennial	4	-	-	2	-	-	-
Total for Annual Grasses		0	0	256	0	0	76	5.42
Total for Perennial Grasses		437	336	325	134	120	97	27.50
Total for Grasses		437	336	581	134	120	173	32.92
F	Achillea millefolium	b155	b151	a50	51	53	21	.89
F	Agoseris glauca	b33	a-	a1	14	-	1	.00
F	Alyssum alyssoides (a)	-	-	14	-	-	5	.05
F	Allium spp.	b24	b32	a2	11	14	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'90	'96	'83	'90	'96	'96
F	Arabis spp.	-	-	-	-	-	-	.00
F	Artemisia dracunculus	_{ab} 8	_b 16	_a -	4	5	-	-
F	Artemisia ludoviciana	4	2	-	2	1	-	-
F	Aster chilensis	_b 177	_b 161	_a 84	62	58	34	1.30
F	Astragalus convallarius	1	3	-	1	1	-	-
F	Balsamorhiza macrophylla	_b 26	_a 6	_a 3	10	4	2	.24
F	Brodiaea douglasii	_b 19	_a -	_a -	9	-	-	-
F	Calochortus nuttallii	4	-	-	2	-	-	-
F	Cirsium spp.	-	4	1	-	2	1	.00
F	Collomia linearis (a)	-	-	17	-	-	9	.04
F	Collinsia parviflora (a)	-	-	17	-	-	5	.27
F	Crepis acuminata	-	9	6	-	3	2	.01
F	Cynoglossum officinale	_a -	_b 27	_a 2	-	11	1	.00
F	Epilobium brachycarpum (a)	-	-	49	-	-	20	.33
F	Erigeron spp.	-	-	1	-	-	1	.03
F	Eriogonum spp.	2	-	-	1	-	-	-
F	Eriogonum umbellatum	_b 35	_b 26	_a -	14	10	-	-
F	Galium aparine (a)	_{ab} 2	_a -	_b 13	1	-	5	.07
F	Geranium spp.	12	7	-	4	2	-	-
F	Hackelia patens	1	-	-	1	-	-	-
F	Helianthella uniflora	_{ab} 37	_b 60	_a 27	15	26	9	1.68
F	Holosteum umbellatum (a)	-	-	2	-	-	1	.03
F	Lathyrus brachycalyx	_b 85	_a 29	_{ab} 47	31	15	25	.63
F	Lathyrus pauciflorus	_b 101	_a -	_a -	40	-	-	-
F	Lactuca serriola	_a -	_b 39	_b 42	-	17	22	.29
F	Lithophragma parviflora	_b 28	_a -	_a -	12	-	-	-
F	Lithospermum ruderales	_b 16	_b 23	_a -	7	14	-	-
F	Lupinus sericeus	_b 43	_b 29	_a 12	18	18	5	.72
F	Mertensia brevistyla	_b 14	_a -	_a -	6	-	-	-
F	Microsteris gracilis (a)	-	-	12	-	-	6	.03
F	Polygonum douglasii (a)	-	-	82	-	-	36	.40
F	Rumex spp.	-	2	-	-	1	-	-
F	Senecio integerrimus	4	-	-	3	-	-	-
F	Solidago missouriensis	-	-	7	-	-	2	.30
F	Taraxacum officinale	3	7	3	2	3	1	.03
F	Tragopogon dubius	_a 17	_b 58	_c 106	11	27	54	1.30

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'90	'96	'83	'90	'96	'96
F	Unknown forb-perennial	6	-	-	4	-	-	-
F	Verbascum thapsus	-	-	3	-	-	1	.03
F	Vicia americana	_b 120	_a 7	_a -	52	3	-	-
F	Viguiera multiflora	_a 20	_b 74	_a 18	10	31	8	.11
Total for Annual Forbs		2	0	206	1	0	87	1.23
Total for Perennial Forbs		995	772	415	397	319	191	7.62
Total for Forbs		997	772	621	398	319	278	8.85

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 05 , Study no: 11

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia tridentata vaseyana	80	15.98
B	Eriogonum heracleoides	8	1.01
B	Mahonia repens	10	.57
B	Prunus virginiana	11	.33
B	Purshia tridentata	4	1.54
B	Rosa woodsii	3	.06
B	Sambucus racemosa	1	.03
B	Symphoricarpos oreophilus	2	.30
Total for Browse		119	19.85

BASIC COVER --

Herd unit 05 , Study no: 11

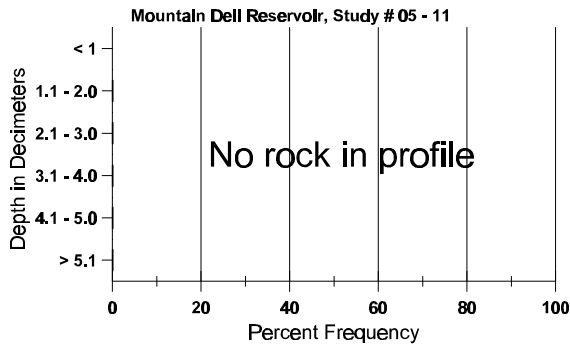
Cover Type	Nested Frequency	Average Cover %		
		'83	'90	'96
Vegetation	394	9.25	13.00	58.34
Rock	8	0	0	.02
Pavement	5	0	0	.01
Litter	400	89.75	86.00	71.09
Cryptogams	-	0	0	0
Bare Ground	109	1.00	1.00	3.40

SOIL ANALYSIS DATA --

Herd Unit 05, Study no: 11, Mountain Dell Reservoir

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
23.4	46.2 (18.1)	6.2	38.2	33.1	28.7	3.5	34.7	297.6	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 05 , Study no: 11

Type	Quadrat Frequency '96
Elk	1
Deer	6

BROWSE CHARACTERISTICS --

Herd unit 05 , 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 alnifolia								
M	83	-	-	-	-	-	-	0
	90	-	-	-	-	-	-	0
	96	-	-	-	-	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>
'83		00%		00%		00%		
'90		00%		00%		00%		
'96		00%		00%		00%		
Total Plants/Acre (excluding Dead & Seedlings)						'83	0	Dec: -
						'90	0	-
						'96	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	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	99	-	-	6	-	-	-	-	-	105	-	-	-	3500			105
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	83	6	-	-	-	-	-	-	-	-	6	-	-	-	200			6
	90	15	-	-	1	-	-	-	-	-	16	-	-	-	533			16
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
M	83	25	23	1	-	-	-	-	-	-	43	-	6	-	1633	33	42	49
	90	33	2	-	1	-	-	-	-	-	36	-	-	-	1200	34	44	36
	96	112	4	-	-	-	-	-	-	-	116	-	-	-	2320	27	45	116
D	83	4	1	-	-	-	-	-	-	-	3	-	2	-	166			5
	90	23	3	-	-	-	-	-	-	-	19	-	-	7	866			26
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	900			45
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		40%			02%			13%			+23%							
'90		06%			00%			09%			+ 5%							
'96		03%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	1999	Dec:	8%				
											'90	2599		33%				
											'96	2740		9%				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	-	1	-	-	33	15	6	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'90	33		-				
											'96	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				
<i>Eriogonum heracleoides</i>																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	9	33	15
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'90	0		-			
												'96	300		-			
<i>Mahonia repens</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	7	-	-	5	-	-	-	-	-	12	-	-	-	240			12
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	34	-	-	28	-	-	-	-	-	62	-	-	-	1240	6	7	62
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'90	0		-			
												'96	1480		-			
<i>Prunus virginiana</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	7	-	-	-	-	-	-	-	-	6	1	-	-	140			7
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	7	-	-	3	-	-	-	-	-	10	-	-	-	200	25	19	10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'90	0		-			
												'96	340		-			

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	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	4	-	-	-	-	-	-	-	6	-	-	-	120	34	66	6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%										
'90		00%			00%			00%										
'96		67%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'90	0		-			
												'96	120		-			
Rosa woodsii																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100	18	8	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'90	0		-			
												'96	100		-			
Sambucus racemosa																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	15	13	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'90	0		-			
												'96	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				
Symphoricarpos oreophilus																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40	41	65	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%										
'90		00%			00%			00%			+18%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'90	33		-			
												'96	40		-			

Trend Study 5-15-01

Study site name: Red Rock Canyon.

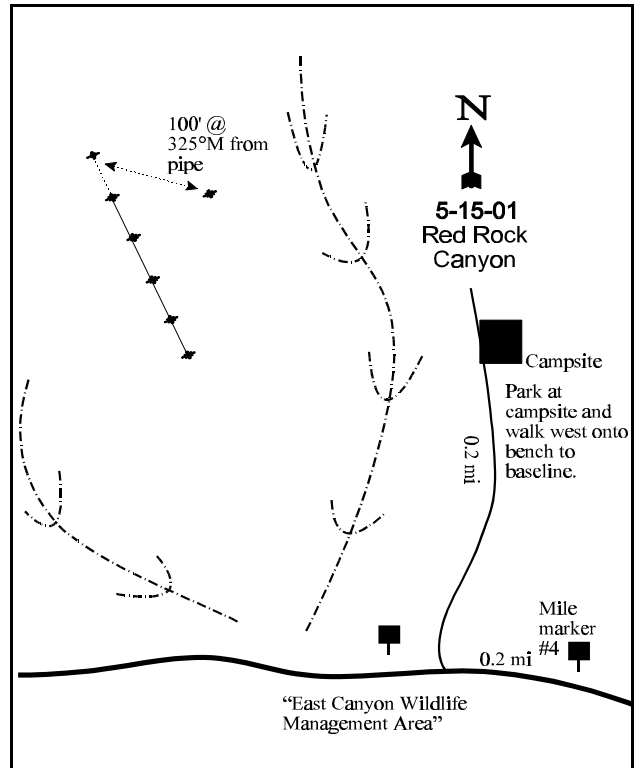
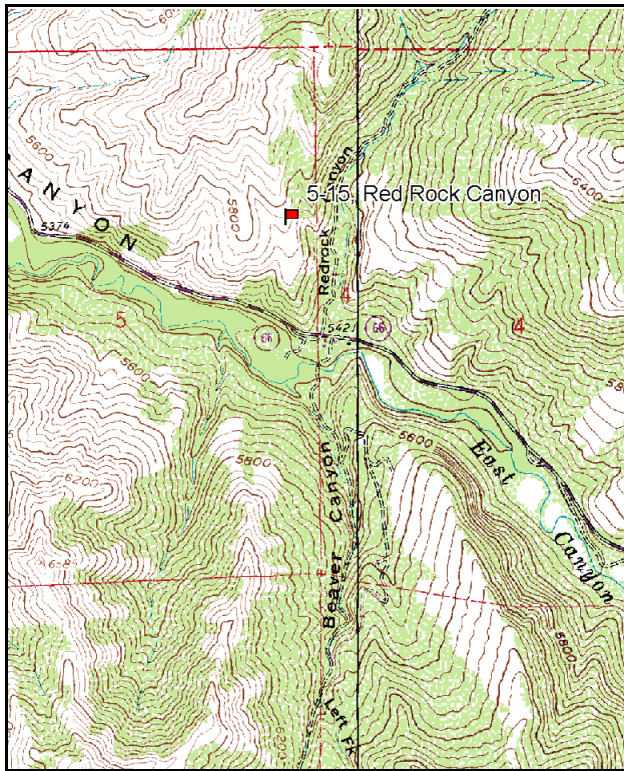
Vegetation type: Burned and Seeded.

Compass bearing: frequency baseline 155 degrees magnetic.

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

LOCATION DESCRIPTION

Travel east for 0.2 miles past mile marker # 4 on highway 66 heading towards Porterville and turn right (sign says East Canyon Wildlife Management Area). Travel north for 0.2 miles to a campsite. Park at the campsite and walk up on the bench due west to a pipe posted in the ground. From the pipe the 0-foot baseline stake is 100 feet at 325 degrees magnetic. The 0-foot baseline stake is marked by a browse tag # 52. The baseline runs 155 degrees magnetic.



Map Name: Porterville

Diagrammatic Sketch

Township 2N, Range 3E, Section 5

UTM 4531873 N 447100 E

DISCUSSION

Trend Study No. 5-15

The Red Rock Canyon trend study was established in 1996. It is located north of East Canyon Reservoir on a small bench that burned, then was seeded in 1992. The site was seeded with a combination of forbs and grasses which have established relatively well. Elevation of the site is approximately 5,620 feet with a south aspect and slight slope (3-5%). The area is considered winter range but it also receives use year round. Little big game use was noted in 1996, but a pellet group transect read on site in 2001, estimated 50 deer days use/acre (124 ddu/ha). Several deer pellet groups were recent and there were a few bedding areas encountered.

The soil is moderately deep with an effective rooting depth of over 13 inches. It has a clay loam to sandy clay loam texture with a neutral soil reaction (7.2 pH). There is very little rock in the soil profile or on the soil surface. Percent bare soil is also low with the majority of the bare soil caused by gopher activity. Vegetative and litter cover are high with no erosion apparent.

Shrubs are not abundant since the fire. The only common species include resprouting stickyleaf low rabbitbrush and some broom snakeweed. Mountain big sagebrush has a stable density of only 220 plants/acre. Other browse species include white rubber rabbitbrush, stickyleaf low rabbitbrush, and mountain snowberry.

The herbaceous understory is abundant and diverse. Seeded grasses established relatively well with crested wheatgrass occurring in over 50% of the quadrats. Other perennial grass species include Kentucky bluegrass, bluebunch wheatgrass, orchard grass, mountain rye, Sandberg bluegrass, thickspike wheatgrass, and Great Basin wildrye. Japanese brome dominated the herbaceous understory in 1996 by providing 57% of the grass cover. Cheatgrass was also present, but not as prominent. Dry conditions and competition with seeded perennials has caused Japanese brome to decline significantly in nested frequency. Sum of nested frequency for cheatgrass actually increased significantly but cover declined. Average cover of annual grasses has dropped from 24% in 1996 to only 5% in 2001. Average cover of perennial grasses more than doubled since 1996.

Forbs are also abundant and several useful species are found on the site. In 1996, yellow salsify was the dominant forb, followed by other increaser species such as prickly lettuce and thistle. Annual species included autumn willow weed, Douglas knotweed, tumble mustard, and pale alyssum. Seeded forbs, Lewis flax, small burnet, alfalfa, and yellow sweetclover, established well and accounted for 32% of the forb cover in 1996. Some utilization was noted on alfalfa and yellow salsify. In 2001, native and seeded perennial forbs have increased in cover and frequency. Yellow salsify, alfalfa, Lewis flax, and American vetch accounted for 71% of the forb cover.

1996 APPARENT TREND ASSESSMENT

There is no erosion apparent on the site at this time with abundant litter and vegetative cover. Most bare ground can be contributed by gopher activity. Browse species are sparse with stickyleaf low rabbitbrush being the most abundant. The mountain big sagebrush density is not high, but the population is healthy and vigorous. Herbaceous understory is dominated by Japanese brome. There are several seeded species present which should provide forage and competition with annuals and increaser species.

2001 TREND ASSESSMENT

Trend for soil is stable with abundant protective ground cover and little exposed bare ground. Trend for the key browse species, mountain big sagebrush, is stable. There are only 220 plants/acre estimated but they are all vigorous. Density of the increasers, broom snakeweed and stickyleaf low rabbitbrush have both declined. Trend for the herbaceous understory is up. Sum of nested frequency of perennial grasses has more than doubled, conversely nested frequency of annual grasses has declined. Cover of perennial grasses has risen from 13% in 1996 to 30% in 2001. The dominant grass in 1996, Japanese brome, has declined significantly in nested frequency and average cover has declined from 21% to only 3%. Seeded crested wheatgrass is now the dominant grass, accounting for 37% of the grass cover. On the negative side, cheatgrass did increase significantly in nested frequency and bulbous blue grass is now the second most abundant perennial grass. The forb component has improved. Sum of nested frequency of perennial forbs has increased moderately but average cover has nearly doubled. Seeded forbs have persisted and alfalfa now accounts for 25% of the total forb cover. Alfalfa is robust and only lightly utilized. Other abundant perennial forbs consist of yellow salsify and American vetch which combine to provided 43% of the total forb cover.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up (5)

HERBACEOUS TRENDS --

Herd unit 05 , Study no: 15

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	<i>Agropyron cristatum</i>	180	183	54	55	9.30	12.78
G	<i>Agropyron dasystachyum</i>	6	1	3	1	.06	.03
G	<i>Agropyron intermedium</i>	-	2	-	1	-	.03
G	<i>Agropyron spicatum</i>	27	34	10	16	.66	2.72
G	<i>Bromus brizaeformis</i> (a)	-	10	-	4	-	.22
G	<i>Bromus carinatus</i>	-	*22	-	10	-	1.25
G	<i>Bromus japonicus</i> (a)	394	*256	87	75	21.03	3.12
G	<i>Bromus tectorum</i> (a)	121	*138	33	50	3.38	1.42
G	<i>Dactylis glomerata</i>	18	*7	9	4	.16	.22
G	<i>Elymus cinereus</i>	2	7	1	2	.85	.81
G	<i>Phleum pratense</i>	-	3	-	1	-	.00
G	<i>Poa bulbosa</i>	-	*146	-	43	-	5.17
G	<i>Poa pratensis</i>	51	63	18	26	1.11	1.50
G	<i>Poa secunda</i>	9	*197	5	68	.05	5.60
G	<i>Secale montanum</i>	14	*-	6	-	.40	.00
Total for Annual Grasses		515	404	120	129	24.41	4.76
Total for Perennial Grasses		307	665	106	227	12.61	30.14
Total for Grasses		822	1069	226	356	37.02	34.91
F	<i>Achillea millefolium</i>	27	39	12	12	.23	.67
F	<i>Agoseris glauca</i>	17	32	9	13	.10	.45
F	<i>Alyssum alyssoides</i> (a)	11	*116	6	39	.03	1.15
F	<i>Allium</i> spp.	-	*89	-	39	-	.35
F	<i>Aster</i> spp.	-	3	-	1	-	.00
F	<i>Camelina microcarpa</i> (a)	-	*21	-	8	-	.21
F	<i>Chaenactis douglasii</i>	-	3	-	1	-	.00
F	<i>Cirsium</i> spp.	39	21	18	11	.66	.76
F	<i>Collomia linearis</i> (a)	13	18	6	7	.03	.06
F	<i>Comandra pallida</i>	19	13	7	6	.08	.10
F	<i>Collinsia parviflora</i> (a)	-	*69	-	26	-	.35
F	<i>Descurainia pinnata</i> (a)	-	5	-	2	-	.01
F	<i>Draba</i> spp. (a)	-	*19	-	7	-	.08
F	<i>Epilobium brachycarpum</i> (a)	122	*13	43	6	1.10	.10
F	<i>Erodium cicutarium</i> (a)	8	*77	4	24	.09	1.26
F	<i>Erigeron pumilus</i>	1	-	1	-	.00	-
F	<i>Galium aparine</i> (a)	1	5	1	2	.00	.03
F	<i>Gilia</i> spp. (a)	-	3	-	1	-	.00

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Grindelia squarrosa	2	-	2	-	.03	-
F	Helianthus spp.	3	-	2	-	.03	-
F	Holosteum umbellatum (a)	-	*37	-	12	-	.13
F	Lappula occidentalis (a)	-	*32	-	8	-	.14
F	Lactuca serriola	154	*6	61	3	1.77	.18
F	Linum lewisii	99	98	39	39	1.39	.71
F	Machaeranthera canescens	4	-	1	-	.18	-
F	Madia glomerata (a)	1	1	1	1	.00	.00
F	Melilotus officinalis	11	7	6	3	.48	.09
F	Medicago sativa	48	60	20	26	1.71	6.19
F	Microsteris gracilis (a)	-	1	-	1	-	.00
F	Onobrychis viciaefolia	-	-	-	-	-	.03
F	Phlox longifolia	2	9	1	3	.00	.01
F	Polygonum douglasii (a)	50	*3	23	2	.19	.01
F	Sanguisorba minor	32	*16	19	9	.60	.17
F	Sisymbrium altissimum (a)	16	*35	7	13	.25	.61
F	Taraxacum officinale	-	*9	-	5	-	.19
F	Tragopogon dubius	190	191	72	67	3.86	8.22
F	Vicia americana	11	*124	9	44	.07	2.45
Total for Annual Forbs		222	455	91	159	1.71	4.18
Total for Perennial Forbs		659	720	279	282	11.24	20.64
Total for Forbs		881	1175	370	441	12.95	24.83

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 05 , Study no: 15

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	10	9	.10	.15
B	Chrysothamnus nauseosus albicaulis	1	3	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	51	44	7.43	4.78
B	Gutierrezia sarothrae	22	11	1.45	.65
B	Purshia tridentata	0	0	.00	-
B	Symphoricarpos oreophilus	3	4	.38	.15
Total for Browse		87	71	9.37	5.74

BASIC COVER --

Herd unit 05 , Study no: 15

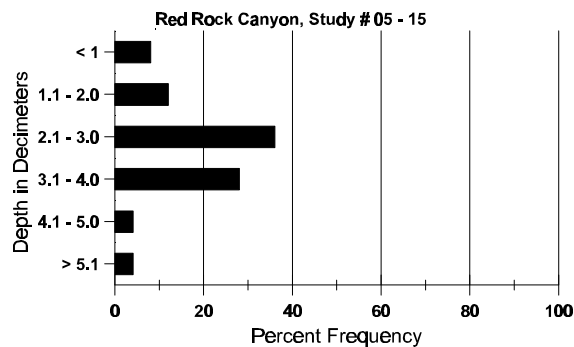
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	493	469	63.68	64.11
Rock	39	43	.35	.51
Pavement	53	121	.20	2.60
Litter	500	484	79.98	49.67
Cryptogams	8	18	.04	.08
Bare Ground	129	175	3.74	4.70

SOIL ANALYSIS DATA --

Herd Unit 05, Study no: 15, Red Rock Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.5	66.2 (16.4)	7.2	44.6	25.4	30.0	3.3	41.4	291.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 05 , Study no: 15

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Elk	1	-	-	-
Deer	5	11	653	50 (124)

BROWSE CHARACTERISTICS --

Herd unit 05 , Study no: 15

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	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
	01	7	-	-	-	-	-	-	-	-	7	-	-	140		7		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	0	17	9	0	
	01	4	-	-	-	-	-	-	-	-	3	1	-	80	18	25	4	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	20			1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	20			1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	220	Dec:	-			
												'01	220		-			
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	3	-	-	-	-	-	-	-	-	3	-	-	60			3	
M	96	1	-	-	-	-	-	-	-	-	1	-	-	20	25	25	1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	9	31	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+67%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
												'01	60		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	96	8	-	-	-	-	-	-	-	-	8	-	-	160			8	
	01	1	-	-	-	-	-	-	-	-	1	-	-	20			1	
M	96	101	-	-	-	-	-	-	-	-	101	-	-	2020	17	28	101	
	01	58	-	-	1	-	-	-	-	-	59	-	-	1180	15	25	59	
D	96	1	-	-	-	-	-	-	-	-	1	-	-	20			1	
	01	8	-	-	-	-	-	-	-	-	8	-	-	160			8	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	40			2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-38%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	2200	Dec:	1%			
												'01	1360		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				
<i>Gutierrezia sarothrae</i>																		
Y	96	27	-	-	1	-	-	-	-	-	28	-	-	-	560		28	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	51	-	-	-	-	-	-	-	-	51	-	-	-	1020	11	10	
	01	27	-	-	-	-	-	-	-	-	27	-	-	-	540	8	10	
D	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-63%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1580	Dec:	0%				
											'01	580		7%				
<i>Symphoricarpos oreophilus</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	23	32	
	01	1	-	-	1	-	-	-	-	-	2	-	-	-	40	13	21	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+ 0%							
'01		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	80	Dec:	-				
											'01	80		-				

SUMMARY

WILDLIFE MANAGEMENT UNIT 5 - EAST CANYON

Seven trend studies were reread in the East Canyon unit in 2001. These trend studies were originally established in 1984 and 1985 and reread in 1990 and 1996. One site at Mountain Dell Reservoir was suspended and will be reevaluated in 2006. Two additional sites in Franklin Canyon were not read due to problems getting permission to access private land at the mouth of Franklin Canyon. Of the 7 sites read in 2001, all sample winter range. Soil trends for unit 5 are mostly stable, but 2 sites, Geary Hollow and Wanship, have down and slightly down trends respectively. All other sites have stable soil trends. The average soil trend for unit 5 is 2.6 or just below stable. Three would represent a stable value. Browse trends are stable for all sites with an average browse trend of 3.0 for the unit. Herbaceous trends are generally improving. Only one site, Davis County Rifle Range, had a declining herbaceous trend. The average herbaceous trend for the unit is 4.0, or slightly up. The main reason for the improvement in the herbaceous trends is a general decline in annual grasses which dominate many of the herbaceous understories. Perennial grasses have correspondingly increased on many sites.

All seven sites read in 2001 have significant amounts (>20% of the grass cover) of annual grasses in their understories. The average cover of annual grasses was 25% in 1996, which accounted for, on average, 69% of the grass cover. Due to aspect, slope, and rock on the surface and in the profile, many of these sites have high average soil temperatures. Soil temperature averages 68° F at an average depth of over 13 inches. This condition causes the soil profile to dry out early in the summer and it gives winter annuals like cheatgrass a competitive advantage over most of the perennial grasses. However, due to the dry and spring conditions, annuals have declined. In 2001, average cover of annual grasses dropped nearly threefold to 9%. Annual grasses now account for an average of 33% of the grass cover. Three sites, East Canyon Reservoir, Davis County Rifle Range, and Red Rock Canyon, had a significant increase in the poor value perennial, bulbous bluegrass, which appears to have responded to the decline in annual grasses.

The primary cause of the decline in annual grasses on unit 5 is the dry conditions during the and spring of 2000 and 2001. Precipitation data from Farmington, which would represent conditions along the Wasatch front portion of unit 5, indicate a generally wet period from 1980 through 1986. A 4 year drought period followed from 1987 through 1990. Between 1991 and 1998, wet years alternated with dry years. Above normal annual precipitation was received in 1995 and 1996. Annual precipitation was near normal in 2000, however all months were normal or below except for February and August which were 174% and 363% of normal respectively. The spring months of 2000 (April-June) were extremely dry averaging only 47% of normal. April precipitation was only 25% of normal and May 36% of normal. Spring precipitation was also below normal in 2001, averaging 63% of normal between April and June. April of 2001 was slightly above normal but May was extremely dry averaging only 9% of normal (Utah climate summaries 2001).

Precipitation at Echo Dam and Wanship, representative of the east side of unit 5, indicate a wet period which extended from 1980 to 1986. An extended drought followed with dry conditions prevailing from 1987 to 1990. Wet and dry years alternated from 1991 to 1995, followed by 4 wet years from 1995 to 1998. Precipitation was below normal in both 1999 and 2000 at Wanship, but below normal in only 1999 at Echo Dam. The general trend of dry spring conditions was encountered at both sites with April to June precipitation being, on average, 77% of normal in 2000 and 73% of normal in 2001. Precipitation was well below normal in April and June of 2000 at Echo Dam. April precipitation was only 52% of normal and June, 12%. In 2001, May and June were extremely dry. At Echo Dam, May precipitation was only 16% of normal. No precipitation was received at Wanship in May. June precipitation was 59% of normal at Echo Dam and 35% of normal at Wanship. Dry conditions during the spring have apparently caused a general decline in the nested frequencies and cover of annual grasses with a corresponding significant increase in the nested frequency and cover of perennial species. A summary of individual site trends follows.

TREND SUMMARY

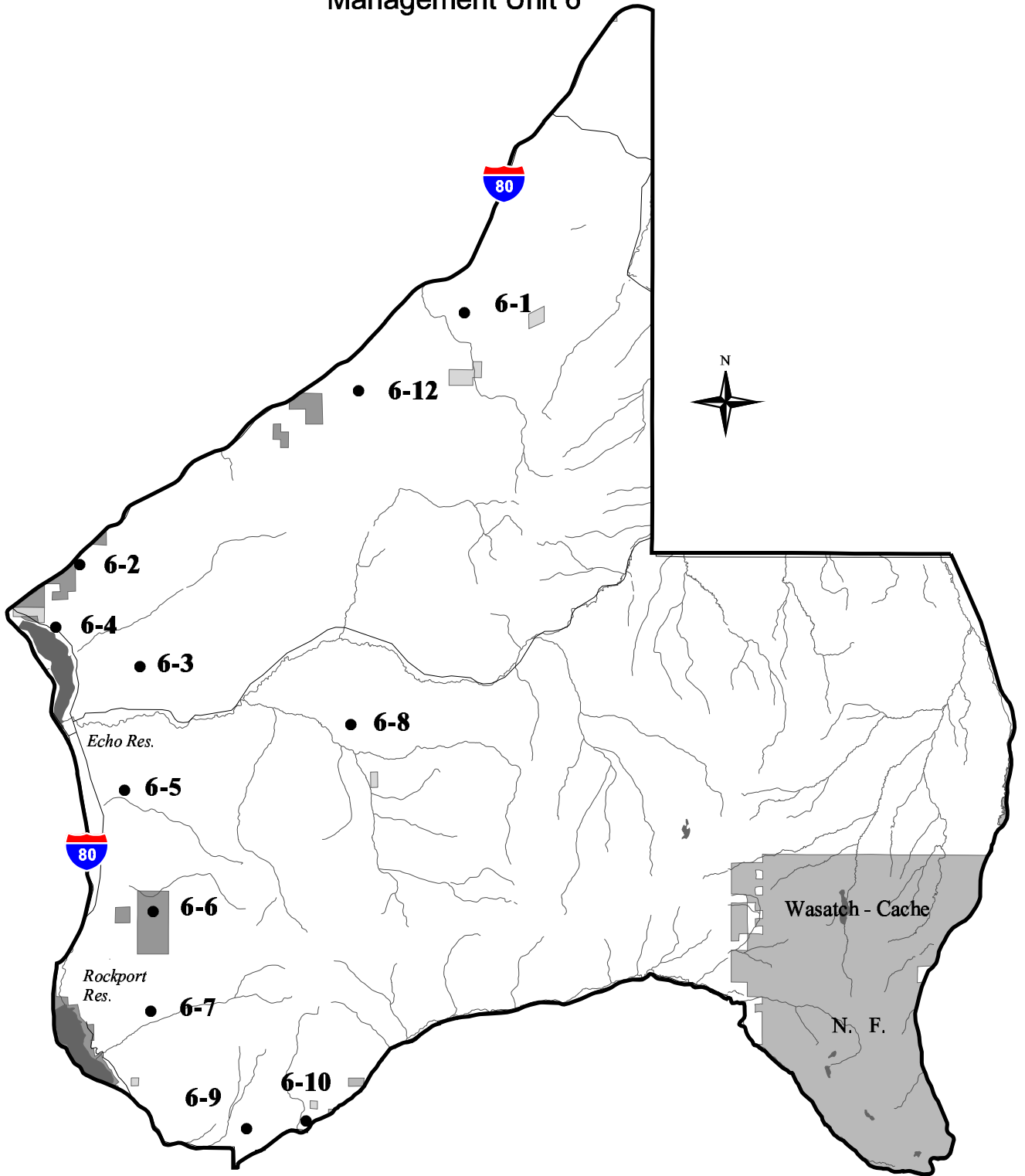
Location	Category	1984	1990	1996	2001
5-1 Geary Hollow	soil	est	3	3	1
	browse	est	3	3	3
	herbaceous understory	est	3	4	4
5-2 Tucson Hollow	soil			est	3
	browse			est	3
	herbaceous understory			est	5
5-3 East Canyon Reservoir	soil	est	3	4	3
	browse	est	3	4	3
	herbaceous understory	est	3	3	3
5-4 Wanship	soil	est	3	4	2
	browse	est	1	5	3
	herbaceous understory	est	3	4	5
5-5 Upper Franklin Canyon	soil	est	1	3	NR
	browse	est	2	5	NR
	herbaceous understory	est	3	3	NR
5-6 Franklin Canyon	soil	est	3	3	NR
	browse	est	1	2	NR
	herbaceous understory	est	4	3	NR
Location	Category	1985	1990	1996	2001
5-8 Barnard Creek	soil	est	3	4	3
	browse	est	3	3	3
	herbaceous understory	est	2	3	4
5-9 Davis County Rifle Range	soil	est	3	NR	3
	browse	est	2	NR	3
	herbaceous understory	est	3	NR	2
Location	Category	1983	1990	1996	2001
5-11 Mountain Dell Reservoir	soil	est	3	3	susp
	browse	est	4	4	susp
	herbaceous understory	est	3	3	susp

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established, susp = suspended

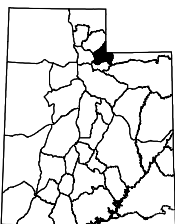
Location	Category	1996	2001
5-15 Red Rock Canyon	soil	est	3
	browse	est	3
	herbaceous understory	est	5

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established,
susp = suspended

Management Unit 6



Unit Location



- Transect Location
- ∕∕ Roads
- ∕∕ Water Courses
- Forest Service
- BLM
- State of Utah
- Private Land
- Water Body

WILDLIFE MANAGEMENT UNIT 6 - CHALK CREEK

Boundary Description

Summit and Duchesne counties - Boundary begins at the junction of Interstates 84 and 80 near Echo; then northeast on I-80 to the Utah-Wyoming state line; south and east along this state line to Highway SR-150; south on SR-150 to Pass Lake and the Weber River Trail; west on this trail to Holiday Park and the Weber River road; west on this road to Highway SR-32; north and west on SR-32 to I-80 and Wanship; north on I-80 to I-84 near Echo.

Management Unit Description

Management unit 6 contains an estimated 395,397 total acres (summer and winter ranges combined) of mule deer range, of which 90% lies on private land. Unit 6 contains an estimated 435,170 total acres of elk range, of which 91% lies on private lands. Widespread private ownership, and subsequent control of the land, leads to numerous management complications. Unregulated development and loss of habitat are some of the biggest problems. The discovery, development, and removal of oil throughout the unit, especially the Chalk Creek area, has led to increased road and housing developments. Agricultural projects on critical winter range also continue to increase depredation problems and further decrease the range available to big game. Because of the preponderance of private land and the establishment of hunting clubs, access is severely restricted for trophy hunting on large portions of the unit. Private landowners are also less likely to undertake extensive rehabilitation projects to improve the value of the remaining range for wildlife. This unit has the largest acreage requirement of range needed to be acquired for any herd unit in the state. Unfortunately, the high cost of the land would probably prevent the acquisition of this critical range.

The topography of the unit is influenced mainly by the Uinta mountains to the east, with their drainages flowing through long, gradual slopes down into the Weber River Valley. Other major drainages include Crandall Canyon, Chalk Creek, Echo Canyon, Hixon and Pecks Canyons, and Grass Creek. The southern exposures of these canyons are especially important winter range. The rest of the winter range is found in the low rolling foothills of the western and central parts of the unit. The upper limits vary between approximately 6,800 and 7,200 feet (Giunta 1979).

Towns are located in the valley along the Weber River. They include Peoa, Wanship, Hoytsville, and Coalville. Echo and Rockport reservoirs, located on the west side of the unit on the Weber River, are both significant barriers to big game movement. Additionally, I-80 through Echo Canyon serves to discourage big game movement, and deer losses are high on the highway in winter and spring.

In the 1977 range inventory, the winter range was classified into 12 distinct vegetation types (Giunta 1979). Of these, seven of the larger, more important types were sampled. The sagebrush-grass and oakbrush types were the most prevalent. The sagebrush-grass type is quite variable with basin big sagebrush, mountain big sagebrush, and Wyoming big sagebrush all occurring within the unit, being found on a variety of exposures, slopes, and elevations. In the 1977 inventory, it occupied 36% of the normal winter range and produced 33% of the total production. It was even more important on severe winter range, occupying 43% of the available range. The oakbrush type, which covered 32% of the winter range, was the most productive type, but becomes largely unavailable in severe winters. This type intergrades with the sagebrush-grass and other types. Other important types are juniper, especially important for thermal cover, and mountain brush. Air dry production from the 1977 range inventory report are as follows: aspen, 435 lbs/acre; juniper, 240 lbs/acre; sagebrush-grass, 383 lbs/acre; mountain brush, 510 lbs/acre; oakbrush, 580 lbs/acre; grassland, 285 lbs/acre.

Fires in recent years have destroyed large tracts of important range in the Chalk Creek unit. Because of this habitat loss, increasing numbers of mule deer, elk, and moose tend to concentrate in the lower areas on agricultural land and at mouths of canyons, especially during severe winters.

Big Game Management Objectives

Management options are rather limited in this herd unit because of the prevalence of private land on both winter and summer ranges. The herd unit management plan in 1983 (Kearl 1983) stated a harvest objective of 2,500 to 3,000 bucks per year and outlined various management programs and numerous problems with possible solutions. In the 1998 management plan, annual buck harvest was expected to be about 1,600 under normal conditions, with a target population size of 11,500 wintering animals (modeled number). This is significantly lower than the 1983 plan. It is more practical to look at the regression of buck harvests since 1950 to get a better understanding of the overall trend since then. The analysis demonstrates an increased buck harvest since 1950 even with the great deal of variation for buck harvest beginning with 2,031 and increasing to 2,323 in 1990. This variation can be further depicted by some low harvests in the 1950's, 60's, and 70's of around 900, and high harvests of over 3,000 in the mid-50's and early-80's. Management of the deer herd is further complicated by the presence of other big game species, migrations, excessive road kills on I-80, and many hunting restrictions. Elk management objectives (1998) call for a target winter herd size of 1,900 animals, a postseason bull to cow ratio of 8:100, with at least 4 bulls being 2½ years or older.

A serious problem in this unit is the composition of herbaceous understories, which on most sites is mostly made up of annual species, primarily cheatgrass. Understories that are dominated by annual species can prohibit sagebrush seedling establishment, especially during Utah's hot, dry summers. Another serious concern is the rapidly increasing loss of critical wintering habitat through urbanization. A DWR program to acquire additional land and/or conservation easements, and landowner cooperation are necessary to help perpetuate the big game herds on this unit.

Range Trend Studies

A total of 12 trend studies are located in management unit 6. All of the transects established in 1984 were located on important big game winter ranges. Six of the 19 line intercept transects established in 1977 were in areas considered important for continued monitoring. These transects were reread and replaced with new interagency trend studies. In addition, 1 new study was established in 1990, and another in 1996. All of the transects in this unit are located on private land, except the Hixon Canyon and Echo Canyon Rest Area studies which are located on DWR property. All of the trend studies that were established in 1984 were reread in 1990. Project personnel attempted to reread all of the trend studies in both 1996 and 2001, but a few of the studies were not read in either 1996 or 2001 due to difficulty getting permission and/or access to privately owned lands.

Trend Study 6-1-01

Study site name: Anshutz Ranch.

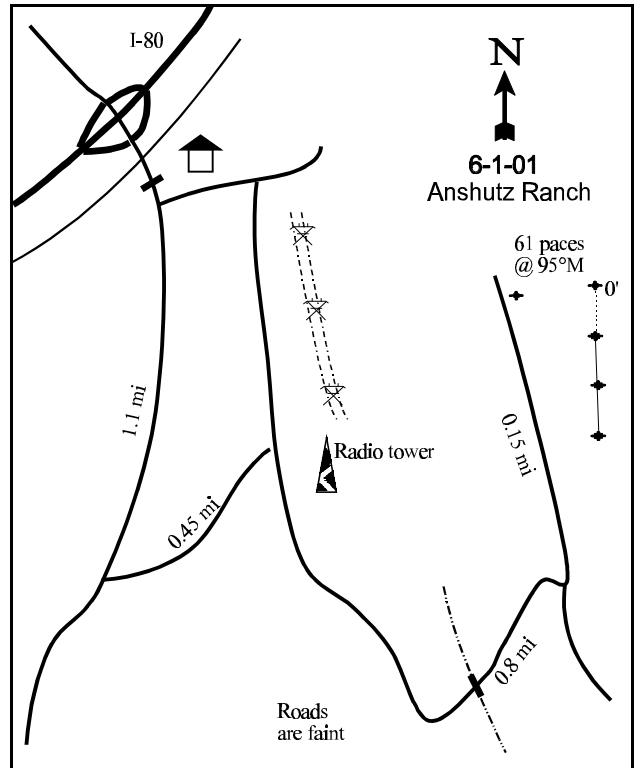
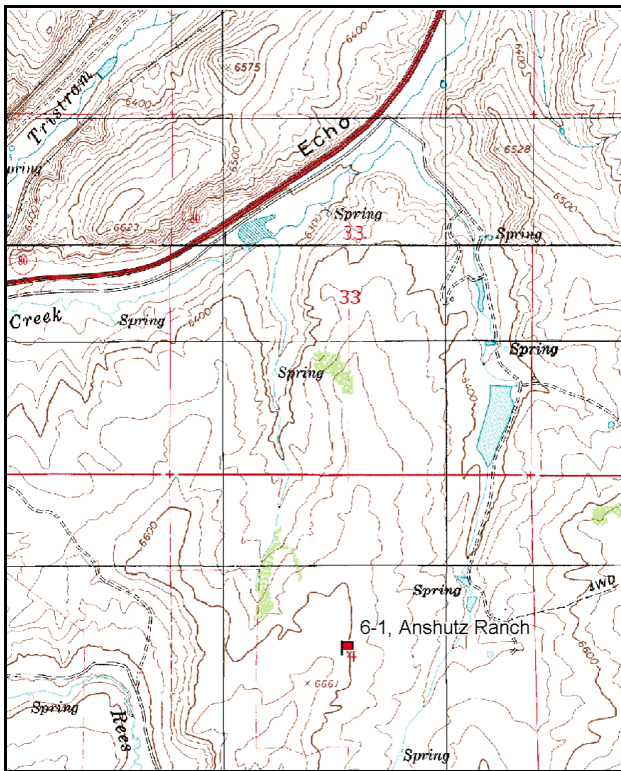
Vegetation type: Low Sagebrush.

Compass bearing: frequency baseline 163 degrees magnetic.

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

LOCATION DESCRIPTION

Proceeding east on I-80 from Echo, leave I-80 at exit number 185 and proceed east to Anshutz Ranch headquarters. From the security guard house proceed 0.1 miles and turn left. Proceed 0.65 miles (passing ranch lumber and equipment yard and a gate) to a faint road to the left. Turn left, proceed 0.8 miles (go through gate) to a crossroad on a small ridge. Turn left (road not on quad and quite faint) and proceed 0.15 miles to a green steel stake on the right (east) side of the road. From stake, walk 51 paces at 95 degrees magnetic to the 0-foot of the baseline marked by browse tag #7949.



Map Name: Castle Rock

Diagrammatic Sketch

Township 4N, Range 7E, Section 4

UTM 4550593 N 486531 E

DISCUSSION

Trend Study No. 6-1

The Anshutz Ranch trend study is located at a moderately high elevation (6,640 feet) southeast of the Anshutz Ranch headquarters. Big game use of the study area is light to moderate and comes chiefly from elk. The area is also important for sage grouse. The land is privately owned and is utilized by sheep, cattle, and horses. Vegetatively, a number of range types are closely intermixed. In swales, grass and/or basin big sagebrush is often predominate. On gentle slopes and flat areas, mixed communities consist mostly of basin big sagebrush and low sagebrush, with Wyoming big sagebrush and possibly mountain big sagebrush occurring occasionally. On the more well-drained ridgetops, low sagebrush is the most common sagebrush. Scattered throughout this area is an abundance of stickyleaf low rabbitbrush and broom snakeweed. In a few places, these two increaser species have gained dominance. The entire area is very open with little protective cover and gently rolling topography. The actual study site slopes gently (5%) to the southeast with vegetation consisting of a mixture of basin big sagebrush and low sagebrush. Broom snakeweed and stickyleaf low rabbitbrush are abundant subdominants. Pellet group transect data taken along the baseline in 2001 estimated 3 deer, 48 elk, and 4 cow days use/acre (8 ddu/ha, 117 edu/ha, and 9 cdu/ha). Horse and sage grouse droppings were also sampled in the transect in 2001.

Soils are moderately deep with an estimated effective rooting depth of nearly 14 inches. The soil is classified as a clay loam, with a slightly alkaline soil reaction (7.6 pH). Percent organic matter is moderate at 2.9%. The soil has some variable-sized rock interspersed throughout the profile. Surface rock and pavement combine to provide 3% average cover in 1996 and 2001. Protective cover provided by vegetation, litter, and cryptogams is abundant. However, most of the vegetative cover comes from shrubs as herbaceous cover is low. Percent bare ground is moderate at almost 21% in 2001, with most of the bare soil being found in sagebrush interspaces. Some localized soil movement is apparent. Phosphorus is low at 5.9 ppm as values less than 10 ppm can be limiting to normal plant growth and development.

Browse composition is dominated by sagebrush, most notably low sagebrush, which contributes 62% and 63% of the total browse cover in 1996 and 2001. Basin big sagebrush, which occurs mostly in the swales where soils are deeper, provides an additional 21% and 18% of the browse cover in 1996 and 2001 respectively. Low sagebrush density is estimated at 9,580 plants/acre in 2001. Mature plants currently ('01) make up 76% of the population, with an additional 22% of the population being classified as decadent. In addition, 44% (940 plants/acre) of the decadent plants sampled in 2001 were classified as dying. Percent decadence was much lower in 1996 and 2001 compared to the sampling periods of 1984 and 1990 when percent decadence was estimated at 50% and 55% respectively. Use on low sagebrush has been mostly light since 1984 when the majority of the population showed moderate use. Vigor has been generally good in all sampling years. Poor vigor has ranged from 4% in 1996 to 13% in 1990. Recruitment from young plants is low at 2% in 2001. Annual leader growth averaged less than 1 inch in 2001, but seed production was abundant.

Density estimates for basin big sagebrush have varied, with the population currently ('01) estimated at 3,120 plants/acre. Density estimates in 1984 and 1990 were overestimated due to the small sample sized used during those readings. The much larger sample used in 1996 and 2001 provides more accurate density estimates for shrubs that have clumped and/or discontinuous population distributions. From 1984-1996, use was light to moderate, percent decadence ranged from 20-28%, and vigor was generally good, except in 1996, when poor vigor was estimated in 20% of the population. In 2001, basin big sagebrush displayed light use, good vigor, and moderately high decadency at 35%. In 1996 and 2001, the average number of young in the population was much lower than the number of dead within the population. Annual leader growth averaged just over 1 inch in 2001, and seed production was moderate.

Broom snakeweed and stickyleaf low rabbitbrush occur on the site. They appeared to be increasing in earlier readings (1984 and 1990). However, population density estimates have been much lower in 1996 and 2001. Both species appear to have stable densities as mature plants are the dominant age class in 2001. Snakeweed is more abundant where low sagebrush is dominant.

The herbaceous understory is fairly diverse, but not overly abundant. Composition has been quite variable through time, with perennials showing increased nested frequency values between 1984-1996. However in 2001, sum of nested frequency for all perennial herbaceous species decreased by 29% and cover decreased by half. These decreases, at least in part, are due to the extremely dry conditions during the spring and summer of 2001. Western wheatgrass and Sandberg bluegrass were the dominant perennial grasses in 2001. Western wheatgrass significantly increased in nested frequency, while Sandberg bluegrass increased but not significantly. Bottlebrush squirreltail was abundant in 1984 and 1990, but has steadily decreased since. Annual grasses are present, but not very abundant. In 2001, some utilization on grasses by cattle was noted, especially on plants within the shrub interspaces. Forbs were depleted in 2001 due to the drought. Desert and longleaf phlox were the most abundant perennials, with birdbeak being the most abundant annual species.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable because of the gentle terrain. If slopes were steeper, the expanse of bare soil in the shrub interspaces would probably allow gully and sheet erosion to occur at a much more rapid rate. Vegetative trend is unclear, but it appears that plant composition is declining in quality because of a shift from sagebrush to rabbitbrush and snakeweed.

1990 TREND ASSESSMENT

Big game use is not concentrated on the large expanse of sagebrush range sampled by this trend study. The big sagebrush, identified as *Artemisia tridentata tridentata*, displays light to moderate hedging. The low sagebrush (*A. arbuscula*) are lightly used. There is a high percentage of decadence in the low sagebrush population, but a large number of young sagebrush were also sampled. Total sagebrush canopy cover is 26%, with equal percentages for both species. Density slightly decreased, while the population continues to be 55% decadent. Broom snakeweed did not increase. The increases in grass frequency are a result of increases in the smaller bunch grasses, this would not include western wheatgrass or bluebunch wheatgrass. Utilization of grasses has been light this year, but overall there is limited herbaceous forage available. Perennial forbs are insignificant. Ground cover percentages are basically unchanged.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Big game use remains light for both elk and deer. Soil trend is improving with a decrease in percent bare ground from 23% to 16% since 1990. The browse trend is slightly improved because low sagebrush, which makes up 62% of the browse cover, has improved vigor and percent decadency has declined from 55% to 13%. The other key browse species, basin big sagebrush which accounts for an additional 21% of the browse cover, has also shown a significant reduction in the percentage of plants classified as decadent. The reduction in density for this species is mostly reflective of the much larger sampling design giving a greatly improved density estimate. Broom snakeweed and stickyleaf low rabbitbrush are showing no tendencies toward uncommon increases in their respective densities. The herbaceous understory trend is stable. Sum of nested

frequency for perennial grasses slightly increased, while sum of nested frequency for perennial forbs slightly declined. Cheatgrass, which is a concern on many of the winter ranges in the Northern Region, is moderately low providing only 11% of the herbaceous cover on the site.

TREND ASSESSMENT

soil - slightly up (4)

browse - slightly up (4)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Soil trend is stable. Although bare ground slightly increased in percent cover, vegetation and litter remain abundant. Cryptogamic cover also increased in 2001 from 1% to nearly 7%. Trend for browse is stable. Low sagebrush and basin big sagebrush show increases in decadency and the number of decadent plants classified as dying. However, these increases are not unusually large. The number of young in the population for both species is low as well. Better precipitation in the future would help sagebrush reproduction on this site. Broom snakeweed and low rabbitbrush have stable densities at the present time. Trend for the herbaceous understory is slightly down. Sum of nested frequency for all perennial herbaceous species declined by 29% due to spring and summer drought in 2001. A positive aspect to the decrease in herbaceous species is that annual species also declined.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 1

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron smithii	_a 72	_a 71	_a 72	_b 111	25	25	25	43	1.80	.76
G	Agropyron spicatum	_a 4	_a 12	_b 98	_a 27	3	4	38	12	2.77	.38
G	Bromus japonicus (a)	-	-	2	3	-	-	1	2	.03	.03
G	Bromus tectorum (a)	-	-	_b 78	_a 25	-	-	31	13	2.00	.09
G	Carex spp.	-	-	-	2	-	-	-	1	-	.03
G	Oryzopsis hymenoides	3	-	8	-	1	-	4	-	.09	-
G	Poa fendleriana	_a -	_a -	_b 26	_b 33	-	-	11	13	.42	.53
G	Poa pratensis	_a 3	_a 8	_b 27	_{ab} 11	1	3	10	6	.75	.10
G	Poa secunda	_a 76	_c 230	_b 154	_b 182	33	87	55	71	2.01	2.61
G	Sitanion hystrix	_b 118	_c 162	_b 127	_a 32	53	69	56	13	2.63	.46
G	Stipa columbiana	5	23	10	19	3	10	7	8	.35	.16
G	Stipa comata	17	9	14	14	6	3	6	4	.25	.59
Total for Annual Grasses		0	0	80	28	0	0	32	15	2.03	0.12
Total for Perennial Grasses		298	515	536	431	125	201	212	171	11.11	5.64
Total for Grasses		298	515	616	459	125	201	244	186	13.15	5.76

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Achillea millefolium</i>	4	13	7	8	2	4	4	4	.07	.21
F	<i>Agoseris glauca</i>	4	3	-	6	2	1	-	2	-	.03
F	<i>Allium acuminatum</i>	_b 44	_a -	_a -	_a -	27	-	-	-	-	-
F	<i>Antennaria rosea</i>	_b 35	_c 82	_a 10	_{ab} 16	15	35	6	7	.27	.10
F	<i>Arabis</i> spp.	_a -	_c 22	_b 9	_a -	-	11	5	-	.02	-
F	<i>Astragalus convallarius</i>	11	5	7	18	5	3	5	8	.12	.19
F	<i>Astragalus utahensis</i>	-	-	-	3	-	-	-	1	-	.03
F	<i>Calochortus nuttallii</i>	8	2	-	-	4	1	-	-	-	-
F	<i>Cirsium undulatum</i>	_a 15	_b 40	_a 12	_a 6	9	22	7	4	.13	.12
F	<i>Collomia linearis</i> (a)	-	-	_a -	_b 24	-	-	-	10	-	.05
F	<i>Collinsia parviflora</i> (a)	-	-	_b 43	_a 13	-	-	23	6	.14	.03
F	<i>Cordylanthus ramosus</i> (a)	-	-	_a -	_b 43	-	-	-	23	-	1.39
F	<i>Epilobium brachycarpum</i> (a)	-	-	-	3	-	-	-	1	-	.01
F	<i>Erigeron pumilus</i>	_{ab} 47	_b 74	_a 31	_a 16	22	35	14	10	.22	.12
F	<i>Eriogonum umbellatum</i>	-	1	3	5	-	1	2	3	.06	.21
F	<i>Gayophytum ramosissimum</i> (a)	-	-	-	4	-	-	-	2	-	.01
F	<i>Holosteum umbellatum</i> (a)	-	-	_b 18	_a -	-	-	7	-	.03	-
F	<i>Lepidium</i> spp. (a)	-	-	-	7	-	-	-	4	-	.02
F	<i>Linum lewisii</i>	-	-	3	7	-	-	1	3	.03	.04
F	<i>Machaeranthera canescens</i>	-	9	-	-	-	3	-	-	-	.00
F	<i>Phlox austromontana</i>	_a -	_a 2	_b 60	_b 46	-	2	27	20	1.36	.85
F	<i>Phlox longifolia</i>	_a 40	_b 164	_b 158	_a 39	21	62	63	15	1.16	.20
F	<i>Polygonum douglasii</i> (a)	-	-	_b 85	_a 27	-	-	34	11	1.08	.08
F	<i>Ranunculus testiculatus</i> (a)	-	-	_b 14	_a 5	-	-	7	2	.03	.01
F	<i>Senecio multilobatus</i>	-	-	-	2	-	-	-	1	-	.00
F	<i>Sphaeralcea coccinea</i>	1	2	-	-	1	2	-	-	-	-
F	<i>Taraxacum officinale</i>	_a -	_b 9	_b 8	_{ab} 5	-	6	5	2	.05	.01
F	<i>Tragopogon dubius</i>	_a -	_a -	_b 11	_{ab} 3	-	-	5	1	.02	.00
F	Unknown forb-perennial	3	-	-	-	1	-	-	-	-	-
Total for Annual Forbs		0	0	160	126	0	0	71	59	1.29	1.61
Total for Perennial Forbs		212	428	319	180	109	188	144	81	3.54	2.16
Total for Forbs		212	428	479	306	109	188	215	140	4.84	3.77

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 06 , Study no: 1

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia arbuscula	90	86	22.02	20.63
B	Artemisia tridentata tridentata	53	61	7.44	6.64
B	Ceratoides lanata	3	4	-	.01
B	Chrysothamnus viscidiflorus viscidiflorus	94	89	5.53	4.28
B	Gutierrezia sarothrae	18	28	.28	1.20
B	Tetradymia canescens	9	8	.03	.03
Total for Browse		267	276	35.31	32.81

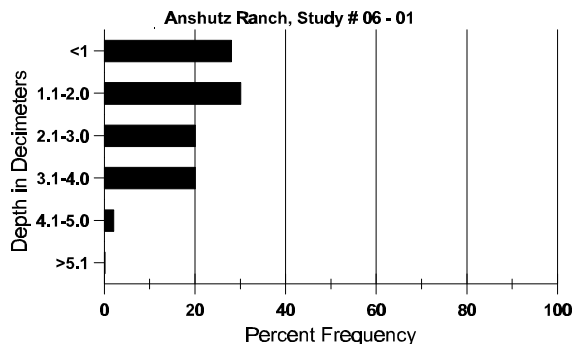
BASIC COVER --
Herd unit 06 , Study no: 1

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	348	331	2.25	12.25	49.98	45.91
Rock	152	109	2.25	1.25	1.98	1.67
Pavement	185	250	0	2.00	1.36	1.81
Litter	398	375	71.25	60.25	55.00	46.81
Cryptogams	72	134	.50	.50	.77	6.75
Bare Ground	255	269	23.75	23.75	16.36	20.99

SOIL ANALYSIS DATA --
Herd Unit 06, Study no: 01, Anshutz Ranch

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.9	63.3 (14.9)	7.6	40.7	26.0	33.3	2.9	5.9	83.2	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 06 , Study no: 1

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Rabbit	11	7	218	N/A
Horse	-	2	96	N/A
Grouse	-	1	9	N/A
Elk	8	7	618	48 (117)
Deer	6	2	44	3 (8)
Cattle	1	-	44	4 (9)

BROWSE CHARACTERISTICS --

Herd unit 06 , 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.			
<i>Artemisia arbuscula</i>																			
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	6	-	-	2	-	-	-	-	-	-	8			8	
	96	2	-	-	-	-	-	-	-	-	-	-	-	-	2			2	
	01	4	-	-	-	-	-	-	-	-	-	-	-	-	4			4	
Y	84	2	1	-	-	-	-	-	-	-	-	-	-	3				3	
	90	9	-	-	4	-	-	-	-	-	-	-	-	13				13	
	96	21	-	-	-	-	-	-	-	-	-	-	-	20		1		21	
	01	10	-	-	-	-	-	-	-	-	-	-	-	10		-		10	
M	84	8	47	1	-	-	-	-	-	-	-	-	-	56			12	17	56
	90	41	1	-	3	-	-	-	-	-	-	-	-	45			9	15	45
	96	280	46	3	-	-	-	-	-	-	-	-	-	322		3	4		329
	01	276	87	-	-	-	-	-	-	-	-	-	-	361		2	-		363
D	84	6	51	2	-	-	-	-	-	-	-	-	-	53		6			59
	90	69	-	-	1	-	-	-	-	-	-	-	-	52		1		17	70
	96	23	26	2	1	-	-	-	-	-	-	-	-	41		-		11	52
	01	85	19	-	2	-	-	-	-	-	-	-	-	59		-		47	106
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-					0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-					0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-					340
	01	-	-	-	-	-	-	-	-	-	-	-	-	-					240
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>								
'84		84%			03%			05%			+ 8%								
'90		.78%			00%			13%			- 6%								
'96		18%			01%			04%			+16%								
'01		22%			00%			10%											
Total Plants/Acre (excluding Dead & Seedlings)												'84	7866	Dec:	50%				
												'90	8532		55%				
												'96	8040		13%				
												'01	9580		22%				

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3				4
Artemisia tridentata tridentata																	
S	84	37	-	-	-	-	-	-	-	-	37	-	-	-	2466		37
	90	3	-	-	1	-	-	2	-	-	5	-	1	-	400		6
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	64	6	-	-	-	-	-	-	-	69	-	1	-	4666		70
	90	29	10	-	10	-	-	-	-	-	48	1	-	-	3266		49
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7
M	84	11	20	2	-	-	-	-	-	-	33	-	-	-	2200	27 35	33
	90	16	2	2	1	-	-	-	-	-	20	1	-	-	1400	28 29	21
	96	35	39	4	-	-	-	-	-	-	68	1	9	-	1560	29 34	78
	01	88	6	-	-	-	-	-	-	-	94	-	-	-	1880	29 38	94
D	84	1	23	2	-	-	-	-	-	-	24	-	2	-	1733		26
	90	19	8	-	-	-	-	-	-	-	22	-	2	3	1800		27
	96	6	15	2	-	-	-	-	-	-	10	-	12	1	460		23
	01	51	4	-	-	-	-	-	-	-	49	-	-	6	1100		55
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	460		23
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	480		24
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		38%				03%				02%				-25%			
'90		21%				02%				05%				-66%			
'96		49%				05%				20%				+29%			
'01		06%				00%				04%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	8599	Dec:	20%		
												'90	6466		28%		
												'96	2200		21%		
												'01	3120		35%		

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				
Ceratoides lanata																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	7	3	1
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	1	-	1	-	-	-	-	-	2	-	-	-	40	7	8	2
	'01	4	2	-	-	-	-	-	-	-	6	-	-	-	120	6	9	6
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	-	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		33%			00%			00%			+57%							
'01		43%			00%			14%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	0		0%			
												'96	60		0%			
												'01	140		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							
Chrysothamnus viscidiflorus viscidiflorus												
S	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	9	-	-	-	-	-	-	180		9	
	01	2	-	-	-	-	-	-	40		2	
Y	84	-	-	-	-	-	-	-	0		0	
	90	20	-	-	5	-	-	2	1800		27	
	96	92	-	-	5	-	-	-	1940		97	
	01	3	-	-	-	-	-	-	60		3	
M	84	115	-	-	-	-	-	-	7666	9 11	115	
	90	64	4	-	8	-	-	3	5266	9 13	79	
	96	286	4	-	16	-	-	-	6120	8 12	306	
	01	328	-	-	6	-	-	4	6760	7 11	338	
D	84	127	-	-	-	-	-	-	8466		127	
	90	95	-	-	2	-	-	23	8000		120	
	96	2	-	-	-	-	-	-	40		2	
	01	26	-	-	-	-	-	-	520		26	
X	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		02%		- 7%				
'90		02%		00%		28%		-46%				
'96		.98%		00%		.24%		- 9%				
'01		00%		00%		01%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	16132	Dec:	52%
									'90	15066		53%
									'96	8100		0%
									'01	7340		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				
Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	14	-	-	-	-	-	1	-	-	14	1	-	-	1000		15	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	123	-	-	-	-	-	-	-	-	123	-	-	-	8200	7	6	123
	90	99	-	-	-	-	-	1	-	-	93	6	1	-	6666	5	7	100
	96	41	-	-	-	-	-	-	-	-	41	-	-	-	820	5	6	41
	01	76	3	-	-	-	-	1	-	-	70	10	-	-	1600	6	11	80
D	84	12	-	-	-	-	-	-	-	-	12	-	-	-	800		12	
	90	12	-	-	-	-	-	-	-	-	10	-	-	2	800		12	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			- 6%							
'90		00%			00%			02%			-89%							
'96		00%			00%			00%			+44%							
'01		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	9000	Dec:	9%			
												'90	8466		9%			
												'96	900		0%			
												'01	1620		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				
Tetradymia canescens																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	8	3	1
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	4	5	1
	96	3	1	4	-	-	-	-	-	-	8	-	-	-	160	7	13	8
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120	6	12	6
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	3	-	-	-	-	-	-	-	-	2	-	-	1	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-50%							
'90		100%			00%			00%			+73%							
'96		08%			33%			00%			-25%							
'01		00%			00%			11%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	132	Dec:	0%			
												'90	66		0%			
												'96	240		8%			
												'01	180		33%			

Trend Study 6-2-01

Study site name: Echo Canyon Rest Area.

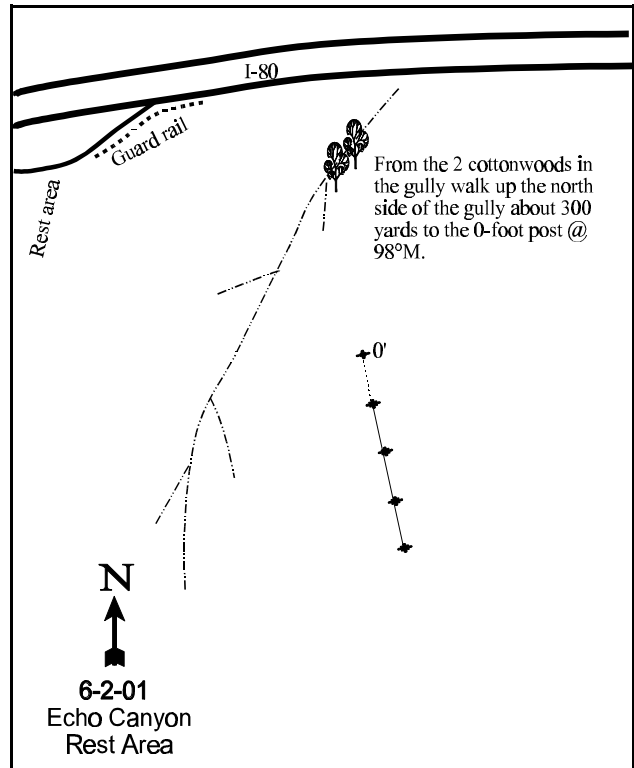
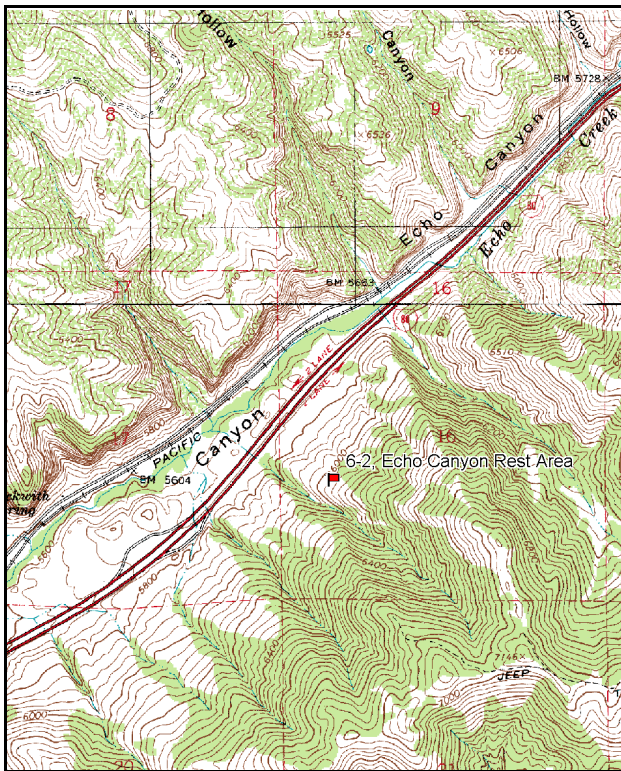
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 80 degrees magnetic.

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

LOCATION DESCRIPTION

Beginning at Echo Reservoir, travel northeast on Highway I-80 to the rest area (approximately 2 miles). From the rest area, follow the guard-rail on the right side of the freeway until it ends (approximately 100 yards). From the end of the guard-rail, proceed on an azimuth of 90 degrees magnetic for approximately 305 paces to a point on the left-hand or north side of the canyon. The 0-foot stake of the baseline consists of a green steel fencepost, 12"-18" high, and is marked with browse tag #7950.



Map Name: Coalville

Diagrammatic Sketch

Township 3N, Range 5E, Section 16

UTM 4537730 N 466866 E

DISCUSSION

Trend Study 6-2

The Echo Canyon Rest Area study originally replaced a line intercept transect established in 1977. It was located slightly uphill from Line 2 of that study, which sampled similar plant communities where true mountain mahogany was prominent. However, this site had many problems. It had a very steep south slope (>80%), rock and pavement cover combined for more than 32%, and the site showed almost no big game use. Therefore, the study site was moved up onto a nearby ridge. The study now lies on a west aspect, a slope of about 32%, and an elevation of approximately 6,000 feet. In 1999, a burn went through the area covering most of the slope where this study lies, including the study site itself. In 1996 (pre-burn), pellet group quadrat frequency showed moderately high use for deer, light use for elk, and occasional use by moose. Pellet group quadrat frequency for deer decreased by 2/3 in 2001, and no elk or moose pellet groups were sampled in quadrats. A pellet group transect read along the baseline in 2001 estimated 26 deer days use/acre (64 ddu/ha) and 7 elk days use/acre (18 edu/ha).

Soil texture on the site is classified as a sandy clay loam. Soils are moderately deep with an effective rooting depth (see methods section) estimated at almost 15 inches. This is the second deepest effective rooting depth on any of the studies within the management unit. Surface rock and pavement are not particularly abundant, yet the soil profile is moderately stony throughout. Erosion is not excessive on this moderately steep ridge because of the well dispersed vegetation and litter cover, with a fairly low percentage of bare ground. An erosion condition class assessment showed slightly eroding soils in 2001.

This site contains a moderately diverse browse community, both before and after the burn. Prior to the fire, the key browse consisted mostly of mountain big sagebrush, true mountain mahogany, bitterbrush, and serviceberry. Two other species that are usually not considered key browse, snowberry and Gambel oakbrush, were also present and had displayed some use in past readings. Mountain big sagebrush was the most abundant browse in 1996, providing 44% of the browse cover and an estimated density of 2,440 plants/acre. The increase in density of mountain big sagebrush in 1996 is due to the relocation of the transect for a more favorable site. In 1996, most of the population was mature and decadent plants, with low recruitment at 5%. The one characteristic that should be noted is that percent decadence for sagebrush decreased from about 60% in 1984 and 1990, to 39% in 1996. Some of this decrease is likely due to relocation of the transect to an area that is more suitable for sagebrush. However, drought conditions in the past most likely played a role in such high percent decadence as well. A cause for concern in 1996 was the high proportion of decadent sagebrush classified as having poor vigor or dying (56%). Use on sagebrush in 1984 was mostly heavy, and in 1996 use was mostly light to moderate. The post-burn inventory conducted in 2001 estimated mountain big sagebrush density at only 80 young plants/acre. The fire nearly eliminated this species from the site.

When the site was monitored in 2001 following the fire, it was noted that some of the other key browse species were resprouting, primarily mountain mahogany and serviceberry. A lot of the mahogany and serviceberry were classified as decadent in 2001 after being burned. However, percent decadence may have been overestimated as many of the resprouting individuals could have been classified as young. True mountain mahogany density was estimated at 420 plants/acre in 1996 (pre-burn) and 300 plants/acre in 2001 (post-burn). Both of these estimates are much lower than the 1984 and 1990 readings, due mostly to site being relocated in 1996. Use on mahogany was light in 2001, but moderate to heavy in all other readings. Serviceberry has an estimated density of 200 plants/acre in 2001, an increase from the 120 plants/acre reported in 1996. Bitterbrush is infrequent with an average density of 50 plants/acre in 1996 and 2001.

Gambel oak and stickleaf low rabbitbrush populations did not appear to be increasing in 1996. However, Gambel oak density increased from 760 stems/acre in 1996 to over 2,000 stems/acre in 2001. This species is a

vigorous sprouter following fire. Stickyleaf low rabbitbrush maintained a stable population between 1996 and 2001.

The herbaceous understory is important on this site as it provided 48% of the total vegetative cover in 1996, increasing to 77% in 2001 following the burn. A compositional change occurred between 1996 and 2001 due to the fire. In 1996, 88% of the herbaceous cover was made up of grasses. In 2001, grasses provided only 47% of the herbaceous cover, while forbs provided 53% of the cover. The increase in forbs was due primarily to two perennial species, yarrow and American vetch, as well as several annual species including pale alyssum, littleflower collinsia, holosteum, and bur buttercup. Sandberg bluegrass and bluebunch wheatgrass made up 85% of the grass cover in 1996. In 2001, both significantly decreased in nested frequency. Cheatgrass made up 14% of the grass cover in 1996, increasing to 34% in 2001. Cheatgrass increased in nested frequency in 2001, but not significantly. Annual forbs had a tenfold increase in sum of nested frequency in 2001. Annual species often increase following disturbance (fire in this case).

1996 APPARENT TREND ASSESSMENT

This site was moved a short distance to sample a more representative area in 1996. The previous two assessment year summaries for 1984 and 1990 have been deleted because they would have been counter intuitive to the trend that is occurring on the new site at this time.

The trend for soil would be considered stable because of the high amounts of vegetative cover (51%) and litter cover (56%), with percent bare ground at only 7%. The key browse species is mountain big sagebrush which contributes 44% of the browse cover. Percent decadence has decreased, but 56% of the decadent plants were classified as dying or with poor vigor. This could cause a continuing loss to the population, but does appear to have become more stable with increased precipitation. All the other key browse species have very low or no decadent plants. Gambel oak seems to be stable. Trend appears mixed with sagebrush being slightly down and the remainder of the browse being stable. The herbaceous understory appears stable, providing almost half of the total vegetative cover.

2001 TREND ASSESSMENT

Trend for soil is slightly down. With the burn between 1996 and 2001, litter cover decreased and percent bare ground increased. An erosion condition class assessment determined soils to be slightly eroding. Trend for browse is down due to the decline in sagebrush density, and increased decadence on several other browse species due to fire. Mountain big sagebrush density declined by 97% in 2001, with only 80 young plants/acre being sampled. Mountain big sagebrush provided 44% of the browse cover in 1996, decreasing to 0% in 2001. True mountain mahogany density decreased as well, but many of the plants are sprouting, and the population should improve in the future with recruitment of young plants being estimated at 13%. Serviceberry and bitterbrush were infrequent prior to the fire, and remain so afterward. Percent decadency on all 3 of these species increased in 2001. Gambel oak density increased from an estimated 760 stems/acre to over 2,000 stems/acre in 2001. This species is a vigorous sprouter following fire. The herbaceous understory has a stable trend. Sum of nested frequency for the two key perennial grasses, Sandberg bluegrass and bluebunch wheatgrass significantly decreased. However, sum of nested frequency for perennial forbs more than doubled. Overall trend is stable with the decrease in perennial grass frequency being offset by the increase in perennial forb frequency.

TREND ASSESSMENT

soil - slightly down (2)

browse - down (1)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 06 , Study no: 2

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	-	2	-	-	-	1	-	-	-	-
G	Agropyron spicatum	_a 29	_a 22	_c 155	_b 96	14	15	60	41	6.88	6.83
G	Bromus carinatus	-	-	-	2	-	-	-	1	-	.15
G	Bromus tectorum (a)	-	-	142	189	-	-	44	66	3.30	7.93
G	Carex spp.	-	-	-	-	-	-	-	-	-	.00
G	Festuca myuros (a)	-	-	-	2	-	-	-	1	-	.00
G	Festuca ovina	-	-	4	-	-	-	1	-	.03	-
G	Koeleria cristata	-	-	3	1	-	-	1	1	.03	.00
G	Oryzopsis hymenoides	_b 84	_b 98	_a -	_a -	42	45	-	-	.00	-
G	Poa fendleriana	_a -	_a -	_{ab} 6	_b 14	-	-	3	6	.18	.57
G	Poa secunda	_a -	_a 6	_c 270	_b 171	-	3	85	57	13.49	8.03
Total for Annual Grasses		0	0	142	191	0	0	44	67	3.30	7.94
Total for Perennial Grasses		113	128	438	284	56	64	150	106	20.62	15.60
Total for Grasses		113	128	580	475	56	64	194	173	23.93	23.54
F	Achillea millefolium	_a -	_a 4	_b 105	_c 150	-	1	41	54	1.82	10.21
F	Agoseris glauca	-	-	-	2	-	-	-	1	-	.00
F	Alyssum alyssoides (a)	-	-	_a 23	_b 90	-	-	9	36	.11	3.04
F	Allium spp.	_a -	_a -	_a 4	_b 85	-	-	2	42	.03	.51
F	Ambrosia psilostachya	-	-	-	1	-	-	-	1	-	.15
F	Antennaria rosea	-	-	1	1	-	-	1	1	.03	.03
F	Arabis spp.	-	-	1	7	-	-	1	3	.00	.04
F	Artemisia ludoviciana	3	-	-	-	1	-	-	-	-	-
F	Astragalus beckwithii	_a -	_a -	_a -	_b 12	-	-	-	5	-	.37
F	Astragalus convallarius	-	-	3	6	-	-	1	4	.03	.16
F	Aster spp.	-	-	3	-	-	-	2	-	.03	.03
F	Castilleja linariaefolia	-	-	3	1	-	-	1	1	.03	.03
F	Calochortus nuttallii	-	-	-	3	-	-	-	3	-	.01
F	Chaenactis douglasii	_b 15	_c 34	_a -	_a -	8	19	-	-	-	-
F	Cirsium undulatum	_a 11	_a 2	_{ab} 13	_b 33	6	2	8	16	.11	.79
F	Collomia linearis (a)	-	-	1	7	-	-	1	4	.00	.02
F	Comandra pallida	1	-	3	-	1	-	1	-	.00	-
F	Collinsia parviflora (a)	-	-	_a 12	_b 168	-	-	7	58	.03	3.34
F	Crepis acuminata	-	-	3	8	-	-	1	4	.00	.10
F	Descurainia pinnata (a)	-	-	_a -	_b 37	-	-	-	17	-	.21

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Draba verna</i> (a)	-	-	a ⁻	b ⁵⁷	-	-	-	21	-	.20
F	<i>Epilobium brachycarpum</i> (a)	-	-	a ⁻	b ⁸⁹	-	-	-	38	-	.46
F	<i>Erigeron pumilus</i>	a ⁻	a ⁻	b ²⁶	b ²⁴	-	-	12	10	.65	.32
F	<i>Gayophytum ramosissimum</i> (a)	-	-	3	3	-	-	1	1	.00	.00
F	<i>Hackelia patens</i>	-	-	3	-	-	-	2	-	.03	.15
F	<i>Helianthella uniflora</i>	-	-	-	-	-	-	-	-	-	.00
F	<i>Holosteum umbellatum</i> (a)	-	-	a ⁶	b ⁸¹	-	-	2	28	.01	1.18
F	<i>Lactuca serriola</i>	-	-	-	1	-	-	-	1	-	.00
F	<i>Lomatium triternatum</i>	-	-	-	4	-	-	-	3	-	.01
F	<i>Microsteris gracilis</i> (a)	-	-	a ⁻	b ¹⁴	-	-	-	6	-	.08
F	<i>Oenothera caespitosa</i>	b ¹⁴	a ⁻	a ⁻	a ⁻	6	-	-	-	-	-
F	<i>Penstemon</i> spp.	-	-	1	-	-	-	1	-	.00	-
F	<i>Phlox longifolia</i>	-	-	6	3	-	-	3	1	.02	.03
F	<i>Polygonum douglasii</i> (a)	-	-	6	2	-	-	3	1	.01	.00
F	<i>Ranunculus testiculatus</i> (a)	-	-	a ⁹	b ⁷¹	-	-	5	24	.02	1.31
F	<i>Schoenocrambe linifolia</i>	a ⁻	a ⁻	a ⁻	b ²⁰	-	-	-	8	-	.53
F	<i>Senecio integerrimus</i>	-	-	-	2	-	-	-	1	-	.00
F	<i>Sisymbrium altissimum</i> (a)	-	-	a ⁻	b ¹³	-	-	-	6	-	.22
F	<i>Verbascum thapsus</i>	a ²	a ⁻	a ⁻	b ¹⁶	2	-	-	7	-	.11
F	<i>Vicia americana</i>	-	-	a ³⁵	b ¹²⁰	-	-	16	43	.28	2.97
F	<i>Zigadenus paniculatus</i>	-	-	-	1	-	-	-	1	-	.03
Total for Annual Forbs		0	0	60	632	0	0	28	240	0.21	10.13
Total for Perennial Forbs		46	40	210	500	24	22	93	210	3.11	16.64
Total for Forbs		46	40	270	1132	24	22	121	450	3.33	26.77

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 06 , Study no: 2

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	6	10	.07	.63
B	Artemisia tridentata vaseyana	75	3	12.75	-
B	Cercocarpus montanus	18	11	3.73	.97
B	Chrysothamnus nauseosus albicaulis	0	2	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	55	52	3.87	5.69
B	Gutierrezia sarothrae	4	3	.06	.18
B	Opuntia spp.	1	1	-	-
B	Purshia tridentata	2	2	1.00	1.25
B	Quercus gambelii	6	9	2.57	2.22
B	Symphoricarpos oreophilus	32	32	4.96	4.35
Total for Browse		199	125	29.04	15.31

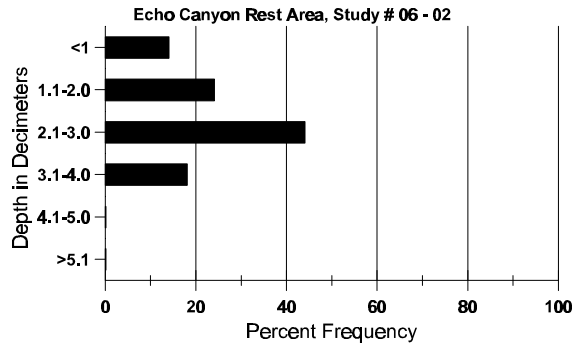
BASIC COVER --
Herd unit 06 , Study no: 2

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	362	379	2.75	9.00	51.15	61.48
Rock	158	161	25.75	20.00	1.75	2.42
Pavement	172	260	18.25	12.50	2.69	3.64
Litter	397	352	35.50	38.50	55.56	36.42
Cryptogams	163	52	0	.25	6.57	1.93
Bare Ground	167	251	17.75	19.75	7.26	14.42

SOIL ANALYSIS DATA --
Herd Unit 06, Study no: 02, Echo Canyon Rest Area

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.9	65.2 (19.7)	6.7	44.7	22.0	33.3	2.9	14.4	92.8	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 06 , Study no: 2

Type	Quadrat Frequency	
	'96	'01
Rabbit	3	4
Moose	1	-
Elk	6	-
Deer	38	12

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
17	N/A
-	-
96	7 (18)
339	26 (64)

BROWSE CHARACTERISTICS --

Herd unit 06 , 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				
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	1	-	-	-	-	1	-	-	-	66			1
	96	1	-	1	1	-	-	-	-	-	3	-	-	-	60			3
	01	3	1	-	-	-	-	-	-	-	4	-	-	-	80			4
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	1	-	-	-	1	-	-	2	-	-	-	133	31	29	2
	96	-	-	3	-	-	-	-	-	-	-	2	1	-	60	34	36	3
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	24	31	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	2	-	-	-	-	-	1	-	-	3	-	-	-	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		33%			33%			00%			-40%							
'96		00%			67%			17%			+40%							
'01		10%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	199		0%			
												'96	120		0%			
												'01	200		30%			

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 tridentata vaseyana																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	4	2	-	-	-	-	-	-	-	6	-	-	-	120		6	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	84	-	1	3	-	-	-	-	-	-	4	-	-	-	266	32 43	4	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0		
	96	5	44	19	-	-	-	-	-	-	50	-	18	-	1360	22 37	68	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21 35	0	
D	84	-	1	6	-	-	-	-	-	-	4	-	2	1	466		7	
	90	1	2	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	7	28	13	-	-	-	-	-	-	21	-	23	4	960		48	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	740		37	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	860		43	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		17%			75%			25%			-58%							
'90		40%			00%			00%			+86%							
'96		61%			26%			37%			-97%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	798	Dec:	58%			
												'90	333		60%			
												'96	2440		39%			
												'01	80		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							
Cercocarpus montanus															
Y	84	-	40	-	-	-	-	-	40	-	-	-	2666		40
	90	-	-	4	3	-	-	-	2	5	-	-	466		7
	96	2	1	-	-	-	-	-	1	2	-	-	60		3
	01	2	-	-	-	-	-	-	2	-	-	-	40		2
M	84	-	2	98	-	-	-	-	100	-	-	-	6666	52 26	100
	90	-	-	11	-	1	-	-	9	3	-	-	800	36 23	12
	96	-	10	7	1	-	-	-	5	13	-	-	360	49 47	18
	01	5	-	-	-	-	-	-	5	-	-	-	100	25 31	5
D	84	-	-	4	-	-	-	-	4	-	-	-	266		4
	90	-	-	4	-	-	-	-	1	2	-	1	266		4
	96	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	8	-	-	-	-	-	-	8	-	-	-	160		8
X	84	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
	'84	29%		71%		00%		-84%							
	'90	04%		83%		04%		-73%							
	'96	52%		33%		00%		-29%							
	'01	00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'84	9598	Dec:	3%		
										'90	1532		17%		
										'96	420		0%		
										'01	300		53%		
Chrysothamnus nauseosus albicaulis															
Y	84	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	2	-	-	-	-	-	-	2	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
	'84	00%		00%		00%									
	'90	00%		00%		00%									
	'96	00%		00%		00%									
	'01	00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	-		
										'90	0		-		
										'96	0		-		
										'01	40		-		

A G R E	Y 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>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	4	-	-	-	-	-	-	-	-	-	-	-	80			4	
	01	9	-	-	-	-	-	-	-	-	-	-	-	180			9	
M	84	5	-	-	-	-	-	-	-	-	-	-	-	333	20	28	5	
	90	4	-	-	-	-	-	-	-	-	-	-	-	266	14	19	4	
	96	105	-	-	8	-	-	-	-	-	-	-	-	2260	15	21	113	
	01	107	-	-	-	-	-	-	-	-	-	-	-	2140	14	22	107	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	3	-	-	-	-	-	-	-	-	-	-	-	60			3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-20%							
'90		00%			00%			75%			+89%							
'96		00%			00%			04%			- 3%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%			
												'90	266		0%			
												'96	2400		3%			
												'01	2320		0%			
<i>Gutierrezia sarothrae</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	2	-	-	-	-	-	-	-	-	-	-	-	133			2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	20			1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	2	-	-	-	-	-	-	-	-	-	-	-	133	6	7	2	
	96	6	-	-	-	-	-	-	-	-	-	-	-	120	7	8	6	
	01	3	-	-	-	-	-	-	-	-	-	-	-	60	8	16	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%			-55%							
'96		00%			00%			00%			-33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	266		-			
												'96	120		-			
												'01	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				
Opuntia spp.																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	6	26	2
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	9	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
												'01	20		-			
Purshia tridentata																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	1	2	-	-	-	-	-	3	-	-	-	60	34	64	3
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	37	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			33%			00%			-33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	60		0%			
												'01	40		50%			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3		4		
Quercus gambelii																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	4	-	-	-	-	-	-	-	-	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	15	34	-	-	-	-	-	-	-	-	-	-	3266			49
	90	9	6	-	3	-	-	1	-	-	-	-	-	1266			19
	96	23	-	-	-	-	-	-	-	-	-	-	-	460			23
	01	102	-	-	-	-	-	-	-	-	-	-	-	2040			102
M	84	-	4	5	-	-	-	-	-	-	-	-	-	600	68	48	9
	90	7	-	-	4	-	-	3	-	-	-	-	-	933	40	23	14
	96	10	3	-	-	-	-	-	-	-	-	-	-	260	16	29	13
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	33	18	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	2	-	-	1	-	-	-	-	-	-	-	333			5
	96	2	-	-	-	-	-	-	-	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	120			6
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		66%				09%				00%				-35%			
'90		24%				00%				00%				-70%			
'96		08%				00%				00%				+63%			
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	3866	Dec:	0%		
												'90	2532		13%		
												'96	760		5%		
												'01	2040		0%		

A Y 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	11	5	-	1	-	-	-	-	-	17	-	-	-	340		17	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	16	17	7	6	-	-	-	-	-	42	2	-	2	920	22	43	
	01	29	-	-	1	-	-	-	-	-	30	-	-	-	600	20	47	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	1	-	-	-	-	-	-	-	-	1	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		34%			13%			05%			-47%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	0		0%				
											'96	1280		2%				
											'01	680		3%				

Trend Study 6-3-01

Study site name: Spring Hollow Burn.

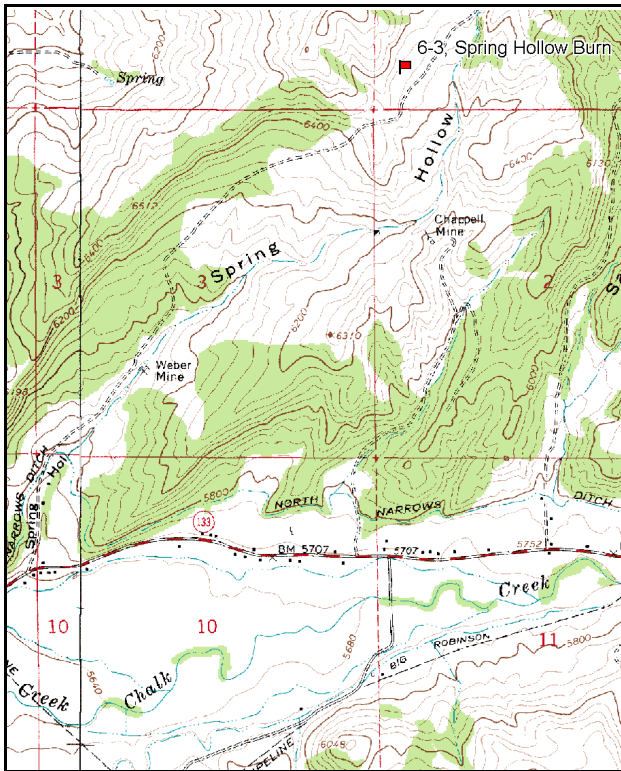
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 165 degrees magnetic.

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

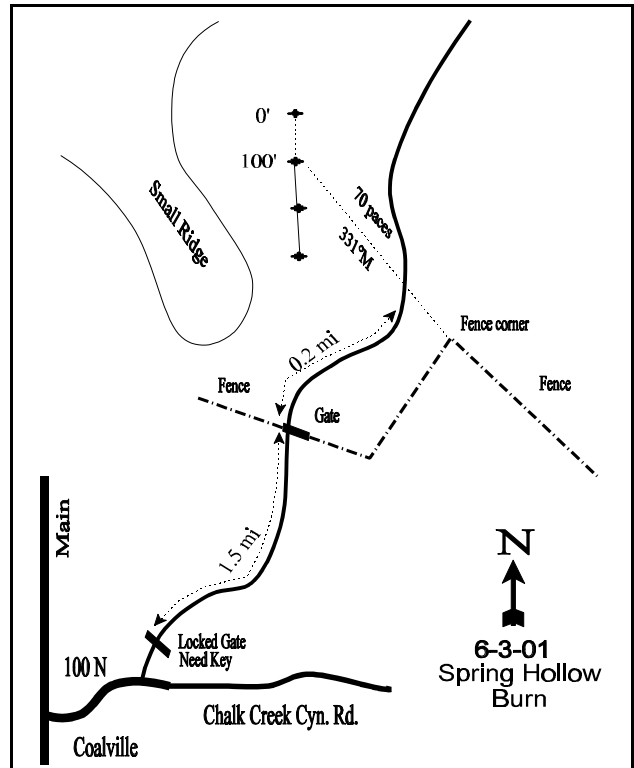
LOCATION DESCRIPTION

From 100 North and Main in Coalville, travel east 1.3 miles to Spring Hollow Road. Turn left (northeast) and proceed 0.2 mile to a locked gate. Proceed through gate, and continue 1.5 miles to a gate. Continue 0.2 miles to a fence line corner on the right. From corner post, walk 70 paces at 331 degrees magnetic to the 100-foot stake of the baseline. The 0-foot stake is marked by browse tag #7974.



Map Name: Turner Hollow

Township 3N, Range 5E, Section 35



Diagrammatic Sketch

UTM 4532493 N 469930 E

DISCUSSION

Trend Study No. 6-3

The Spring Hollow Burn study is located on an old burn in the upper part of Spring Hollow, which was placed near a old line intercept study. This site was not read in 1996 because the landowner would not give us permission to go onto the property. However, permission was obtained to monitor the study in 2001. The area is deer winter range originally dominated by sagebrush-grass and juniper-pinyon communities. The area was subsequently seeded with perennial grasses, mostly crested and intermediate wheatgrass after the burn. The transect is located on a gently rolling, southeast-facing exposure at an elevation of 5,560 feet. This area is privately-owned and grazed by a variety of domestic animals in addition to winter use by deer and elk. During heavy winters this site may not be as critical for wildlife due to the lack of browse. In 1984, deer pellet groups occurred frequently, and 3 deer and 1 elk antler shed were found. In 2001, a pellet group transect read along the study baseline estimated 9 elk days use/acre (21 edu/ha), 6 deer days use/acre (15 ddu/ha), and 21 cow days use/acre (52 cdu/ha). Livestock were also observed near the site in 2001 when the study was monitored.

Soils are clay loam in texture, with a soil reaction that is slightly acidic (6.5 pH). Soil depth is quite shallow with an estimated effective rooting depth of less than 9 inches. The majority of the rock occurs in the upper portions of the profile. Organic matter is relatively high at 4.6%. Erosion is minimal due to the abundance of herbaceous vegetation cover, litter cover, and low percent bare ground. An erosion condition class assessment determined soils as stable in 2001.

Browse is very limited on the site providing only 2% average cover in 2001. Mountain big sagebrush and serviceberry are the most preferred species on the site. Both have densities estimated at 40 plants/acre or less. Both species show moderate to heavy use in 2001. Snakeweed is the most abundant species having an estimated density of 4,100 plants/acre in 2001. The sagebrush and serviceberry populations will remain minimal at this site due to high competition with crested wheatgrass for resources.

The herbaceous understory is dominated by crested wheatgrass, with Sandberg bluegrass being fairly abundant as well. Crested wheatgrass displayed moderate to heavy utilization over the entire site in 2001. It was reported in 1990 that grasses appeared less vigorous than at the line intercept study because of grazing effects and damage by ants and aphids. Forbs provided 15% of the vegetative cover on the site in 2001. Perennial species increased in sum of nested frequency between 1990 and 2001. Annuals, which were not sampled in 1984 or 1990, were also quite abundant in 2001.

1984 APPARENT TREND ASSESSMENT

Based on a rereading of the line intercept study, cover data from the 1984 study, and on-site reconnaissance, soil trend appears to be slowly improving and in fair condition. Vegetative trend is more difficult to assess. Although long-term trend may be toward an improving big sagebrush stand, it will likely be a very slow process. In the interim, the area will continue to be grass dominated and subject to sharp increases of undesirable shrubs in an irregular pattern.

1990 TREND ASSESSMENT

There is a significant increase in percent decadence in this low density, heavily used big sagebrush population. Also, the high density of snakeweed indicates a definite downward trend on this winter range. The site has an incredible infestation of ants and aphids on the sagebrush. In spite of these factors, the sagebrush display fair growth and seed production. No seedlings were found. Any openings in the dense crested wheatgrass stand that would allow young sagebrush to become established are crowded with snakeweed seedling and young. The dense stand of small crested wheatgrass plants had increased nested frequency values. It shows 40-60% utilization, and cattle are still in the area utilizing the fall green-up. Litter cover is fair. The percentage of cryptogamic cover decreased from 11 to 2%. There is evidence of some soil erosion.

TREND ASSESSMENT

soil - down (1)

browse - down (1)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Soils have minimal erosion, vegetation and litter cover are well disbursed, and bare soil is moderately low. Trend for browse is stable, although browse is limited on the site with only 20 sagebrush and 40 serviceberry plants/acre being estimated in 2001. Due to the lack of dead sagebrush plants, the large decrease in sagebrush density since 1990 is due to the greatly increased sample size used in 2001 which more accurately estimates browse populations that have clumped and/or discontinuous distributions. Sagebrush is very patchy throughout the entire area. Recruitment by residual plants seems unlikely in the future due to competition with understory of crested wheatgrass. Snakeweed has a much lower density compared to 1984 and 1990 estimates. The population appears stable with an age class consisting of 94% mature plants. Trend for the herbaceous understory is slightly up due an increase in sum of nested frequency for perennial grasses and forbs.

TREND ASSESSMENT

soil - stable (3)

browse - stable but limited (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 3

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'01	'84	'90	'01	
G	Agropyron cristatum	_a 312	_b 348	_b 323	96	100	92	27.98
G	Agropyron dasystachyum	_a 10	_a -	_{ab} 11	4	-	5	.67
G	Agropyron intermedium	_a -	_b 9	_{ab} 5	-	5	3	.04
G	Agropyron spicatum	_a 5	_a 7	_b 46	4	3	16	2.08
G	Elymus cinereus	-	-	3	-	-	1	.03
G	Koeleria cristata	_a 14	_a 2	_b 44	7	1	18	.59
G	Poa bulbosa	-	-	9	-	-	4	.12
G	Poa fendleriana	-	5	-	-	2	-	-
G	Poa pratensis	1	-	8	1	-	4	.07
G	Poa secunda	_a 77	_b 214	_b 205	36	74	73	4.55
G	Stipa spp.	-	3	-	-	1	-	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		419	588	654	148	186	216	36.16
Total for Grasses		419	588	654	148	186	216	36.16
F	Achillea millefolium	_a 3	_a 4	_b 20	1	2	8	.11
F	Agoseris glauca	_a -	_a -	_b 12	-	-	7	.04
F	Alyssum alyssoides (a)	-	-	42	-	-	20	.25
F	Allium spp.	_a -	_a -	_b 54	-	-	27	.18
F	Antennaria rosea	-	-	2	-	-	1	.03
F	Arabis spp.	-	4	-	-	2	-	-
F	Artemisia ludoviciana	4	8	8	1	3	3	.06
F	Aster chilensis	_a 7	_a 8	_b 60	3	3	20	1.82
F	Astragalus convallarius	-	-	2	-	-	1	.03
F	Astragalus spp.	_a -	_a -	_b 59	-	-	28	.39
F	Calochortus nuttallii	-	-	3	-	-	3	.01
F	Cirsium undulatum	5	3	4	4	1	3	.06
F	Collomia linearis (a)	-	-	34	-	-	16	.08
F	Collinsia parviflora (a)	-	-	98	-	-	38	.33
F	Descurainia pinnata (a)	-	-	6	-	-	2	.01
F	Draba spp. (a)	-	-	85	-	-	31	.18
F	Epilobium brachycarpum (a)	-	-	85	-	-	33	.46
F	Erodium cicutarium (a)	-	-	3	-	-	2	.01
F	Erigeron divergens	_b 124	_a 56	_a 46	48	25	22	.65
F	Holosteum umbellatum (a)	-	-	31	-	-	13	.09

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'01	'84	'90	'01	'01
F	Lappula occidentalis (a)	-	-	9	-	-	4	.04
F	Lactuca serriola	-	-	8	-	-	3	.04
F	Lithospermum ruderales	_b 45	_b 42	_a 8	22	20	4	.49
F	Lupinus argenteus	-	-	2	-	-	2	.06
F	Microsteris gracilis (a)	-	-	27	-	-	14	.11
F	Oenothera pallida	_b 40	_b 32	_a 14	16	16	8	.23
F	Phlox longifolia	-	-	7	-	-	3	.01
F	Polygonum douglasii (a)	-	-	34	-	-	14	.07
F	Ranunculus testiculatus (a)	-	-	46	-	-	20	.15
F	Senecio integerrimus	-	-	2	-	-	2	.01
F	Sphaeralcea coccinea	-	4	4	-	2	3	.02
F	Tragopogon dubius	_a 8	_a 12	_b 56	4	9	29	.42
F	Viguiera multiflora	-	1	-	-	1	-	-
F	Zigadenus paniculatus	_a -	_a -	_b 13	-	-	7	.19
Total for Annual Forbs		0	0	500	0	0	207	1.80
Total for Perennial Forbs		236	174	384	99	84	184	4.89
Total for Forbs		236	174	884	99	84	391	6.70

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 06 , Study no: 3

T y p e	Species	Strip Frequency	Average Cover %
		'01	'01
B	Amelanchier alnifolia	2	.03
B	Artemisia tridentata vaseyana	1	.63
B	Chrysothamnus viscidiflorus viscidiflorus	8	.18
B	Gutierrezia sarothrae	63	1.19
B	Leptodactylon pungens	1	-
B	Opuntia spp.	3	-
B	Symphoricarpos oreophilus	1	-
Total for Browse		79	2.03

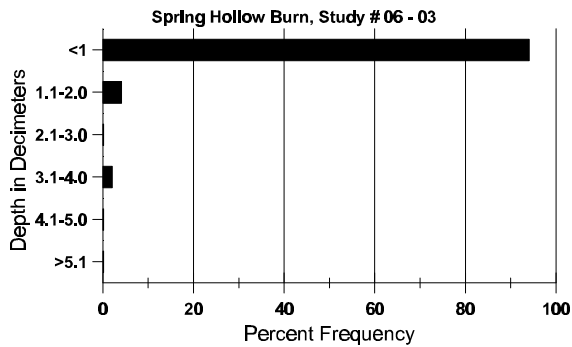
BASIC COVER --
Herd unit 06 , Study no: 3

Cover Type	Nested Frequency '01	Average Cover %		
		'84	'90	'01
Vegetation	379	3.50	15.50	49.49
Rock	202	7.00	3.25	3.73
Pavement	317	11.50	15.75	6.90
Litter	372	49.50	43.25	43.11
Cryptogams	12	11.25	2.00	.07
Bare Ground	280	17.25	20.25	13.19

SOIL ANALYSIS DATA --
Herd Unit 06, Study no: 03, Spring Hollow Burn

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
8.6	66.0 (12.0)	6.5	30.9	38.4	30.6	4.6	25.8	384.0	.9

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 06 , Study no: 3

Type	Quadrat Frequency '01	Pellet Transect	
		Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	10	9	N/A
Horse	1	-	-
Elk	5	113	9 (21)
Deer	2	78	6 (15)
Cattle	16	252	21 (52)

BROWSE CHARACTERISTICS --

Herd unit 06 , Study no: 3

A G R E	Y 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>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	23	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	1	1	-	-	-	-	-	-	2	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'01		50%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'01	40		100%			
<i>Artemisia tridentata vaseyana</i>																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	15	6	-	-	-	-	-	-	21	-	-	-	700	17	23	21
	90	-	7	4	-	-	-	-	-	-	-	11	-	-	366	23	36	11
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20	22	34	1
D	84	-	2	4	-	-	-	-	-	-	4	2	-	-	200			6
	90	-	6	4	-	-	-	-	-	-	1	8	1	-	333			10
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		59%			34%			00%			-28%							
'90		62%			38%			05%			-97%							
'01		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	966	Dec:	21%			
												'90	699		48%			
												'01	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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	3	-	-	-	-	-	3	-	-	-	100		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	11	17	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	12	11	1
	01	16	-	-	-	-	-	-	-	-	16	-	-	-	320	9	13	16
D	84	1	-	-	-	-	-	-	-	-	-	-	1	-	33			1
	90	4	1	-	1	-	-	-	-	-	4	-	-	2	200			6
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			50%			+80%							
'90		10%			00%			20%			-4%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	50%			
												'90	333		60%			
												'01	320		0%			
<i>Gutierrezia sarothrae</i>																		
S	84	43	-	-	-	-	-	-	-	-	43	-	-	-	1433		43	
	90	29	-	-	-	-	-	-	-	-	29	-	-	-	966		29	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	124	-	-	-	-	-	-	-	-	124	-	-	-	4133		124	
	90	239	1	-	-	-	-	-	-	-	232	7	1	-	8000		240	
	01	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
M	84	486	-	-	-	-	-	-	-	-	486	-	-	-	16200	7	6	486
	90	242	2	-	-	-	-	-	-	-	243	-	1	-	8133	7	7	244
	01	193	-	-	-	-	-	-	-	-	191	2	-	-	3860	7	8	193
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	25	1	-	-	-	-	-	-	-	15	-	7	4	866		26	
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-16%							
'90		.78%			00%			03%			-76%							
'01		00%			00%			.48%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	20333	Dec:	0%			
												'90	16999		5%			
												'01	4100		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				
Leptodactylon pungens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'01	60		-			
Opuntia spp.																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200			6
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	11	-	-	-	-	-	-	-	-	11	-	-	-	366	3	3	11
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66	5	10	2
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	9	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	33			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-25%							
'90		00%			00%			11%			-80%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec:	0%			
												'90	299		11%			
												'01	60		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																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	15	23	1
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%			-39%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	33		100%			
												'01	20		0%			

Trend Study 6-4-01

Study site name: Echo Reservoir.

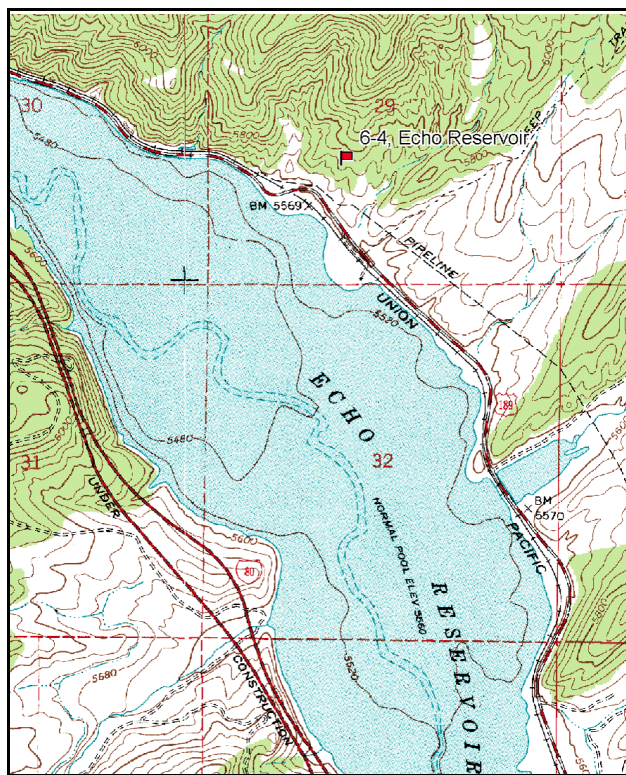
Vegetation type: Juniper.

Compass bearing: frequency baseline 163 degrees magnetic.

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

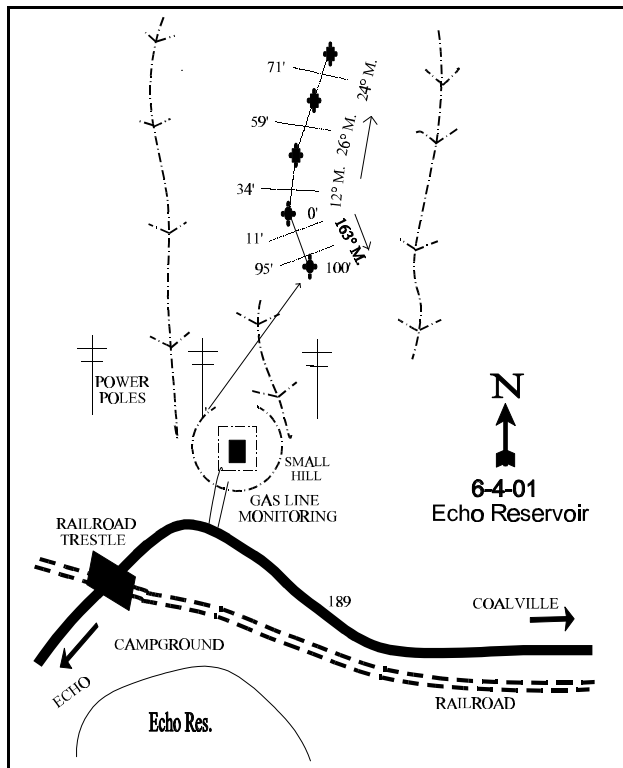
LOCATION DESCRIPTION

From the east end of Echo Dam, proceed toward Coalville on Highway 189 to a point where the road passes over railroad tracks. Continue for approximately 150 yards to a spur road on the left that leads to a gas monitoring station on a small hill. From the power pole, approximately 25 yards north of the station, walk up the narrow ridge north of the power pole approximately 70 paces at 45 degrees true to the 100-foot stake of the baseline. The 0-foot stake is marked by browse tag #7970. The rest of the baseline runs off the 0-foot baseline stake. Line 2 runs in a direction of 34 degrees magnetic. Line 3 runs in a direction of 26 degrees magnetic. Line 4 runs in a direction of 24 degrees magnetic.



Map Name: Coalville

Township 3N, Range 5E, Section 29



Diagrammatic Sketch

UTM 4534516 N 465647 E

DISCUSSION

Trend Study No. 6-4

The Echo Reservoir study samples a Utah juniper community located immediately east of Echo Reservoir near Coalville. This area has critical importance to wintering deer, and to a lesser extent elk. Topographically, the study area is on a rugged southwest-facing slope that becomes very steep on the north and east, but is more gentle near the reservoir. Elevation of the study is about 5,600 feet. Much of the surrounding area, including the high ridge to the north and the bench lands lying immediately adjacent to Grass Creek, were consumed by fire prior to 1977. The old line intercept transect, as well as the range trend study, both lie entirely within unburned juniper.

Big game use of this study area can generally be classified as moderate to heavy. Deer use was known to be heavy prior to 1977 and has, if anything, increased in the intervening years. Although deer were fed at two nearby locations during the winter of 1983-84, signs of long-term winter use was intense. The result of heavy use has been the elimination of nearly all the browse forage, which was already in low abundance. The only species currently capable of providing more than token amounts of browse forage is Utah juniper. Even this species was intensely "highlined" in the past, and provides only limited forage. Further evidence of heavy deer use is provided by the more than 50 winter-killed carcasses from the critical winter of 1983-84 being observed along the old line intercept transect. A pellet group transect read on the site in 2001 estimated 63 deer days use/acre (155 ddu/ha), 8 elk days use/acre (20 edu/ha), and 4 cow days use/acre (9 cdu/ha). In 2001, 3 deer carcasses were also observed on the site.

Soil is a coarse textured, cobblestone loam derived from conglomerate parent material. Effective rooting depth was estimated at just over 12 inches. The soil is clay loam in texture with a moderately alkaline soil reaction (7.9 pH). One characteristic that is of concern is the high average soil temperature on the site determined to be nearly 76°F in 1996. This high of a soil temperature helps explain the presence of cheatgrass, a winter annual, on the site. High soil temperatures are often indicative that a site is prone to invasion by annual species. On the more gentle slopes, soil depth is moderate. On the steeper slopes, soil depth is more shallow and the erosion rate is more rapid. Bare soil has ranged from 23% in 1996 to 32% in 1990. Most of the bare soil lies in the interspaces between juniper trees. On more gentle areas, there is good litter cover under tree crowns and fair grass cover within the tree interspaces. Apart from some unpalatable increasers, shrubs provide very little cover or forage. An erosion condition class assessment done in 2001 determined soil erosion as moderate.

Browse composition consists of a variety of shrubs, of which only mountain big sagebrush and Saskatoon serviceberry are palatable. The remaining species are less preferred and generally classed as increasers or invaders. Most abundant are stickyleaf low rabbitbrush and broom snakeweed. Big sagebrush and serviceberry occurred at very low densities in the past, with an understandably high incidence of decadence. In 2001, no live plants of either species were sampled on the site. Utah juniper is highlined, but not like it was in the winters of 1982-84. It has shown significant recovery, yet is still a limited source of low quality browse. Point-centered quarter data taken in 2001 estimated 80 juniper trees/acre.

Considering the dominant species on the site is juniper, grasses are moderately abundant. Cheatgrass brome was the dominant grass in 1996, providing 64% of the grass cover and 38% of the total vegetative cover on the site. Cheatgrass significantly declined in nested frequency and cover in 2001 due to the drought conditions of 2000 and 2001 in Northern Utah. Perennial grasses nearly doubled in cover in 2001. Indian ricegrass, Sandberg bluegrass, and needle-and-thread all significantly increased in nested frequency in 2001, while bluebunch wheatgrass significantly decreased in nested frequency. Overall, perennial grass sum of nested frequency values increased between 1996 and 2001. Perennial grasses were large and vigorous in

2001. They were also noted as producing plenty of seed. Forbs have been relatively insignificant during all years it has been sampled, contributing only 2% average cover in 2001.

1984 APPARENT TREND ASSESSMENT

Although this area is characterized by heavy sheet and gully erosion, there is some evidence of improvement since 1977. The increase in grass density and vigor, especially that of perennial grasses, suggests a slight improvement in soil trend. In contrast, there has been a new low in shrub cover. Overall trend is only marginally better. Vegetative trend appears to be going downward because of the obvious decline or disappearance of valuable browse species, severe highlining of Utah juniper, and an apparent increase among less palatable increaser shrubs.

1990 TREND ASSESSMENT

The downward browse trend assessed in 1984 for this heavily used winter range still applies. The estimated 101 juniper trees/acre are mostly mature, severely highlined trees. Low rabbitbrush provides most of the browse forage. Opuntia and broom snakeweed are the only browse species that increased in density. The perennial grass component has improved since 1984. The site has a good stand of bluebunch wheatgrass, which increased significantly in frequency, plus Indian ricegrass and needle-and-thread. However, the percentage of litter cover declined, which would be expected with the extended drought. Bare areas increased which could cause more sheet and gully erosion on the steeper slopes.

TREND ASSESSMENT

soil - slightly downward (2)

browse - down (1)

herbaceous understory - slightly up with increases in perennial grasses (4)

1996 TREND ASSESSMENT

Percent bare ground has decreased from 32% to 23%. The nested frequency ratio of bare ground to protective cover (vegetation, litter, and cryptogams) is good at over 1:3. Soil trend is considered slightly up. The browse trend is continuing downward with most all of the preferred key browse species dying off. The trend for the herbaceous understory is slightly down, especially for perennial grasses. Sum of nested frequency for perennial grasses decreased by 16% between 1990 and 1996. Cheatgrass currently contributes 64% of the grass cover, which makes the site a hazard for destructive wildfires.

TREND ASSESSMENT

soil - improved, still only fair (4)

browse - continuing downward, loss of almost all preferred browse species (1)

herbaceous understory - slightly down due to decreased frequency of perennial grasses (2)

2001 TREND ASSESSMENT

Trend for soil is stable. Bare soil slightly increased, but the nested frequency ratio of bare soil to protective cover (vegetation, litter, and cryptogams) only slightly declined, and is still good at over 1:3. Trend for browse remains down. Palatable browse is in very low abundance. Juniper is the dominant browse. The less palatable species, low rabbitbrush, prickly pear, and snakeweed, are the most abundant shrubs. Trend for the herbaceous understory is slightly up. Perennial grasses increased in sum of nested frequency, and cheatgrass brome has greatly reduced cover and frequency due to drought.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 4

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	ab13	b21	ab7	a6	6	9	3	2	.18	.15
G	Agropyron spicatum	a81	b130	c177	ab109	31	51	63	44	5.22	4.59
G	Bromus brizaeformis (a)	-	-	7	-	-	-	4	-	.02	-
G	Bromus japonicus (a)	-	-	-	2	-	-	-	1	-	.00
G	Bromus tectorum (a)	-	-	b323	a152	-	-	93	62	15.37	1.27
G	Oryzopsis hymenoides	b71	b79	a26	b70	31	38	13	36	.43	3.11
G	Poa fendleriana	a-	a-	b18	a-	-	-	6	-	.13	-
G	Poa pratensis	-	-	2	5	-	-	1	2	.00	.30
G	Poa secunda	a10	c143	b63	c150	5	52	24	59	.93	2.65
G	Sitanion hystrix	-	-	1	3	-	-	1	1	.03	.00
G	Sporobolus cryptandrus	2	1	-	-	1	1	-	-	-	-
G	Stipa comata	a32	a47	a61	b92	16	25	26	38	1.87	5.07
Total for Annual Grasses		0	0	330	154	0	0	97	63	15.39	1.28
Total for Perennial Grasses		209	421	355	435	90	176	137	182	8.81	15.89
Total for Grasses		209	421	685	589	90	176	234	245	24.20	17.17
F	Agoseris glauca	-	1	-	-	-	1	-	-	-	-
F	Alyssum alyssoides (a)	-	-	b291	a264	-	-	90	89	2.98	1.28
F	Allium spp.	-	-	-	4	-	-	-	2	-	.01
F	Antennaria rosea	b24	b20	a-	a3	10	8	-	1	-	.00
F	Astragalus spp.	-	-	-	3	-	-	-	1	-	.00
F	Astragalus utahensis	b79	a17	b68	a38	34	10	31	18	1.45	.29
F	Camelina microcarpa (a)	-	-	-	1	-	-	-	1	-	.00
F	Calochortus nuttallii	-	-	-	10	-	-	-	3	-	.01
F	Cirsium undulatum	8	2	3	-	4	2	2	-	.03	-
F	Collomia linearis (a)	-	-	-	3	-	-	-	1	-	.00
F	Collinsia parviflora (a)	-	-	-	8	-	-	-	4	-	.04
F	Cordylanthus ramosus (a)	-	-	-	1	-	-	-	1	-	.00
F	Crepis acuminata	-	-	1	-	-	-	1	-	.00	-
F	Cryptantha spp.	-	-	10	-	-	-	3	-	.06	-
F	Cymopterus spp.	-	-	2	6	-	-	2	2	.01	.01
F	Descurainia pinnata (a)	-	-	-	1	-	-	-	1	-	.00

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Draba spp. (a)	-	-	-	2	-	-	-	1	-	.00
F	Epilobium brachycarpum (a)	-	-	-	4	-	-	-	2	-	.03
F	Eriogonum brevicale	6	2	5	-	2	2	4	-	.09	-
F	Erigeron pumilus	a-	ab ⁵	a-	b ¹²	-	2	-	6	-	.08
F	Galium aparine (a)	-	-	-	2	-	-	-	1	-	.00
F	Hackelia patens	-	-	4	-	-	-	3	-	.01	-
F	Holosteum umbellatum (a)	-	-	1	6	-	-	1	4	.00	.02
F	Lesquerella spp.	-	-	-	3	-	-	-	1	-	.00
F	Lomatium spp.	-	-	-	3	-	-	-	2	-	.01
F	Machaeranthera grindelioides	-	-	-	5	-	-	-	2	-	.03
F	Penstemon humilis	1	-	-	-	1	-	-	-	-	-
F	Phlox austromontana	22	21	12	8	11	9	5	5	.12	.19
F	Phlox longifolia	-	1	-	-	-	1	-	-	-	-
F	Ranunculus testiculatus (a)	-	-	-	5	-	-	-	3	-	.01
F	Sphaeralcea coccinea	30	29	24	19	12	13	11	9	.49	.31
F	Townsendia spp.	-	-	-	5	-	-	-	2	-	.01
F	Tragopogon dubius	b ¹⁵	a ¹	a ¹	a-	8	1	1	-	.00	-
F	Vicia americana	-	-	-	3	-	-	-	2	-	.01
Total for Annual Forbs		0	0	292	297	0	0	91	108	2.98	1.43
Total for Perennial Forbs		185	99	130	122	82	49	63	56	2.30	1.00
Total for Forbs		185	99	422	419	82	49	154	164	5.29	2.43

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 06 , Study no: 4

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Chrysothamnus nauseosus albicaulis	2	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	36	27	1.18	.72
B	Gutierrezia sarothrae	36	33	1.12	.90
B	Juniperus osteosperma	3	2	7.92	5.48
B	Opuntia spp.	36	41	1.15	.90
B	Tetradymia canescens	1	3	-	.03
Total for Browse		114	107	11.39	8.03

CANOPY COVER --

Herd unit 06 , Study no: 4

Point-Quarter Tree Data

Species	Percent Cover		Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01	'96	'01
Juniperus osteosperma	15	18	101	80	10.4	12.6

BASIC COVER --

Herd unit 06 , Study no: 4

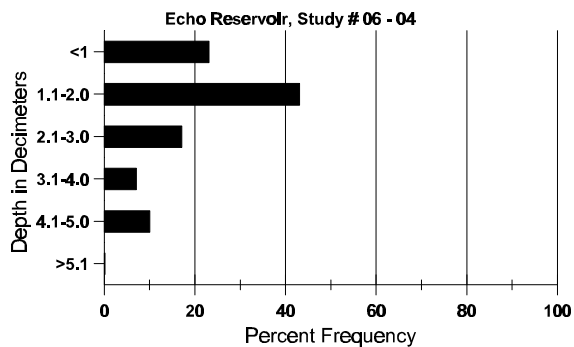
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	381	334	6.50	7.25	37.54	31.35
Rock	132	88	1.25	1.50	2.04	1.21
Pavement	248	262	2.25	4.50	6.47	6.97
Litter	387	348	61.00	46.50	37.07	31.57
Cryptogams	161	236	.75	7.75	6.51	16.85
Bare Ground	282	292	28.25	32.50	23.30	27.64

SOIL ANALYSIS DATA --

Herd Unit 06, Study no: 04, Echo Reservoir

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.3	75.6 (12.1)	7.9	44.7	24.0	31.3	2.1	4.3	38.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 06 , Study no: 4

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	2	19	44	N/A
Elk	5	2	104	8 (20)
Deer	31	36	818	63 (155)
Cattle	1	3	-	-

BROWSE CHARACTERISTICS --

Herd unit 06 , 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		1	2					
Amelanchier alnifolia													
Y	84	-	1	-	-	-	-	-	1	66			1
	90	-	-	-	-	-	-	-	0				0
	96	-	-	-	-	-	-	-	0				0
	01	-	-	-	-	-	-	-	0				0
M	84	-	-	5	-	-	1	-	6	400	42	14	6
	90	-	-	-	-	-	-	-	0				0
	96	-	-	-	-	-	-	-	0				0
	01	-	-	-	-	-	-	-	0				0
D	84	-	-	6	-	-	-	-	5	400			6
	90	-	-	-	-	-	-	-	0				0
	96	-	-	-	-	-	-	-	0				0
	01	-	-	-	-	-	-	-	0				0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'84		08%		92%		00%							
'90		00%		00%		00%							
'96		00%		00%		00%							
'01		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)						'84	866	Dec:	46%				
						'90	0		0%				
						'96	0		0%				
						'01	0		0%				

A Y G R E	Form Class (No. of Plants)	1				2				3				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>																		
D	84	-	1	1	-	-	-	-	-	-	1	-	1	-	66		2	
	90	-	1	-	-	-	-	-	-	-	-	-	-	1	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'84		50%				50%				50%				-50%				
'90		100%				00%				100%								
'96		00%				00%				00%								
'01		00%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)											'84	66	Dec:	100%				
											'90	33		100%				
											'96	0		0%				
											'01	0		0%				
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	84	-	-	1	-	-	-	-	-	-	-	1	-	-	33	19	18	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	27	40	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	20	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	1	-	-	-	-	-	-	-	-	1	-	33		1	
	96	1	-	1	-	-	-	-	-	-	1	-	-	1	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'84		00%				100%				00%				+ 0%				
'90		00%				100%				100%				+18%				
'96		00%				50%				50%				-50%				
'01		00%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)											'84	33	Dec:	0%				
											'90	33		100%				
											'96	40		100%				
											'01	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		1	2											
Chrysothamnus viscidiflorus viscidiflorus																			
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1			
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
Y	84	1	-	-	-	-	-	-	-	1	-	-	-	66		1			
	90	1	-	-	-	-	-	-	-	1	-	-	-	66		1			
	96	28	-	-	-	-	-	-	-	28	-	-	-	560		28			
	01	5	-	-	-	-	-	-	-	5	-	-	-	100		5			
M	84	31	-	-	-	-	-	-	-	14	17	-	-	2066	12 18	31			
	90	22	3	1	-	-	-	-	-	9	-	17	-	1733	10 14	26			
	96	67	-	-	-	-	-	-	-	67	-	-	-	1340	8 14	67			
	01	41	1	-	-	-	-	-	-	42	-	-	-	840	6 10	42			
D	84	34	11	-	-	-	-	-	-	45	-	-	-	3000		45			
	90	5	-	3	-	-	-	-	-	1	-	5	2	533		8			
	96	1	1	-	-	-	-	-	-	2	-	-	-	40		2			
	01	13	-	-	-	-	-	-	-	11	-	-	2	260		13			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'84		14%		00%		00%		-55%											
'90		09%		11%		69%		-17%											
'96		01%		00%		00%		-38%											
'01		02%		00%		03%													
Total Plants/Acre (excluding Dead & Seedlings)										'84	5132	Dec:	58%						
										'90	2332		23%						
										'96	1940		2%						
										'01	1200		22%						

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				
Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	17	-	-	-	-	-	-	-	-	17	-	-	-	566			17
	96	35	-	-	-	-	-	-	-	-	35	-	-	-	700			35
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	90	36	-	-	-	-	-	-	-	-	31	-	4	1	1200			36
	96	29	-	-	-	-	-	-	-	-	29	-	-	-	580			29
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	40	-	-	-	-	-	-	-	-	40	-	-	-	1333	13	14	40
	90	31	-	-	-	-	-	-	-	-	30	-	1	-	1033	8	7	31
	96	64	-	-	-	-	-	-	-	-	64	-	-	-	1280	8	10	64
	01	107	-	-	-	-	-	-	-	-	107	-	-	-	2140	6	8	107
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	4	-	-	-	-	-	-	-	-	3	-	-	1	133			4
	96	2	-	-	-	-	-	-	-	-	-	-	-	2	40			2
	01	10	-	-	-	-	-	-	-	-	5	-	1	4	200			10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+39%							
'90		00%			00%			10%			-20%							
'96		00%			00%			02%			+20%							
'01		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1432	Dec:	2%			
												'90	2366		6%			
												'96	1900		2%			
												'01	2380		8%			

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																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	1	-	-	-	-	-	1	-	33	69 47	1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	2	-	-	-	-	-	-	1	-	3	-	-	-	60	- -	3	
	01	-	1	-	-	-	-	-	1	-	2	-	-	-	40	- -	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			50%			50%			-50%							
'90		100%			00%			00%			+45%							
'96		00%			00%			00%			-33%							
'01		50%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	33		-			
												'96	60		-			
												'01	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				
Opuntia spp.																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	11	-	-	-	-	-	-	-	-	11	-	-	-	366		11	
	90	9	-	-	1	-	-	-	-	-	9	-	1	-	333		10	
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	84	19	-	-	-	-	-	-	-	-	19	-	-	-	633	6 16	19	
	90	25	-	-	-	-	-	-	-	-	18	-	7	-	833	4 16	25	
	96	48	-	-	1	-	-	-	-	-	47	-	2	-	980	5 18	49	
	01	51	1	-	-	-	-	24	-	-	74	1	-	1	1520	5 10	76	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	3	-	-	-	-	-	-	-	-	1	-	-	2	60		3	
	01	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+17%							
'90		00%			00%			22%			+ 8%							
'96		00%			00%			06%			+23%							
'01		01%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	999	Dec:	0%			
												'90	1199		3%			
												'96	1300		5%			
												'01	1680		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																		
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	8	4	-	-	-	-	-	-	-	12	-	-	-	800	27	25	12
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		32%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	1266	Dec:	11%				
											'90	0		0%				
											'96	0		0%				
											'01	0		0%				
Tetradymia canescens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	8	16	2
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20	12	24	1
D	84	-	2	-	-	-	-	-	-	-	-	2	-	-	66		2	
	90	-	2	-	-	-	-	-	-	-	-	1	1	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	4	-	-	-	-	-	-	-	-	1	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		100%			00%			00%			+ 0%							
'90		100%			00%			50%			-39%							
'96		00%			00%			00%			+60%							
'01		20%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	66	Dec:	100%				
											'90	66		100%				
											'96	40		0%				
											'01	100		80%				

Trend Study 6-5-01

Study site name: Spring Canyon.

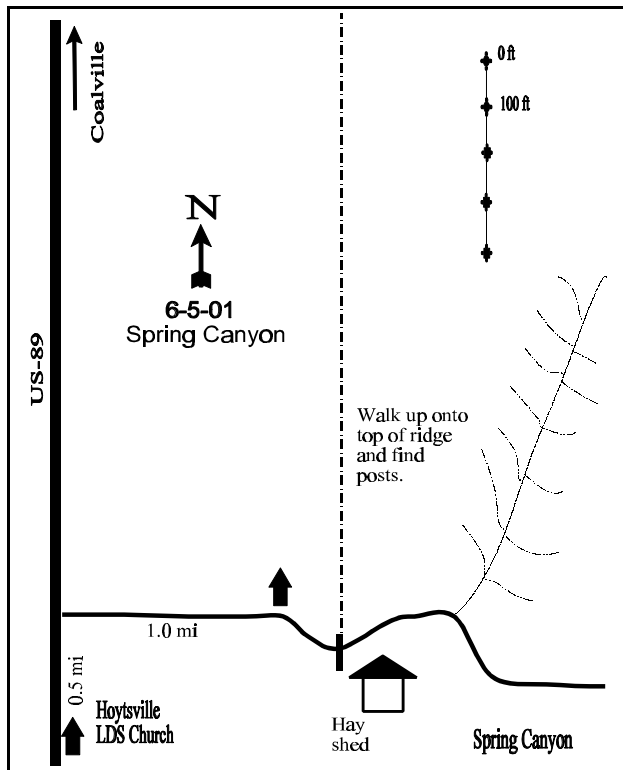
Vegetation type: Juniper.

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the LDS Church in Hoytsville, travel north 0.5 miles on old U.S. 189. At 0.5 miles note a dirt road to the right with a sign "Echo-Chalk Creek Range Owners Protective Association" and turn right (east). Proceed 1.0 miles to a gate and a sharp bend to the right (south). Walk to the north side of the road to a north/south running fence. From here walk north along the fence to the 40th metal fence post. From post #40 walk 35 paces at 73 degrees true to the 400-foot baseline stake. The 0-foot stake is marked with browse tag #7953.



Map Name: Turner Hollow

Diagrammatic Sketch

Township 2N, Range 5E, Section 22

UTM 4526183 N 469139 E

DISCUSSION

Trend Study No. 6-5

The Spring Canyon study is located on a juniper covered ridge immediately east of Hoytsville and north of the mouth of Spring Canyon. The study area lies on south-facing slopes that seldom exceed 15%. The area is considered critical deer winter range and is occupied by a closed and relatively unproductive Utah juniper community. The juniper type is very uniform in this area and characterized by a moderately dense stand of uneven-aged juniper. Animal use has been heavy on the site and includes sheep, deer, and elk. Domestic sheep were on the area in late-August of 1984 when the study was initiated. Deer pellet groups have been high in all sampled years. Nine winter-killed deer were observed in the immediate vicinity in 1984. Utilization of available forage has usually approached 100% in the past. Browsing has often extended into 3-year, 4-year, and even older wood on mountain big sagebrush, true mountain mahogany, and juniper. Few preferred shrubs are found on the site anymore. A pellet group transect read on the site in 2001 estimated 58 deer days use/acre (144 ddu/ha) and less than 1 cow day use/acre (2 cdu/ha). Numerous game trails also traverse the site.

Soils on the site have a clay loam texture, and are neutral soil reaction (7.3 pH). The soil surface is rocky and the profile is also moderately stony. Effective rooting depth was estimated at just over 12 inches in 1996. Average soil temperature at 12 inches in depth was estimated at over 70° F. Soil temperatures this high tend to make the soil dry for long periods during the summer, making it more difficult for perennial grasses and young shrubs to become established on the site. Thus, high soil temperatures tend to favor winter annuals like cheatgrass. The erosion hazard is moderately high because of poor understory cover and low permeability. In 2001, the level of erosion ranges from slight to moderate on the site. Vegetation cover is low at only 18% in 2001. Litter was moderate (40%), but much of the litter is provided by dead juniper leaves. Cryptogams are moderately abundant (14% in 2001), which provide additional important protective cover in the absence of herbaceous vegetation.

Other than juniper, shrubs and trees are rare. Browse species consists basically of broom snakeweed, prickly pear cactus, and a few snowberry. Utah juniper is the dominant species which provides little forage. Nearly all of the juniper trees have received use over the years as evidenced by past highlining. Juniper canopy cover was estimated at 37% in 2001.

The herbaceous understory is sparse and is not an important source of cover or forage. Native perennial grasses are somewhat abundant in the more open areas, but are infrequent where the juniper overstory is dense. Bluebunch wheatgrass, Indian ricegrass, Sandberg bluegrass, squirreltail, and needle-and-thread have all been sampled on the site. Perennial grasses provided only 5% average cover in 1996 and 2001. Cheatgrass is also present, but has not reached a dominant level. Forbs consist mostly of annual and/or low-growing perennials that provide very little cover or forage. A chaining and seeding project is likely the only type of treatment that could increase vegetative diversity and production on this site.

1984 APPARENT TREND ASSESSMENT

Soil is moderately shallow and inadequately protected from erosion. The current rate of erosion is moderately high and will continue to be so. Trend appears down. Vegetative trend appears to be marginally down. It is categorized as "marginally down" only because it is difficult to imagine conditions being much worse than they currently are. Plant composition shows little evidence of significant change beyond the continuing decline of all palatable browse species, and possibly a small increase in density, cover, and production of perennial grasses. Utah juniper will likely become even more dominant than it is now. Very heavy use in the past seven years, especially the last two, has adversely affected long-term forage production potential of the

site as well as the further depletion of shrub diversity. Of particular concern is the "highlining" of juniper which formerly provided an "emergency" forage source.

1990 TREND ASSESSMENT

Unfortunately, this depleted juniper range type is representative of a majority of winter range in the area above Hoytsville. There is very little browse forage available. The steeper slopes and west exposures support a variety of browse species, but all occur in low densities, are heavily hedged, and mostly decadent. All juniper trees are highlined. Notably, bluebunch wheatgrass decreased in nested frequency while Indian ricegrass frequency was almost unchanged. These plants show evidence of recent grazing. The highly erodible soil is exposed except for the dense litter under the junipers.

TREND ASSESSMENT

soil - slightly downward (2)

browse - down (1)

herbaceous understory - down (1)

1996 TREND ASSESSMENT

This site has the lowest herbaceous cover of all the sites within management unit 6 at only 8%. This doesn't allow for very much protective cover. Percent bare ground actually increased since 1990. Trend for soil is slightly down and in poor condition. The browse trend remains down, with no preferred browse being sampled within the study area. Trend for the herbaceous understory is stable for perennial species, but it still is in very poor condition contributing only 8% cover.

TREND ASSESSMENT

soil - slightly down and in poor condition (2)

browse - down, most preferred browse is gone (1)

herbaceous understory - stable for perennial species, but still not enough cover to protect the soil (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Herbaceous vegetation remains low, but litter cover is stable and cryptogamic cover increased from 3% to 14%. Bare soil remains high, but only slightly increased since 1996. Trend for browse remains down. As in previous readings, palatable, preferred browse forage is nearly nonexistent on the site. Trend for the herbaceous understory is stable, but remains in poor condition. Perennial grasses are in low abundance and forbs are insignificant. Due to the vegetative characteristics of the site at the present time, this site is really only useful as thermal cover and as a travel corridor for wildlife. A chaining and seeding project is likely the only treatment that could increase vegetative diversity and production in the area.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 5

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	b ₅₉	a ₃₂	ab ₄₄	ab ₅₃	31	13	20	23	.59	1.43
G	Bromus tectorum (a)	-	-	b ₁₂₉	a ₁₀₃	-	-	48	44	2.82	.42
G	Oryzopsis hymenoides	68	66	78	85	34	31	36	42	1.08	1.62
G	Poa pratensis	3	-	-	-	2	-	-	-	-	-
G	Poa secunda	a ₁₃	b ₅₆	ab ₄₇	b ₅₄	7	28	17	22	.48	.96
G	Sitanion hystrix	a ₁	b ₃₄	b ₂₂	ab ₂₃	1	18	12	10	.28	.51
G	Stipa comata	b ₁₃	ab ₂₇	ab ₂₉	a ₉	7	13	11	6	.30	.34
Total for Annual Grasses		0	0	129	103	0	0	48	44	2.82	0.42
Total for Perennial Grasses		157	215	220	224	82	103	96	103	2.75	4.86
Total for Grasses		157	215	349	327	82	103	144	147	5.58	5.28
F	Alyssum alyssoides (a)	-	-	239	262	-	-	76	91	1.10	1.05
F	Antennaria rosea	-	6	1	7	-	3	1	3	.00	.04
F	Arabis spp.	-	3	5	-	-	1	3	-	.01	-
F	Astragalus convallarius	4	-	-	-	2	-	-	-	-	-
F	Astragalus utahensis	1	-	2	1	1	-	1	1	.03	.03
F	Camelina microcarpa (a)	-	-	5	2	-	-	2	1	.01	.00
F	Chaenactis douglasii	2	-	-	-	2	-	-	-	-	-
F	Cirsium undulatum	2	-	1	-	2	-	1	-	.03	-
F	Collinsia parviflora (a)	-	-	2	3	-	-	2	1	.01	.00
F	Cryptantha spp.	30	13	21	16	16	8	11	8	.25	.45
F	Cymopterus longipes	-	2	5	3	-	2	4	2	.02	.01
F	Descurainia pinnata (a)	-	-	-	2	-	-	-	1	-	.00
F	Eriogonum umbellatum	7	2	-	-	3	1	-	-	-	-
F	Hackelia patens	-	11	7	6	-	5	4	3	.04	.04
F	Hedysarum boreale	8	-	-	-	5	-	-	-	-	-
F	Machaeranthera canescens	-	-	2	1	-	-	2	1	.01	.00
F	Microsteris gracilis (a)	-	-	b ₋	a ₁₂	-	-	-	6	-	.05
F	Penstemon humilis	1	5	3	5	1	2	1	3	.03	.01
F	Penstemon spp.	b ₁₇	a ₋	a ₃	a ₁	7	-	1	1	.03	.00
F	Phlox austromontana	27	20	39	37	12	8	17	18	.66	.82
F	Phlox longifolia	-	-	5	11	-	-	3	4	.01	.02
F	Ranunculus testiculatus (a)	-	-	a ₈₆	b ₁₆₆	-	-	35	61	.27	.97
F	Senecio multilobatus	-	-	2	-	-	-	1	-	.00	-
F	Sisymbrium altissimum (a)	-	-	1	-	-	-	1	-	.00	-

T y p e	Species	Nestled Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
	Total for Annual Forbs	0	0	333	447	0	0	116	161	1.39	2.09
	Total for Perennial Forbs	99	62	96	88	51	30	50	44	1.16	1.43
	Total for Forbs	99	62	429	535	51	30	166	205	2.56	3.53

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 06 , Study no: 5

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	0	1	-	-
B	Gutierrezia sarothrae	6	7	.20	.03
B	Juniperus osteosperma	12	12	16.73	8.39
B	Opuntia spp.	8	11	.22	.05
B	Symphoricarpos oreophilus	1	0	-	-
	Total for Browse	27	31	17.15	8.47

CANOPY COVER --

Herd unit 06 , Study no: 5

Point-Quarter Tree Data

Species	Percent Cover		Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01	'96	'01
Juniperus osteosperma	35	37	159	189	11.9	17.7

BASIC COVER --

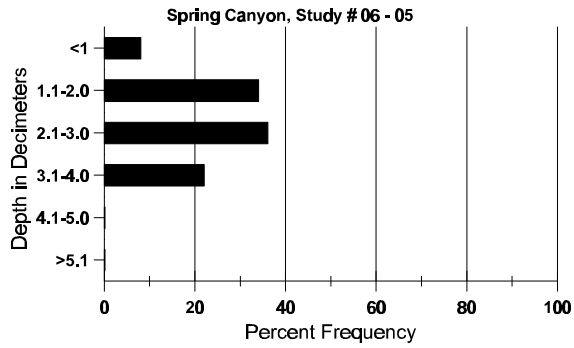
Herd unit 06 , Study no: 5

Cover Type	Nestled Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	337	321	.50	1.00	25.55	18.48
Rock	129	123	1.75	6.25	2.94	2.79
Pavement	207	201	9.25	12.50	3.84	5.47
Litter	382	331	56.25	48.50	40.31	40.42
Cryptogams	152	206	2.75	5.25	3.52	14.18
Bare Ground	260	251	29.50	26.50	28.08	31.93

SOIL ANALYSIS DATA --
 Herd Unit 06, Study no: 05, Spring Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.1	70.2 (11.9)	7.3	32.6	30.7	36.7	2.9	3.8	38.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 06 , Study no: 5

Type	Quadrat Frequency	
	'96	'01
Sheep	2	-
Rabbit	12	37
Elk	1	1
Deer	44	22
Cattle	-	1

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
339	N/A
-	-
757	58 (144)
9	1 (2)

BROWSE CHARACTERISTICS --

Herd unit 06 , Study no: 5

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 alnifolia</i>																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	1	-	-	-	-	-	-	-	-	-	-	1	33		1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
	'84	00%			00%			00%									
	'90	100%			00%			100%									
	'96	00%			00%			00%									
	'01	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	33		-		
												'96	0		-		
												'01	0		-		
<i>Artemisia tridentata vaseyana</i>																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
	'84	00%			00%			00%									
	'90	00%			00%			00%									
	'96	00%			00%			00%									
	'01	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	0		-		
												'01	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			
Chrysothamnus viscidiflorus viscidiflorus																	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		50%			00%			00%									
'90		00%			00%			00%									
'96		00%			00%			00%									
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	50%		
												'90	0		0%		
												'96	0		0%		
												'01	0		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			
Gutierrezia sarothrae																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	01	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	7	8
	01	3	-	-	-	-	-	1	-	-	4	-	-	-	80	5	4
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		00%			00%			00%									
'90		00%			00%			00%									
'96		00%			00%			00%			+40%						
'01		00%			00%			05%									
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%			
											'90	0		0%			
											'96	240		0%			
											'01	400		5%			

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																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	1	1	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	33		1	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	3	3	-	-	-	-	3	-	9	-	-	-	300	67 157	9	
	90	1	-	-	-	-	-	4	-	3	8	-	-	-	266	186 153	8	
	96	5	-	-	-	-	-	3	3	-	11	-	-	-	220	- -	11	
	01	6	-	-	-	-	-	2	3	-	11	-	-	-	220	- -	11	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	2	-	-	-	-	-	2	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		36%			36%			00%			-18%							
'90		00%			33%			00%			-13%							
'96		00%			00%			00%			+ 7%							
'01		00%			00%			14%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	366	Dec:	0%			
												'90	299		0%			
												'96	260		0%			
												'01	280		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		1	2											
Opuntia spp.																			
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1			
Y	84	1	-	-	-	-	-	-	-	1	-	-	-	33		1			
	90	2	-	-	-	-	-	-	-	2	-	-	-	66		2			
	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1			
	01	3	-	-	-	-	-	-	-	3	-	-	-	60		3			
M	84	1	-	-	-	-	-	-	-	1	-	-	-	33	7 14	1			
	90	2	-	-	-	-	-	-	-	2	-	-	-	66	5 10	2			
	96	8	-	-	-	-	-	-	-	8	-	-	-	160	5 12	8			
	01	8	-	-	1	-	-	-	-	8	1	-	-	180	4 10	9			
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	90	1	-	-	-	-	-	-	-	-	-	1	-	33		1			
	96	5	-	-	-	-	-	-	-	1	-	4	-	100		5			
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1			
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	96	-	-	-	-	-	-	-	-	-	-	-	-	40		2			
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'84		00%		00%		00%		+60%											
'90		00%		00%		20%		+41%											
'96		00%		00%		29%		- 7%											
'01		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'84	66	Dec:	0%						
										'90	165		20%						
										'96	280		36%						
										'01	260		8%						
Symphoricarpos oreophilus																			
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
	96	1	-	-	-	-	-	-	-	1	-	-	-	20	7 12	1			
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'84		00%		00%		00%													
'90		00%		00%		00%													
'96		00%		00%		00%													
'01		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	-						
										'90	0		-						
										'96	20		-						
										'01	0		-						

Not Read

Trend Study 6-6-96

Study site name: Hixon Canyon.

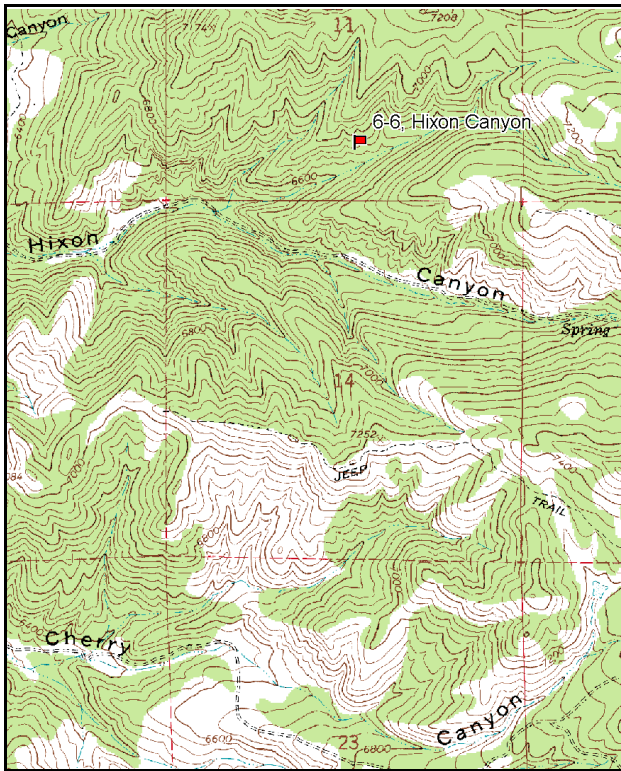
Vegetation type: True Mountain Mahogany.

Compass bearing: frequency baseline 146 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34 & 76ft), line 3 (59ft).

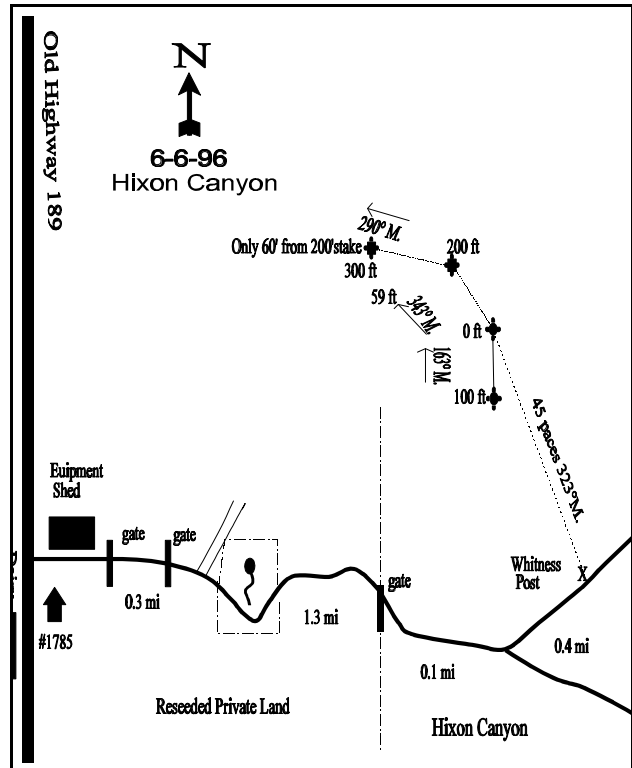
LOCATION DESCRIPTION

From 1875 Old Highway 189, travel east up Hixon Canyon on a dirt road through a gate and proceed 0.3 miles to another gate. Turn right and proceed 1.3 miles to a fence with a gate. Continue 0.1 miles and turn left at the fork. This road is only shown as an intermittent stream on 1967 quad map. Proceed 0.40 miles to a white topped green steel fence post stake in a rockpile. From the rockpile, walk 45 paces at 323 degrees magnetic to the 0-foot stake of the baseline marked by browse tab #7966. The baseline runs 146 degrees. The rest of the baseline runs off the 0-foot baseline stake. Line 2 runs 326 degrees magnetic. Line 3 runs 288 degrees magnetic.



Map Name: Crandall Canyon

Township 1N, Range 5E, Section 11



Diagrammatic Sketch

UTM 4519983 N 470604 E

DISCUSSION

Trend Study No. 6-6

***This study was not read in 2001 because project personnel could not gain access through private land. The study will be reevaluated during the next rotation. The site narrative and data tables are included from the 1996 volume 2 Utah Big Game Range Trend Studies report.

The Hixon Canyon study was established in 1984. This site is located in the upper reaches of Hixon Canyon at 6,680 feet in elevation. It samples a mixed mountain brush type on moderately steep (20-25% slope), south-facing terrain. Although it lies higher up the canyon than the old line intercept transect it replaced, this study is still within the limits of critical deer winter range. Browse utilization appears to be moderately heavy, but this appearance is exacerbated by extended drought. Pellet group frequency for deer appears to indicate moderate use (17%), with elk pellet groups displaying only light use (3%). Domestic sheep and cattle also utilize the site. There was significant use of Indian ricegrass noted in 1984.

Soil is red in color and appears to be highly erodible. Most surface rock and herbaceous plants are pedestaled. Soil texture is a sandy clay loam with a soil reaction that is moderately alkaline (7.9 pH). Percent organic matter in the soil is the lowest of all sites in the management unit at only 1.7%, where the average for the unit is 3%. The range for percent organic matter for Utah is generally from 1.5 to 5.0%. Drainage and permeability are probably quite rapid. Effective rooting depth (see methods) is moderate at a little over 12 inches. Soil temperature at this depth is about 66° F with a moderately rocky soil profile. Percent bare ground was originally quite high at 39% (1984) and now is about 18% in 1996. The ratio and distribution (nested frequency) of protective ground cover (vegetation and litter cover) to bare ground is considered only fair with a value of 1:2.8. A value of 1:3 or higher usually affords moderately good protection from high intensity summer storm events. Consequently, the erosion rate is moderate and continuing soil loss is a problem.

This site, like many mountain brush types, has a plant composition that is quite variable according to the availability of microsites. On much of the area, the key browse species (true mountain mahogany and mountain big sagebrush) and juniper provide the vegetative aspect for the community. In terms of abundance however, they provide 2%, 23%, and 56% of the browse cover respectively. From 1984 and 1990, it appeared that broom snakeweed was going to take over the site with a population that had increased to more than 22,000 plants/acre. Since then, the population is estimated at only 740 plants/acre. The drought has obviously had a detrimental effect on its density. Now only 3% of the browse cover is contributed by broom snakeweed. Both of the preferred "key" species, as well as the less abundant Saskatoon serviceberry and mountain snowberry, have sustained heavy use which has been intensified by prolonged drought. Utilization coupled with drought has effected the vigor and age structure of mountain big sagebrush and true mountain mahogany. Even stickyleaf low rabbitbrush, a species that seldom is utilized, shows moderately heavy use. Almost all of the browse populations mentioned above, but especially the key species, have excessively decadent age structures. What is most alarming on this site is the proportion of dead plants in the populations of mountain big sagebrush and true mountain mahogany at 55% and 29% respectively.

The herbaceous understory contributes little quality forage, and the majority comes from cheatgrass. Plants occur erratically and appear to be greatly effected by soil erosion. Many of the shrub interspaces are bare soil and rock. The most numerous perennial species are Sandberg bluegrass, bluebunch wheatgrass, and Indian ricegrass which are important forage species. All show evidence of considerable current utilization.

1984 APPARENT TREND ASSESSMENT

Soil is derived from conglomerate parent material and thus is highly erodible. Heavy animal use is contributing to conditions that favor rapid soil erosion, which in turn adversely affects vegetative potential. Soil trend appears down. Vegetative trend also appears to be declining due to decadent age structures and excessive browsing on the key browse species, and an apparent increase of undesirable shrubs such as broom snakeweed and prickly pear cactus.

1990 TREND ASSESSMENT

The key browse species are highly decadent and heavily used. The south-facing slope is moderately steep (35%). North-facing slopes in the area support more and healthier browse, attesting to the effects of the prolonged drought. There is some mountain mahogany recruitment with the young age class accounting for 13% of the population. The low density sagebrush population has canopy cover averaging only 2%. Undesirable woody species make up the vast majority of the browse composition. Broom snakeweed has increased by 31%. Junipers have an estimated density of 78 trees/acre. Indian ricegrass shows an increase in nested frequency with moderate utilization. There was a 78% increase in the amount of erosion pavement.

TREND ASSESSMENT

soil - downward (1)

browse - downward due to density losses for key browse species and large increase for broom snakeweed (1)

herbaceous understory - slightly improving with increased nested frequencies for Indian ricegrass and Sandberg bluegrass (4)

1996 TREND ASSESSMENT

The trend for soil is stable. Percent bare ground declined to less than 18%. Vegetation and litter cover are moderate and adequately distributed to prevent heavy erosion. The trend for the two preferred browse species is down. The proportion of the population made up of dead plants is high at 56% for mountain big sagebrush and 29% for true mountain mahogany. Percent decadency for sagebrush is also high at 62%. Mahogany is showing some improvement with only about 20% decadency, but its density is down to only 300 plants/acre. This is one of the few sites where dead mahogany was sampled. You can usually have a moderately high percent decadency, but usually no significant number of dead plants. The only real positive note for this site is that the population of broom snakeweed has decreased by 97%. The herbaceous understory (perennial component) is also down for both the grasses and forbs where most of the herbaceous cover is from annuals.

TREND ASSESSMENT

soil - stable (3)

browse - continuing downward (1)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	<i>Agropyron dasystachyum</i>	-	-	3	-	-	1	.03
G	<i>Agropyron spicatum</i>	_a 29	_a 27	_b 64	13	12	28	1.64
G	<i>Bromus tectorum</i> (a)	-	-	269	-	-	85	6.09
G	<i>Elymus cinereus</i>	-	-	6	-	-	2	.53
G	<i>Oryzopsis hymenoides</i>	_b 86	_b 116	_a 29	44	47	15	1.04
G	<i>Poa bulbosa</i>	-	-	3	-	-	1	.00
G	<i>Poa fendleriana</i>	-	-	1	-	-	1	.15
G	<i>Poa secunda</i>	_a 18	_b 58	_b 69	7	25	29	1.97
Total for Annual Grasses		0	0	269	0	0	85	6.09
Total for Perennial Grasses		133	201	175	64	84	77	5.38
Total for Grasses		133	201	444	64	84	162	11.48
F	<i>Alyssum alyssoides</i> (a)	-	-	252	-	-	77	2.32
F	<i>Artemisia ludoviciana</i>	_b 21	_b 17	_a -	9	6	-	.03
F	<i>Camelina microcarpa</i> (a)	-	-	1	-	-	1	.00
F	<i>Calochortus nuttallii</i>	-	5	-	-	2	-	-
F	<i>Chenopodium album</i> (a)	-	-	1	-	-	1	.00
F	<i>Chaenactis douglasii</i>	_a 9	_b 53	_a 3	7	27	3	.01
F	<i>Cirsium undulatum</i>	_{ab} 9	_b 17	_a 5	5	10	2	.04
F	<i>Comandra pallida</i>	_{ab} 6	_a 1	_b 11	3	1	4	.07
F	<i>Cryptantha</i> spp.	6	16	8	3	6	4	.02
F	<i>Cynoglossum officinale</i>	1	-	-	1	-	-	-
F	<i>Erigeron pumilus</i>	-	-	8	-	-	3	.01
F	<i>Hackelia patens</i>	6	12	11	3	5	5	.02
F	<i>Holosteum umbellatum</i> (a)	-	-	1	-	-	1	.00
F	<i>Machaeranthera canescens</i>	1	2	-	1	1	-	-
F	<i>Oenothera caespitosa</i>	_{ab} 8	_b 13	_a -	3	6	-	-
F	<i>Phlox austromontana</i>	-	-	2	-	-	1	.00
F	<i>Phlox longifolia</i>	-	2	-	-	2	-	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	13	-	-	4	.02
F	<i>Tragopogon dubius</i>	2	1	-	1	1	-	-
Total for Annual Forbs		0	0	268	0	0	84	2.35
Total for Perennial Forbs		69	139	48	36	67	22	0.22
Total for Forbs		69	139	316	36	67	106	2.57

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 06 , Study no: 6

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier alnifolia	2	.03
B	Artemisia tridentata vaseyana	10	.25
B	Cercocarpus montanus	15	2.93
B	Chrysothamnus viscidiflorus viscidiflorus	3	.03
B	Gutierrezia sarothrae	11	.32
B	Juniperus osteosperma	8	7.08
B	Opuntia spp.	19	.16
B	Quercus gambelii	2	1.63
B	Symphoricarpos oreophilus	1	.18
Total for Browse		71	12.62

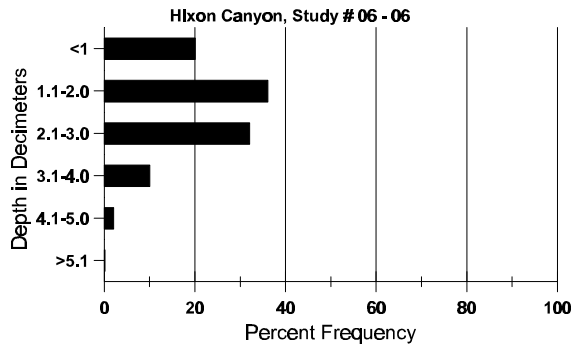
BASIC COVER --
Herd unit 06 , Study no: 6

Cover Type	Nested Frequency	Average Cover %		
	'96	'84	'90	'96
Vegetation	350	2.75	7.00	28.37
Rock	290	21.00	23.00	15.63
Pavement	258	4.00	18.25	10.17
Litter	388	33.25	20.50	39.14
Cryptogams	17	0	0	.09
Bare Ground	268	39.00	31.25	17.65

SOIL ANALYSIS DATA --
Herd Unit 06, Study no: 06, Hixon Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.3	66.3 (12.4)	7.9	46.9	25.1	28.0	1.7	9.7	19.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 06 , Study no: 6

Type	Quadrat Frequency '96
Rabbit	18
Elk	3
Deer	17
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 06 , 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.		
Amelanchier alnifolia																		
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66	30	30	2
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	66	39	31	2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	24	24	1
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>						<u>%Change</u>				
'84		00%			100%			00%						-33%				
'90		00%			100%			00%						-39%				
'96		50%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	99	Dec:	33%			
												'90	66		0%			
												'96	40		50%			

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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	2	5	-	-	-	-	-	-	7	-	-	-	233	21	28	7
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	14	43	1
	96	2	3	-	-	-	-	-	-	-	5	-	-	-	100	18	32	5
D	84	-	-	16	-	-	-	-	-	-	14	-	-	2	533			16
	90	1	1	1	-	-	-	-	-	-	1	-	-	2	100			3
	96	3	4	1	-	-	-	-	-	-	6	-	-	2	160			8
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	320			16
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		09%			91%			09%			-78%							
'90		20%			20%			40%			+36%							
'96		54%			08%			15%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	766	Dec:	70%			
												'90	166		60%			
												'96	260		62%			
<i>Cercocarpus montanus</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	1	1	-	-	-	-	-	-	2	-	-	-	66			2
	96	1	1	1	-	-	-	-	-	-	3	-	-	-	60			3
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	2	-	-	-	-	-	-	1	1	-	-	66	22	31	2
	96	-	1	8	-	-	-	-	-	-	9	-	-	-	180	23	34	9
D	84	-	-	14	-	-	-	-	-	-	14	-	-	-	466			14
	90	-	-	11	-	-	-	-	-	-	2	-	4	5	366			11
	96	-	1	2	-	-	-	-	-	-	2	-	-	1	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			93%			00%			- 0%							
'90		07%			93%			60%			-40%							
'96		20%			73%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	499	Dec:	93%			
												'90	498		73%			
												'96	300		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				
Chrysothamnus viscidiflorus viscidiflorus																		
M	84	4	-	3	-	-	-	-	-	-	7	-	-	-	233	20	18	7
	90	9	-	-	1	-	-	-	-	-	6	-	4	-	333	19	27	10
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	11	19	3
D	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66			2
	90	1	-	-	-	-	-	-	-	-	-	-	1	33			1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			56%			00%			+18%							
'90		00%			00%			45%			-84%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	299	Dec:	22%			
												'90	366		9%			
												'96	60		0%			
Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	11	-	-	-	-	-	-	-	-	11	-	-	-	366			11
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	97	-	-	-	-	-	-	-	-	97	-	-	-	3233			97
	90	445	-	-	-	-	-	-	-	-	445	-	-	-	14833			445
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
M	84	363	-	-	-	-	-	-	-	-	363	-	-	-	12100	9	9	363
	90	213	1	-	3	-	-	-	-	-	216	-	1	-	7233	9	10	217
	96	23	-	-	-	-	-	-	-	-	23	-	-	-	460	7	13	23
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	8	-	-	-	-	-	-	-	-	4	-	-	4	266			8
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+31%							
'90		.14%			00%			.74%			-97%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	15333	Dec:	0%			
												'90	22332		1%			
												'96	740		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				
Juniperus osteosperma																		
M	84	2	-	-	2	-	-	-	-	-	4	-	-	-	133	60	48	4
	90	2	-	-	1	-	-	-	-	-	3	-	-	-	100	71	56	3
	96	4	-	2	-	-	-	2	-	-	8	-	-	-	160	-	-	8
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-25%							
'90		00%			00%			00%			+38%							
'96		00%			25%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	133	Dec:	-				
											'90	100		-				
											'96	160		-				
Opuntia spp.																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	90	6	-	-	1	-	-	-	-	-	7	-	-	-	233			7
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	15	-	-	-	-	-	-	-	-	15	-	-	-	500	6	7	15
	90	6	-	-	1	-	-	-	-	-	6	-	1	-	233	4	8	7
	96	26	1	-	-	-	-	-	-	-	23	1	1	2	540	6	16	27
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-21%							
'90		00%			00%			13%			+11%							
'96		04%			00%			11%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	633	Dec:	0%				
											'90	499		7%				
											'96	560		0%				

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4	5	6	7	8	9	1	2	3		4			
Quercus gambelii																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	7	-	-	7	-	-	-	140	-	-	7
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'84		00%				00%				00%								
'90		00%				00%				00%								
'96		00%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	140		-			
Symphoricarpos oreophilus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	19	17	1
	90	7	-	-	-	-	-	-	-	-	-	-	7	-	233	23	24	7
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	17	37	0
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'84		50%				50%				00%				+75%				
'90		00%				00%				100%				-92%				
'96		00%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	50%			
												'90	266		12%			
												'96	20		0%			

Trend Study 6-7-01

Study site name: Crandall Canyon .

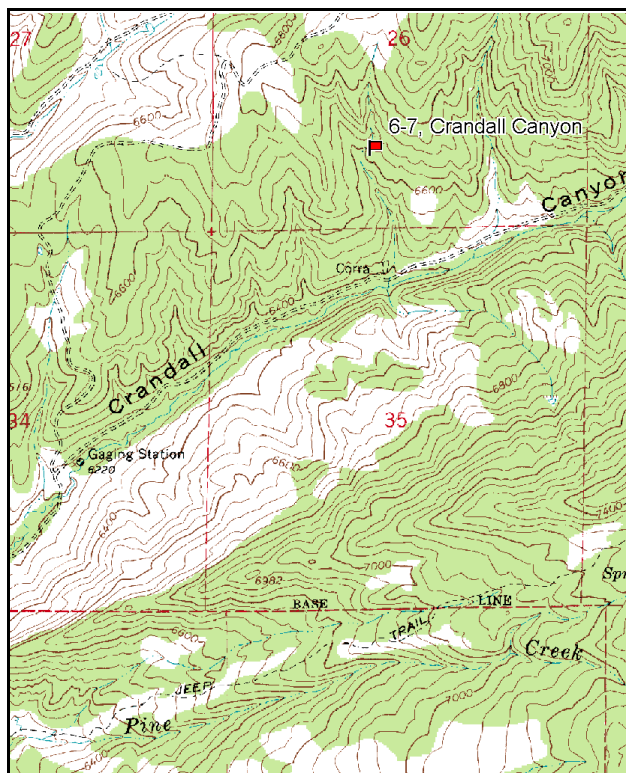
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11, 31, & 71ft), line 2 (59 & 95ft).

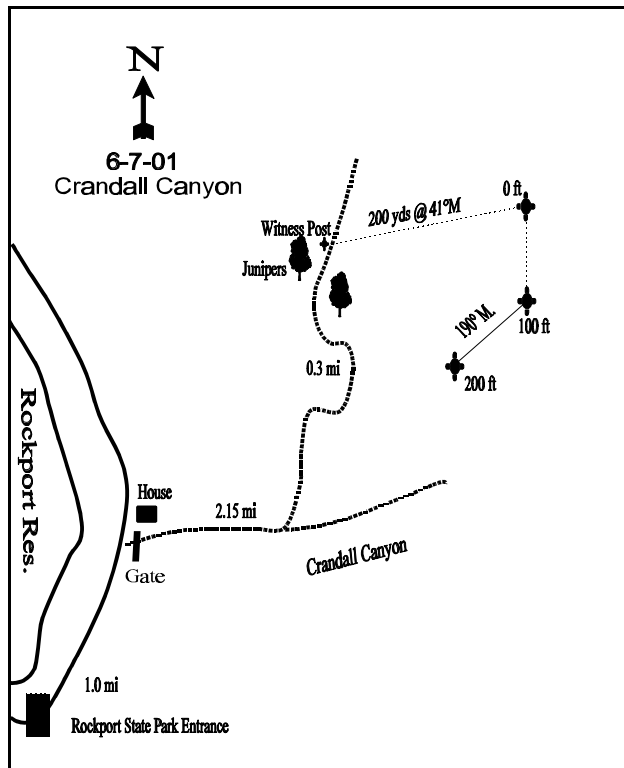
LOCATION DESCRIPTION

From the guard house at Rockport State Park, proceed north and east on the paved road for 1.0 mile. Turn right, proceed up through the gate and up Crandall Canyon (dirt road) for 2.15 miles, and turn left at the fork. Travel 0.3 miles north on this road to a pair of junipers on either side of the road. Just past the junipers on the left hand side of the road is a witness post. From the witness post walk approximately 200 yards at 41 degrees magnetic to the 0-foot stake of the baseline. The 0-foot stake is marked by browse tag #7956. The 200-foot baseline doglegs and runs 190 degrees magnetic.



Map Name: Crandall Canyon

Township 1N, Range 5E, Section 26



Diagrammatic Sketch

UTM 4514925 N 470499 E

DISCUSSION

Trend Study No. 6-7

The Crandall Canyon study is located on critical deer and elk winter range at approximately 6,640 feet in elevation. The site lies on a moderately steep (35%), southwest-facing slope. The plant community in this area is best described as mixed mountain brush that varies from mountain big sagebrush-grass to areas nearly dominated by Gambel oak. The result is a mosaic vegetative pattern that provides excellent big game habitat. Crandall Canyon is entirely private land and is intensively grazed by sheep and cattle. Deer, elk, and moose must therefore compete for available forage. The intensity of use tends to be heavy, and one or more of previous listed animal species is usually on the site at all times of the year. All classes of vegetation have shown impacts of grazing or browsing over the life of this transect. A pellet group transect read on the site in 2001 estimated 50 deer days use/acre (122 ddu/ha), 2 elk days use/acre (5 edu/ha), and 7 cow days use/acre (16 cdu/ha).

Soil texture on this site is classified as sandy clay loam. The soil reaction is moderately alkaline (8.0 pH). Phosphorus is low at 5.1 ppm, as values less than 10 ppm can be limiting to normal plant growth and development. The soil profile is moderately rocky throughout, appears well-drained, and seems to have good growth potential. Some erosion is apparent with pedestalling around some of the plants on the site. Amount of bare soil is quite high at 31% in 1996 and 41% in 2001. An erosion condition class assessment estimated slight soil erosion in 2001. Gullies appear easily formed, but many of them show signs of healing. Most of the area has been utilized heavily enough to adversely effect plant and litter cover, especially when associated with periods of drought. Sheet and gully erosion has been unacceptably high in the past, but appears to have been stabilizing in recent years. The ratio of the nested frequency of bare soil to protective ground cover (vegetation, litter, and cryptogams) was low at 1:2.4 in 1996 and 1:2.2 in 2001. A grazing system needs to be implemented that will allow for long-term improvements in soil condition and herbaceous vegetative cover.

The majority of the vegetation on the site is composed of a diverse mixture of mountain brush species. Twelve species have been sampled on the site with the principal species being true mountain mahogany, mountain snowberry, Gambel oak, serviceberry, mountain big sagebrush, and bitterbrush. Increaser shrubs include broom snakeweed, stickyleaf low rabbitbrush, and prickly pear cactus. Of the increaser species, only broom snakeweed comprises a substantial portion of the composition, making up 17% of the browse cover in 2001. The estimated density of two species, serviceberry and mountain big sagebrush, is much lower in 1996 and 2001 compared to the 1984 and 1990 readings. Both of these species have discontinuous, clumped distributions, and much of the change in density is due to the much larger sample implemented prior to the 1996 reading. In 1990, percent decadence and poor vigor were high in the populations of serviceberry, mountain big sagebrush, mountain mahogany, and snowberry. In 1996 and 2001 however, percent decadence and vigor have shown considerable improvement for all of these species. The principal species receive moderate to heavy use and appear to have stable populations. In 2001, the highest level of use was observed on mountain mahogany with 80% of the plants showing heavy use. Consistent heavy browsing on mahogany has resulted in the population being short in stature. Average leader growth on mahogany was less than 2 inches in 2001. Pocket gopher and badger diggings around plants were noted in the past, as was a moderate rust infestation on serviceberry plants. This disease does not usually kill plants, but can effect vigor.

The herbaceous understory is quite sparse for a mountain brush community. Forbs are insignificant providing only 3% average cover in 1996 and 2001. Grasses have contributed an average of 11% cover in 1996 and 2001, with perennial species providing nearly all of it. Thickspike wheatgrass, bluebunch wheatgrass, and Indian ricegrass are the most abundant perennial grasses on the site. Two annuals, cheatgrass and Japanese brome, are present, but infrequent. Both of these annual bromes have remained at low frequencies since 1996.

1984 APPARENT TREND ASSESSMENT

In spite of rather heavy big game and livestock use, this area does not appear to have a sharply declining trend. Range condition may be changing slightly downward, and if so, the rate is relatively slow. With respect to soil, there is little empirical evidence to suggest that the erosion rate is increasing. A more subjective view reveals the presence of active gullies in the area and signs of ongoing sheet erosion. Both of these observations suggest a declining soil trend. Vegetatively, the data are inconclusive. Broom snakeweed, an aggressive and undesirable increaser shrub, appears to be becoming more abundant. Both the old line intercept and Interagency studies document this. Perennial grasses may be increasing slightly in density and species diversity. This observation is somewhat tentative but if confirmed, could eventually have a detrimental effect on shrub reproduction. Utilization, especially of browse, appears to be heavier now than in 1977. Forage production appears to have remained stable since 1977. There are some very tentative clues to suggest that there may be declining populations of mountain big sagebrush and true mountain mahogany.

1990 TREND ASSESSMENT

The mixed mountain brush community on this privately-owned winter range still provides good big game habitat, although conditions have deteriorated for some species since 1984. Photo-point comparisons depict a loss of sagebrush cover and production. This is shown in the data by an increase in the percentage of decadent plants (71%), and heavier hedging. Density is slightly higher. Sagebrush canopy cover averages only 5%. The data also illustrates a slight decline in true mountain mahogany density and the loss of mature plants resulting in 88% decadence. Vigor is poor on these heavily hedged shrubs. Oakbrush, low rabbitbrush, and snakeweed increased in several, but not all measured parameters. Thickspike wheatgrass increased significantly. The nested frequency of Indian ricegrass is almost unchanged, while that of bluebunch wheatgrass was significantly lower. Forbs are relatively insignificant. The amount of litter cover decreased, percent bare ground increased, leaving the rocky soil more vulnerable to erosion.

TREND ASSESSMENT

soil - down (1)

browse - downward (1)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Since the extended drought from 1987 to 1990, there have been some signs of recovery. Percent bare ground has decreased to 31%, and percent litter cover has also slowly increased. The gullies around the site show signs of healing. Soil trend for this site appears to be improving at this time. The overall browse trend for the site is improving except for mountain big sagebrush which now only provides 4% of the browse cover. This species seems to have reached its lowest density with almost 29% being classified as dead. With continued normal precipitation patterns this would be expected to turn around in the future. The best description for the herbaceous understory trend would be stable. Many of the species have changed either up or down, but overall it has remained basically stable for perennial species.

TREND ASSESSMENT

soil - slightly up (4)

browse - slightly up (4)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is slightly down. Litter cover decreased with a corresponding increase in bare ground. Vegetative cover remained nearly stable, but the majority of the vegetative cover comes from browse which is not as effective at holding soils in place as herbaceous species. Trend for browse is stable. The principal species remain at stable densities. Percent decadency increased in the populations of mountain big sagebrush and mountain mahogany, but current levels are within acceptable limits for these species. Use remains moderate to heavy on true mountain mahogany, serviceberry, and mountain big sagebrush. Recruitment from young plants is low for big sagebrush and mahogany, but moderately high for serviceberry and snowberry. Trend for the herbaceous understory is stable. Nested frequency for thickspike, bluebunch wheatgrass, and Indian ricegrass declined, but not significantly. Sum of nested frequency for all perennial grass and forb species declined by 12% in 2001. However, this decline is not enough to warrant a downward trend at this time. Further decreases in perennial herbaceous species should be watched closely in future readings.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 7

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	_a 26	_c 268	_b 126	_b 100	11	89	40	32	3.48	2.92
G	Agropyron spicatum	_b 244	_a 21	_b 147	_b 133	83	11	48	51	4.57	5.35
G	Bromus japonicus (a)	-	-	-	10	-	-	-	4	-	.04
G	Bromus tectorum (a)	-	-	57	40	-	-	24	21	.22	.15
G	Carex spp.	19	12	8	6	7	6	3	3	.16	.08
G	Elymus cinereus	-	-	-	1	-	-	-	1	-	.03
G	Oryzopsis hymenoides	53	53	72	49	23	26	29	26	1.62	1.81
G	Poa pratensis	-	-	1	5	-	-	1	2	.00	.06
G	Poa secunda	4	6	20	13	2	3	7	6	.18	.03
G	Sitanion hystrix	-	3	4	3	-	2	1	1	.00	.03
G	Stipa comata	_a 1	_{ab} 10	_{ab} 8	_b 15	1	5	3	6	.45	.64
Total for Annual Grasses		0	0	57	50	0	0	24	25	0.21	0.20
Total for Perennial Grasses		347	373	386	325	127	142	132	128	10.48	10.97
Total for Grasses		347	373	443	375	127	142	156	153	10.70	11.17
F	Achillea millefolium	-	-	4	1	-	-	2	1	.03	.03
F	Alyssum alyssoides (a)	-	-	215	182	-	-	71	59	1.00	.84
F	Arabis spp.	-	-	-	1	-	-	-	1	-	.00
F	Aster chilensis	_a -	_a -	_b 32	_b 36	-	-	11	14	.52	.48
F	Astragalus spp.	-	3	-	-	-	1	-	-	-	-

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Balsamorhiza sagittata	3	3	5	2	1	1	2	1	.06	.03
F	Camelina microcarpa (a)	-	-	-	1	-	-	-	1	-	.00
F	Calochortus nuttallii	-	-	-	5	-	-	-	3	-	.18
F	Chaenactis douglasii	4	11	13	5	2	6	7	4	.08	.04
F	Cirsium undulatum	_a 9	_a 5	_{ab} 22	_b 27	6	4	11	18	.63	.90
F	Collomia linearis (a)	-	-	-	3	-	-	-	1	-	.00
F	Comandra pallida	28	12	28	25	11	6	13	15	.19	.22
F	Cryptantha spp.	_a 19	_b 34	_a 22	_{ab} 30	9	21	10	12	.27	.50
F	Descurainia pinnata (a)	-	-	1	-	-	-	1	-	.00	-
F	Epilobium brachycarpum (a)	-	-	1	-	-	-	1	-	.00	-
F	Eriogonum umbellatum	-	3	-	-	-	1	-	-	-	-
F	Hackelia patens	_b 32	_a 10	_{ab} 21	_a 8	16	6	11	3	.20	.04
F	Lactuca serriola	-	-	1	-	-	-	1	-	.00	-
F	Oenothera caespitosa	-	-	-	1	-	-	-	1	-	.03
F	Penstemon humilis	11	6	9	15	7	4	4	8	.09	.18
F	Ranunculus testiculatus (a)	-	-	_a -	_b 14	-	-	-	5	-	.02
F	Smilacina racemosa amplexicaulis	-	-	6	3	-	-	4	1	.07	.03
F	Tragopogon dubius	2	-	4	-	1	-	3	-	.06	-
F	Unknown forb-perennial	3	-	-	-	1	-	-	-	-	-
Total for Annual Forbs		0	0	217	200	0	0	73	66	1.01	0.88
Total for Perennial Forbs		111	87	167	159	54	50	79	82	2.24	2.71
Total for Forbs		111	87	384	359	54	50	152	148	3.25	3.59

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 06 , Study no: 7

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	22	25	1.68	1.17
B	Artemisia tridentata vaseyana	13	11	.94	.56
B	Cercocarpus montanus	38	38	5.02	4.66
B	Chrysothamnus viscidiflorus viscidiflorus	20	23	.74	1.50
B	Gutierrezia sarothrae	82	77	4.02	3.67
B	Juniperus osteosperma	2	6	2.39	3.37
B	Opuntia spp.	10	7	.51	.45
B	Purshia tridentata	1	1	.63	.38
B	Quercus gambelii	6	8	2.65	1.66
B	Rosa woodsii	0	1	.15	-
B	Symphoricarpos oreophilus	19	19	2.75	3.59
B	Tetradymia canescens	4	3	.18	.38
Total for Browse		217	219	21.69	21.43

CANOPY COVER --
Herd unit 06 , Study no: 7

Species	Percent Cover	
	'96	'01
Juniperus osteosperma	7	7
Quercus gambelii	1	3

BASIC COVER --
Herd unit 06 , Study no: 7

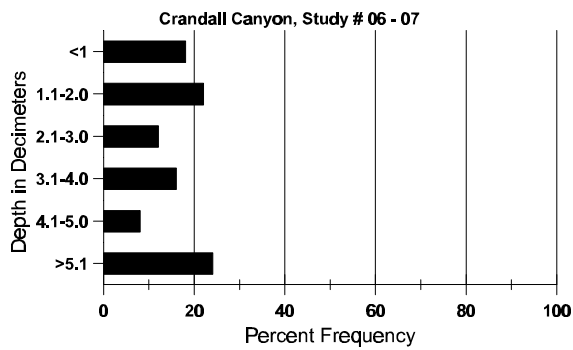
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	353	330	4.50	9.50	34.75	37.41
Rock	153	147	2.75	4.75	3.69	3.95
Pavement	229	268	11.25	7.25	5.34	4.38
Litter	388	347	46.50	37.00	38.81	26.92
Cryptogams	3	-	.25	0	.03	0
Bare Ground	311	314	34.75	41.50	31.27	41.62

SOIL ANALYSIS DATA --

Herd Unit 06, Study no: 07, Crandall Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	68.0 (14.8)	8.0	58.7	12.0	29.3	1.7	5.1	32.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 06 , Study no: 7

Type	Quadrat Frequency	
	'96	'01
Rabbit	-	11
Elk	5	2
Deer	15	22
Cattle	-	1

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
252	N/A
26	2 (5)
644	50 (122)
78	7 (16)

BROWSE CHARACTERISTICS --

Herd unit 06 , Study no: 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					
Amelanchier alnifolia										
S	84	-	-	-	-	-	-	-	0	0
	90	-	-	-	-	-	-	-	0	0
	96	1	-	-	-	-	-	-	20	1
	01	-	-	-	-	-	-	-	0	0
Y	84	-	-	-	-	-	-	-	0	0
	90	-	2	-	3	-	-	3	8	8
	96	4	-	1	-	1	-	-	120	6
	01	4	1	1	2	-	-	-	160	8
M	84	-	-	-	-	-	-	-	0	0
	90	-	-	-	-	-	-	-	0	0
	96	1	3	4	11	1	-	-	400	21 22
	01	4	4	6	-	2	2	2	400	22 27
D	84	-	-	-	-	-	-	-	0	0
	90	-	1	3	-	1	-	2 2	600	9
	96	-	-	1	1	1	-	-	60	3
	01	-	2	1	-	-	1	-	80	4
X	84	-	-	-	-	-	-	-	0	0
	90	-	-	-	-	-	-	-	0	0
	96	-	-	-	-	-	-	-	40	2
	01	-	-	-	-	-	-	-	0	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
'84		00%		00%		00%				
'90		24%		18%		29%		-49%		
'96		21%		21%		14%		+ 9%		
'01		28%		34%		09%				
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%	
						'90	1133		53%	
						'96	580		10%	
						'01	640		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				
Artemisia tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	1	-	-	-	-	-	-	4	-	-	-	80		4	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	1	4	1	-	-	-	-	-	-	6	-	-	-	400	20	23	6
	90	-	1	4	-	-	-	-	-	-	5	-	-	-	333	19	23	5
	96	2	4	5	1	-	-	-	-	-	12	-	-	-	240	14	25	12
	01	2	4	3	-	-	-	-	-	-	9	-	-	-	180	16	26	9
D	84	-	3	3	-	-	-	-	-	-	6	-	-	-	400		6	
	90	5	1	6	-	-	-	-	-	-	5	-	3	4	800		12	
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	1	3	-	-	-	-	-	-	4	-	-	-	80		4	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		62%			31%			00%			+24%							
'90		12%			59%			41%			-70%							
'96		24%			41%			00%			-18%							
'01		36%			43%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	866	Dec:	46%			
												'90	1133		71%			
												'96	340		6%			
												'01	280		29%			

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				
Cercocarpus montanus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	5	6	-	-	-	-	-	-	-	11	-	-	-	220		11	
	01	-	-	2	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	9	-	-	-	-	-	-	9	-	-	-	600	17 18	9	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	6 10	1	
	96	1	2	24	9	7	-	-	-	-	42	-	1	-	860	21 29	43	
	01	1	3	26	1	1	15	-	-	-	47	-	-	-	940	26 35	47	
D	84	-	1	8	-	-	-	-	-	-	9	-	-	-	600		9	
	90	-	1	11	-	-	2	-	-	-	9	-	1	4	933		14	
	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
	01	6	-	1	-	-	4	-	-	-	3	-	-	8	220		11	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		15%			85%			00%			-20%							
'90		13%			81%			31%			+ 5%							
'96		27%			43%			02%			+ 7%							
'01		07%			80%			13%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1333	Dec:	45%			
												'90	1065		88%			
												'96	1120		4%			
												'01	1200		18%			

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 viscidiflorus viscidiflorus																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	21	-	-	-	-	-	-	-	-	19	-	2	-	1400		21
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	44	2	-	1	-	-	-	-	-	23	-	24	-	3133	9	7
	96	42	1	1	4	-	-	-	-	-	48	-	-	-	960	10	12
	01	79	-	-	-	-	-	-	-	-	79	-	-	-	1580	8	11
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	9	13	-	-	-	-	4	-	-	12	-	3	11	1733		26
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		00%			00%			00%									
'90		16%			00%			43%			-84%						
'96		02%			02%			00%			+38%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%		
												'90	6266		28%		
												'96	1020		4%		
												'01	1640		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				
Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	35	-	-	-	-	-	-	-	-	35	-	-	-	2333		35	
	96	31	-	-	-	-	-	-	-	-	31	-	-	-	620		31	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	36	-	-	7	-	-	-	-	-	43	-	-	-	2866		43	
	96	41	-	-	-	-	-	-	-	-	41	-	-	-	820		41	
	01	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	84	66	1	-	-	-	-	-	-	-	67	-	-	-	4466	11 13	67	
	90	63	-	-	1	-	-	1	-	-	63	-	2	-	4333	8 7	65	
	96	341	-	-	-	-	-	-	-	-	341	-	-	-	6820	9 11	341	
	01	488	-	-	-	-	-	-	-	-	488	-	-	-	9760	6 8	488	
D	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	12	-	-	-	-	-	-	-	-	10	-	-	2	800		12	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	37	-	-	-	-	-	-	-	-	15	-	3	19	740		37	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	520		26	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		01%			00%			00%			+43%							
'90		00%			00%			03%			- 4%							
'96		00%			00%			00%			+28%							
'01		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	4599	Dec:	3%			
												'90	7999		10%			
												'96	7640		0%			
												'01	10680		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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	01	5	-	-	-	-	-	-	1	-	6	-	-	-	120	-	6
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		00%			00%			00%									
'90		00%			00%			00%									
'96		00%			00%			00%			+67%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	40		-		
												'01	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		1	2				
Opuntia spp.												
S	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	20		1	
Y	84	2	-	-	-	-	-	-	133		2	
	90	1	-	-	-	-	-	-	66		1	
	96	3	-	-	-	-	-	-	60		3	
	01	-	-	-	-	-	-	-	0		0	
M	84	3	-	-	-	-	-	-	200	10	7	3
	90	2	-	-	-	-	-	-	133	6	6	2
	96	15	-	-	1	-	-	-	320	5	15	16
	01	9	-	-	-	-	-	-	180	4	9	9
D	84	1	-	-	-	-	-	-	66			1
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	0			0
	01	6	-	-	-	-	-	-	120			6
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%		-50%				
'90		00%		00%		00%		+48%				
'96		00%		00%		00%		-21%				
'01		00%		00%		27%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	399	Dec:	17%			
						'90	199		0%			
						'96	380		0%			
						'01	300		40%			
Purshia tridentata												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	-	-	-	20	-	-	1
	01	3	-	-	-	-	-	-	60	14	51	3
D	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		50%		00%		00%		+33%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%			
						'90	0		0%			
						'96	40		50%			
						'01	60		0%			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3		4		
Quercus gambelii																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	9	-	-	1	-	-	-	-	-	-	-	-	10	-	-	10
	96	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Y	84	8	2	1	-	-	-	-	-	-	-	-	-	11	-	-	11
	90	33	13	1	1	-	-	-	-	-	-	-	-	43	-	5	48
	96	6	-	-	-	-	-	-	-	-	-	-	-	6	-	-	6
	01	6	-	-	11	-	-	-	-	-	-	-	-	17	-	-	17
M	84	-	6	11	-	-	2	-	-	-	-	-	-	19	-	-	19
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	96	28	-	-	2	-	-	-	-	-	-	-	-	30	-	-	30
	01	23	-	-	23	-	-	3	-	-	-	-	-	49	-	-	49
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	11	4	3	-	-	-	-	-	-	-	-	-	11	-	6	18
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		27%				47%				00%				+55%			
'90		26%				06%				18%				-84%			
'96		00%				00%				00%				+45%			
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	1999	Dec:	0%		
												'90	4400		27%		
												'96	720		0%		
												'01	1320		0%		
Rosa woodsii																	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	16	10	0
	01	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		00%				00%				00%							
'90		00%				00%				00%							
'96		00%				00%				00%							
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	0		-		
												'01	40		-		

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3			
Symphoricarpos oreophilus																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	1	-	-	-	-	-	-	-	-	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	1	-	-	-	-	1	-	-	-	-	-	133		2
	96	14	-	-	3	-	-	-	-	-	-	-	-	340		17
	01	6	-	-	-	-	-	-	-	-	-	-	-	120		6
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	5	12	1	7	1	-	-	-	-	-	-	-	520	16	26
	01	13	-	-	6	-	-	3	-	-	-	-	-	440	18	29
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	2	6	1	1	-	-	1	-	-	-	-	8	733		11
	96	1	2	-	1	-	-	-	-	-	-	-	1	80		4
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>		
'84		00%				00%				00%						
'90		54%				08%				62%				+ 8%		
'96		32%				02%				02%				-40%		
'01		00%				00%				00%						
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%	
												'90	866		85%	
												'96	940		9%	
												'01	560		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				
Tetradymia canescens																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	1	8	-	-	-	-	-	-	-	9	-	-	-	180	15	18	9
	'01	3	-	-	1	-	-	-	-	-	4	-	-	-	80	10	15	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		90%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	200		-			
												'01	100		-			

Not Read

Trend Study 6-8-96

Study site name: South Fork Chalk Creek.

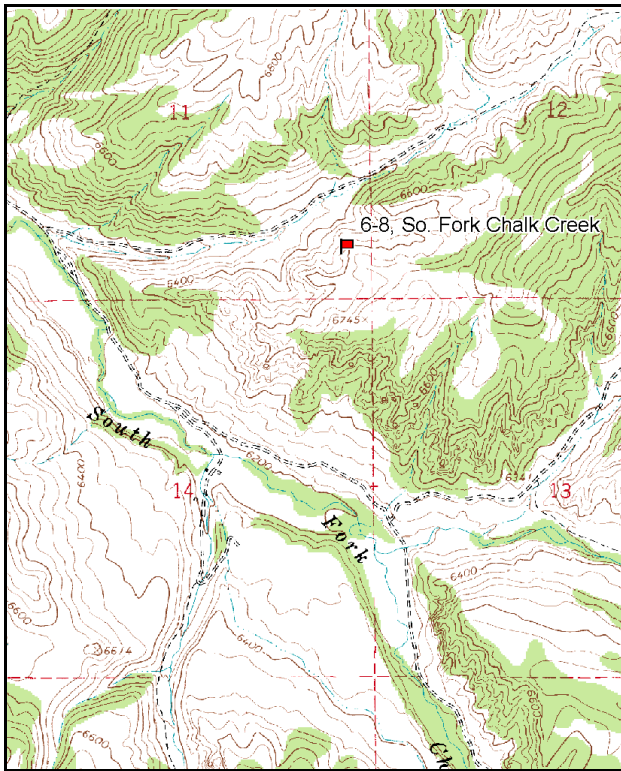
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 121 degrees magnetic.

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

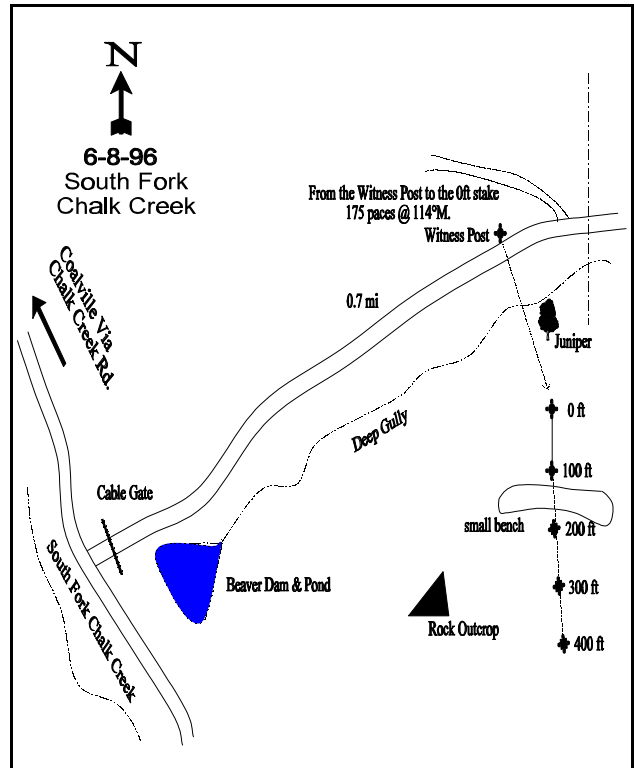
LOCATION DESCRIPTION

From Coalville, go up Chalk Creek to the South Fork Road. Go up the South fork of Chalk Creek approximately 3 miles to a cable gate at the mouth of Cottonwood Canyon. Go up this side canyon 0.7 miles to a witness post and park. A lone juniper should be across the flat on the other side of a deep gully. Cross the gully and walk up the slope approximately 175 paces at 114 degrees magnetic from the witness post to the 0-foot baseline stake which is located just below a knoll of conglomerate rock on the ridge. All study stakes are short fenceposts, the 0-foot stake has a white top.



Map Name: Upton

Township 2N, Range 6E, Section 11



Diagrammatic Sketch

UTM 4529544 N 480731 E

DISCUSSION

Trend Study No. 6-8

***This study was not read in 2001 because permission to access this private land was not obtained. This study will be reevaluated during the next rotation. Maps, data tables, and a site narrative for this study are included from the 1996 volume 2 Utah Big Game Range Trend Studies report.

The South Fork Chalk Creek trend study was established in 1990 and is located in a wide side canyon of the South Fork of Chalk Creek. The area is privately-owned, as is all of the winter range in the area. The study is on a northwest-facing slope, which supports a mixed mountain brush community dominated by mountain big sagebrush. Mountain big sagebrush contributed 64% of the browse cover in 1996. The south-facing slopes in the area have juniper and sparse stands of sagebrush. The bottoms of the canyon have been sprayed to kill shrubs. Cattle use is heavy in the bottom areas. The ridges to the south had also recently burned prior to the 1996 reading. All these factors tend to concentrate deer use on the areas where browse forage still remains. Quadrat frequency pellet group data indicates that deer use is moderately high (38%), while that of elk (8%) and cattle (3%) is considered light.

The study site is on a ridge with a northwest exposure and a moderately steep slope (56%) at an elevation of 6,600 feet. Soil texture is a sandy clay loam with a slightly acidic soil reaction (6.2 pH). Effective rooting depth is the most shallow of any site in this management unit at 8 inches. This is mostly because the soil surface and profile are rocky with rock-pavement covering 25% of the ground surface. However, vegetative cover, litter cover, and percent organic matter is above average when compared to other sites within the area. There is a very deep gully in the canyon bottom.

The study samples a sagebrush covered ridge with components of serviceberry, true mountain mahogany, and snowberry. Sagebrush cover is currently estimated at 16% with a density of 4,220 plants/acre. The sagebrush has a moderately hedged growth form. Vigor and production varies, but is generally good. Those classified with poor vigor have decreased from 23% to 9%. Overall leader growth was low in 1990, but now appears to be average. The mountain mahogany had been heavily used in 1990 and also had poor vigor (20%) related to the drought. In 1996, poor vigor decreased to only 5% of the population. Low rabbitbrush and broom snakeweed are fairly common on the more shallow soils. Low rabbitbrush is not currently increasing, but broom snakeweed has the characteristics of an expanding population with a high biotic potential (proportion seedlings to the population density) at 46%, and a high proportion of young in the population (41%).

Sandberg bluegrass and cheatgrass are the most common grasses. A wide variety and high diversity of perennial forbs occupy the site, yet together they only provide about 4% total cover. Yarrow, silvery lupine, and redroot buckwheat are the most prevalent of the 37 species encountered.

1990 APPARENT TREND ASSESSMENT

There is a large amount of rock exposed, but the remaining soil on the site is well protected and currently appears stable. The populations of the key browse species also appear stable with respect to age class structure. However, continued heavy use and the resulting increased decadence could lead to downward vegetative trends. Quality winter range is limited in the area due to past and current management practices on private lands. An end to the drought would help mitigate these downward changes.

1996 TREND ASSESSMENT

Soil trend is slightly improving with percent bare ground decreasing from 12% to 7%. Litter cover has also increased. Also, the nested frequency ratio of bare ground to vegetation and litter (protective ground cover) is quite good at 1:4.7. Usually any value > 1:3 shows little problem with erosion from high intensity summer storms. The key browse species is mountain big sagebrush which contributes 64% of the total browse cover. Population density has gone down slightly, but what is more important is the low proportion of dead plants in the population (17%). Moderate to heavy use has increased from 67% to 84% of the population, but percent decadence has slightly declined from 41% to 37%. Additionally, the proportion of the decadent plants that were classified as having poor vigor or dying has also decreased from 55% to 23% indicating that it has turned the corner and the loss of plants has now stopped. Other key browse species include serviceberry, true mountain mahogany, and mountain snowberry. These species appear to have stable populations while providing another 14% of the browse cover. Trend for browse, where the key species is mountain big sagebrush (64% of the browse cover), is currently stable. Trend for the herbaceous understory is slightly down with a significantly lower sum of nested frequency for perennial grasses which make up 79% of the herbaceous cover.

TREND ASSESSMENT

soil - slightly improving (4)

browse - stable at this time, (3)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 8

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %
		'90	'96	'90	'96	
G	Agropyron spicatum	137	*56	52	24	.81
G	Bromus tectorum (a)	-	155	-	47	3.54
G	Carex spp.	29	*57	14	26	1.71
G	Poa fendleriana	104	119	41	48	2.19
G	Poa pratensis	2	1	1	1	.00
G	Poa secunda	301	*223	93	72	7.41
G	Sitanion hystrix	12	14	6	8	.14
G	Stipa columbiana	4	6	1	2	.18
G	Stipa lettermani	-	5	-	3	.07
G	Vulpia octoflora (a)	-	4	-	2	.01
Total for Annual Grasses		0	159	0	49	3.55
Total for Perennial Grasses		589	481	208	184	12.53
Total for Grasses		589	640	208	233	16.09
F	Achillea millefolium	63	73	29	29	1.25
F	Agoseris glauca	8	4	3	3	.01
F	Alyssum alyssoides (a)	-	54	-	19	.24
F	Allium spp.	2	-	2	-	-
F	Antennaria rosea	33	*19	19	8	.19

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %
		'90	'96	'90	'96	'96
F	Arabis spp.	5	15	3	7	.03
F	Astragalus beckwithii	-	2	-	1	.03
F	Astragalus convallarius	17	*5	9	2	.03
F	Astragalus utahensis	6	8	4	4	.23
F	Castilleja linariaefolia	11	19	7	11	.13
F	Calochortus nuttallii	1	1	1	1	.00
F	Cirsium undulatum	-	*15	-	9	.29
F	Collinsia parviflora (a)	-	29	-	9	.07
F	Cordylanthus ramosus (a)	-	5	-	4	.19
F	Crepis acuminata	24	*9	12	4	.02
F	Cruciferae	3	-	1	-	-
F	Cryptantha spp.	-	1	-	1	.00
F	Cymopterus spp.	1	-	1	-	-
F	Epilobium brachycarpum (a)	-	3	-	1	.00
F	Erigeron pumilus	38	*16	19	8	.14
F	Eriogonum racemosum	34	42	18	20	.35
F	Erigeron strigosus	-	*23	-	11	.13
F	Eriogonum umbellatum	12	*2	6	1	.03
F	Gayophytum ramosissimum (a)	-	10	-	4	.02
F	Hackelia patens	5	4	3	4	.02
F	Heuchera parvifolia	1	-	1	-	-
F	Holosteum umbellatum (a)	-	8	-	3	.01
F	Lupinus argenteus	3	*18	2	10	.39
F	Machaeranthera canescens	3	3	1	2	.04
F	Penstemon spp.	-	4	-	2	.03
F	Phlox longifolia	24	25	13	11	.15
F	Polygonum douglasii (a)	-	53	-	30	.14
F	Ranunculus spp.	2	-	1	-	-
F	Senecio integerrimus	1	-	1	-	-
F	Senecio multilobatus	3	-	1	-	-
F	Tragopogon dubius	-	8	-	3	.01
F	Unknown forb-perennial	27	*-	13	-	-
Total for Annual Forbs		0	162	0	70	0.69
Total for Perennial Forbs		327	316	170	152	3.55
Total for Forbs		327	478	170	222	4.25

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 06 , Study no: 8

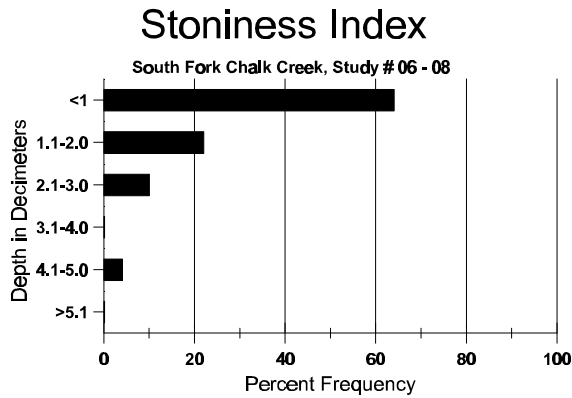
Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier alnifolia	19	1.51
B	Artemisia tridentata vaseyana	83	16.14
B	Cercocarpus montanus	20	.86
B	Chrysothamnus nauseosus albicaulis	1	.38
B	Chrysothamnus viscidiflorus viscidiflorus	52	3.02
B	Eriogonum heracleoides	13	.63
B	Gutierrezia sarothrae	23	.61
B	Quercus gambelii	3	.79
B	Symphoricarpos oreophilus	26	1.37
B	Tetradymia canescens	3	-
Total for Browse		243	25.34

BASIC COVER --
Herd unit 06 , Study no: 8

Cover Type	Nested Frequency	Average Cover %	
		'96	'90 '96
Vegetation	366	13.75	45.09
Rock	303	10.00	18.52
Pavement	218	13.50	6.75
Litter	396	42.50	46.06
Cryptogams	119	7.50	5.89
Bare Ground	162	12.75	7.04

SOIL ANALYSIS DATA --
Herd Unit 06, Study no: 08, South Fork Chalk Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
8.0	71.6 (9.0)	6.2	54.9	23.7	21.4	4.9	14.6	89.6	.4



PELLET GROUP FREQUENCY --

Herd unit 06 , Study no: 8

Type	Quadrat Frequency '96
Rabbit	2
Elk	8
Deer	38
Cattle	3

BROWSE CHARACTERISTICS --

Herd unit 06 , Study no: 8

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			
Amelanchier alnifolia																	
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	4	-	2	-	-	-	-	-	-	-	4	2	-	120		6
M	90	-	-	1	-	-	-	-	-	-	-	1	-	-	66	13	19
	96	2	9	5	-	3	-	-	-	-	9	2	8	-	380	18	28
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	2	-	-	-	-	-	-	-	-	-	2	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'90		00%			100%			00%			+88%						
'96		52%			26%			37%									
Total Plants/Acre (excluding Dead & Seedlings)												'90	66	Dec:	0%		
												'96	540		7%		

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	90	13	-	-	-	-	-	-	-	-	13	-	-	-	866		13	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	19	11	-	-	-	-	1	-	-	31	-	-	-	2066		31	
	96	5	8	-	-	-	-	-	-	-	13	-	-	-	260		13	
M	90	1	10	4	-	-	-	1	-	-	15	1	-	-	1066	18	31	
	96	13	81	25	1	-	-	-	-	-	119	-	1	-	2400	22	36	
D	90	5	14	14	-	-	-	-	-	-	15	-	-	18	2200		33	
	96	10	47	18	3	-	-	-	-	-	60	-	8	10	1560		78	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	840		42	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		44%			23%			23%			-21%							
'96		64%			20%			09%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	5332	Dec:	41%				
											'96	4220		37%				
<i>Cercocarpus montanus</i>																		
S	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	7	4	-	-	-	-	-	-	11	-	-	-	220		11	
M	90	-	-	2	-	-	-	-	-	-	2	-	-	-	133	13	19	
	96	-	3	18	4	-	1	-	-	-	22	2	2	-	520	21	27	
D	90	-	-	1	1	-	-	-	-	-	1	-	-	1	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			80%			20%			+55%							
'96		27%			62%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	332	Dec:	40%				
											'96	740		0%				
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	26	45	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			-70%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	66	Dec:	-				
											'96	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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	90	21	-	-	-	-	-	-	-	-	18	-	3	-	1400		21	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	90	16	4	-	1	-	-	-	-	-	18	-	3	-	1400	10	14	21
	96	101	1	-	3	-	-	-	-	-	105	-	-	-	2100	13	19	105
D	90	17	-	-	2	1	-	2	-	-	11	-	2	9	1466		22	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		08%			00%			27%			-45%							
'96		.85%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	4266	Dec:	34%			
												'96	2340		3%			
<i>Eriogonum heracleoides</i>																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	26	3	-	2	-	-	-	-	-	31	-	-	-	620	6	8	31
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%										
'96		09%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	660		-			
<i>Gutierrezia sarothrae</i>																		
S	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	52	-	-	-	-	-	-	-	-	52	-	-	-	1040		52	
Y	90	4	1	-	-	-	-	-	-	-	5	-	-	-	333		5	
	96	46	-	-	-	-	-	-	-	-	46	-	-	-	920		46	
M	90	11	-	-	1	-	-	-	-	-	12	-	-	-	800	6	8	12
	96	66	-	-	-	-	-	-	-	-	66	-	-	-	1320	8	9	66
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		06%			00%			00%			+49%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	1133	Dec:	-			
												'96	2240		-			

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>Quercus gambelii</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180	37	41	9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	180		-			
<i>Symphoricarpos oreophilus</i>																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	12	-	-	2	-	-	-	-	-	14	-	-	-	280		14	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	21	10	-	6	-	-	-	-	-	36	-	1	-	740	15	21	37
D	90	-	1	1	1	2	-	4	-	-	6	-	-	3	600		9	
	96	1	-	-	-	-	-	-	-	-	-	-	1	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		33%			11%			33%			+42%							
'96		19%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	600	Dec:	100%			
												'96	1040		2%			
<i>Tetradymia canescens</i>																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	10	15	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%										
'96		33%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	60		-			

Trend Study 6-9-01

Study site name: North Oakley Bench.

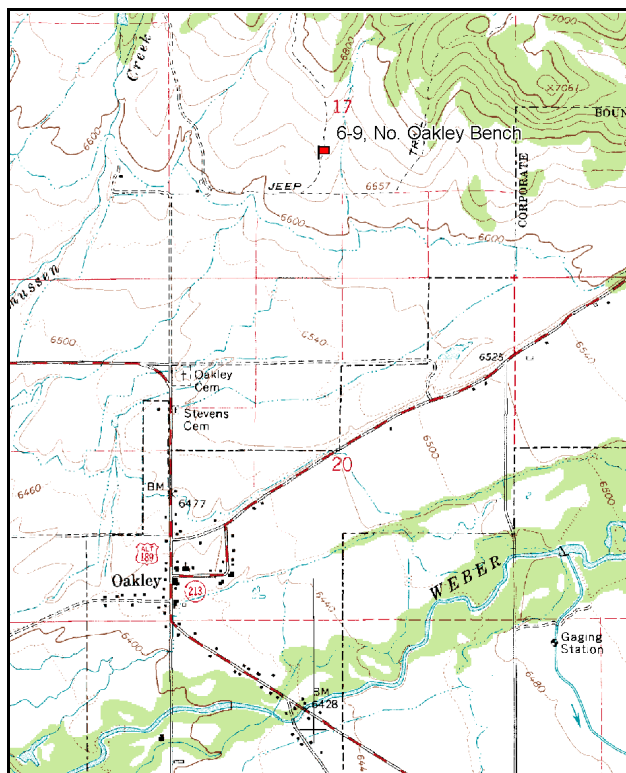
Vegetation type: Mountain brush.

Compass bearing: frequency baseline 180 degrees magnetic.

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

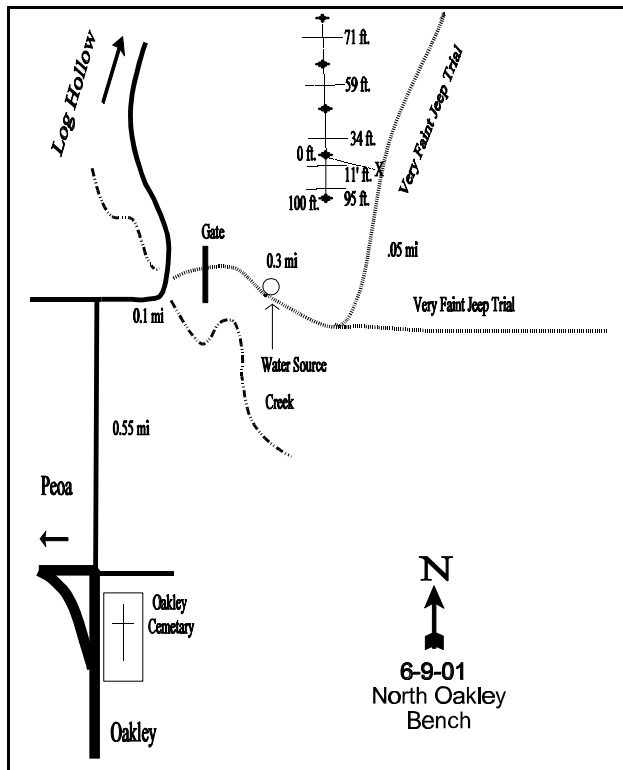
LOCATION DESCRIPTION

From the Oakley cemetery, just north of Oakley, proceed north 0.55 miles to an intersection and turn right. Proceed east 0.1 miles to a gate, pass through gate (private land; key needed) with creek on immediate right. Continue on a faint road for 0.3 miles to a fork. Turn left and proceed 0.05 miles to a witness post. From the witness post walk 7 paces at 248 degrees magnetic to the 0-foot baseline stake. The first 100 feet of the baseline runs 180 degrees magnetic. The remaining 300 feet run off the 0-foot baseline stake at 343 degrees magnetic.



Map Name: Kamas

Township 1S, Range 6E, Section 17



Diagrammatic Sketch

UTM 4508895 N 475394 E

DISCUSSION

Trend Study No. 6-9

The North Oakley Bench study lies on a relatively uniform mountain big sagebrush-grass type with a mixture of mountain brush. The study area is on a gently sloping, south-facing exposure. There is very little useful escape or thermal cover close to the study site. Elevation is approximately 6,600 feet. The area is privately owned, which means that the winter range is also used by domestic livestock most of the year. Judging from pellet group frequency and forage utilization, the level of use from both game and livestock varies from moderate to heavy. Pellet group quadrat frequency data indicates use by deer, elk, and cattle to be light to moderate in 1996 and 2001. A pellet group transect read on the site in 2001 estimated 29 elk days use/acre (73 edu/ha), 19 deer days use/acre (48 ddu/ha), and 22 cow days use/acre (54 cdu/ha). The range monitoring crew had to pass through a large group of cattle to reach the study in 2001. This area, because of its location, has high potential for residential homes. Ants were extremely abundant on the site in 2001.

Soils are alluvially deposited from sedimentary parent material. Soil depth should not be limiting, although a large amount of rock does exist within the profile. It could be classified as having very high amounts of cobblestone in the soil which probably has rather poor water holding capability in the upper horizon. Effective rooting depth was estimated at nearly 10 inches with a clay loam soil texture and a neutral soil reaction (7.0 pH). During the height of the drought (1987-1990), some trampling damage and soil compaction were evident from livestock in the past, but are less evident at this time. Protective ground cover is adequate to prevent most soil loss. Erosion is minimal, primarily because of the gentle terrain and high proportion of cover contributed by the herbaceous understory. A soil erosion condition class assessment completed in 2001 determined soils as stable.

The key preferred browse species are mountain big sagebrush, mountain snowberry, serviceberry, and antelope bitterbrush. The most abundant key browse is mountain big sagebrush which provided 36% and 38% of the browse cover in 1996 and 2001 respectively. When the study was initially established (1984), mountain big sagebrush was decadent in appearance and heavily browsed. On this site, sagebrush is in much poorer condition than it is over most of the surrounding area. Mountain big sagebrush is the shrub that has been most effected by the prolonged drought (late-1980's), especially on south and west aspects. Use on big sagebrush has been moderate to heavy in all years for this study. In 1996, 29% of the population were classified as dead. The proportion of the population classified as dead declined to 13% in 2001. It appears that the population has stabilized and is starting to recover with a decrease in the number of dead and decadent plants since the site was established. Recruitment from young sagebrush plants was much lower than the number of dead in 1996, but the ratio of young to dead improved in 2001.

Snowberry, serviceberry, and bitterbrush combine to produce about one-third of the browse cover in 1996 and 2001. Serviceberry and bitterbrush show moderate to heavy use, good vigor, and low decadence in 1996 and 2001. Snowberry displayed moderate to heavy use in 1996, but lighter use in 2001. Vigor has been normal and decadence low in both 1996 and 2001. Annual leader growth for mountain big sagebrush averaged less than 2 inches in 2001, while bitterbrush and serviceberry averaged 2 inches. Other browse sampled on the site include stickyleaf low rabbitbrush, broom snakeweed, gray horsebrush, and prickly pear cactus.

Grass and forb composition is remarkably diverse but includes many biennial and perennial weeds or species of poor forage value. Many also act as indicators of heavy livestock use. Thistle, aster, western yarrow, common dandelion, bulbous bluegrass, Letterman needlegrass, yellow salsify, flannel mullein, death camas, and wild onion are all examples of increaser species with heavy livestock use. Overall, sum of nested frequency for perennial grasses has slightly increased each year since 1984. Perennial forbs have decreased in sum of nested frequency each year since 1990. Grasses provide about 80% of the herbaceous cover and

nearly half of the total cover on the site in 1996 and 2001. There are over 50 species of herbs on the site, with most of them being classified as increaser species. Herbaceous species that are considered to have good value include bluebunch wheatgrass, crested wheatgrass, thickspike, and Sandberg bluegrass.

1984 APPARENT TREND ASSESSMENT

Soil, although subject to some trampling and compaction from livestock, is not seriously eroded. Ground cover appears to be adequate for protection and has shown no significant change over the past seven years. Trend appears to be stable. Vegetative trend is not clearly indicated by the data. However, there are a few clues, that when used with judgment, permit some preliminary assessments. While overall density of mountain big sagebrush has not definitely declined, there are some indicators pointing in that direction. Furthermore, it is more evident that age and form class structure has deteriorated. There is evidence that increaser grasses, forbs, and shrubs have increased in density and dominance. An overall assessment of vegetative trend from a big game standpoint would be stable to slightly down.

1990 TREND ASSESSMENT

It was noted in the 1984 report that this study was a rather poor site. There may be less sagebrush on this particular spot, but overall it appears representative of the south-facing slope of the foothills above Oakley. It is privately-owned land, managed for cattle grazing by the Oakley Cattlemen's Association. It is also used as winter range by elk and deer. As predicted, mountain big sagebrush had declined on this site and has decreased significantly in numbers between 1984 and 1990. The density plot data indicates that most of the decrease came in the mature age class. Currently, there are abundant seedling and young sagebrush. A majority of the sagebrush are lightly hedged and have good vigor and fair growth in 1990. The other browse on the site have stable or increased numbers. The only shrubs to be uniformly and heavily utilized are the large bitterbrush plants. They are browsed year-round, but still display good vigor. Low rabbitbrush increased on the density plots due to the addition of a large number of young in the population. It is the most numerous browse species.

The seeded and native grasses had a high nested frequency of occurrence. The nested frequency of crested wheatgrass increased significantly, while bluebunch wheatgrass displays a large decrease in frequency. There has also been a shift in forb composition, but the most common species remain hoary aster, thistle, and yarrow, all increasers indicating excessive grazing. Ants, often associated with overgrazing and a large amount of bare soil, are very common on the site. Many of these ants attend aphids that have infested the sagebrush. The site has adequate ground cover and soil protection, but does have an increased percentage of bare soil. However, erosion is minimal on the site.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly up (4)

1996 TREND ASSESSMENT

The trend for soil is slightly upward with a significant decrease in percent bare ground. Furthermore, 63% of the vegetative cover is contributed by herbaceous species which are better at protecting the soil than browse cover. The trend for browse, especially the preferred species, is slightly up with decreases in percent decadency for all species, and an increase in density for mountain big sagebrush which provides 36% of the total browse cover. The nested frequency value for the perennial grasses has increased, but that of the perennial forbs has decreased. However, forbs contribute only 18% of the total herbaceous cover. The

biggest problem for this site is that the majority of the cover for the herbaceous species is contributed by increasers due to excessive grazing. The composition is not ideal for a stable plant community. Trend for herbaceous understory is stable, but of poor composition.

TREND ASSESSMENT

soil - slightly up (4)

browse - slightly up (4)

herbaceous understory - stable, but poor composition with too many increasers (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover remain abundant and well disbursed over the site. The proportion of the surface represented by bare ground remained stable. Trend for browse is stable. The population of mountain big sagebrush shows slight increases in those classified with poor vigor and decadence, but the proportion of the population in the dead age class declined considerably. The population appears to be stabilizing with the mature age class making up three-fourths of the population. Serviceberry, bitterbrush, and snowberry all show stable densities, normal vigor, and low decadence. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses slightly increased, while sum of nested frequency for perennial forbs slightly decreased. Because grasses provide the majority of the forb cover, trend is considered stable overall. The understory remains in poor condition however, as it is dominated by increaser species.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 9

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	_b 132	_c 216	_a 71	_a 82	49	80	22	26	2.39	4.20
G	Agropyron dasystachyum	_b 80	_a 17	_b 72	_c 124	29	6	30	46	.74	2.00
G	Agropyron intermedium	-	-	2	-	-	-	1	-	.15	-
G	Agropyron spicatum	_b 47	_a 14	_b 68	_a 15	18	7	28	5	1.48	.60
G	Bromus brizaeformis (a)	-	-	-	3	-	-	-	1	-	.03
G	Bromus inermis	-	13	7	6	-	4	3	2	.18	.18
G	Bromus tectorum (a)	-	-	18	18	-	-	6	7	.22	.06
G	Koeleria cristata	_a -	_a -	_{ab} 4	_b 16	-	-	2	6	.03	.39
G	Poa bulbosa	_a -	_a -	_b 135	_c 230	-	-	44	73	6.46	11.66
G	Poa fendleriana	_a -	_{ab} 4	_{ab} 8	_b 10	-	2	3	6	.21	.18
G	Poa pratensis	_a 116	_b 182	_b 182	_a 81	45	63	59	29	4.97	2.01
G	Poa secunda	_a 10	_a 25	_a 17	_b 58	4	12	6	26	.42	.89
G	Sitanion hystris	-	-	-	5	-	-	-	3	-	.18

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
		G	<i>Stipa columbiana</i>	_b 133	_c 221	_a 18	_a 6	52	80	6	3
G	<i>Stipa comata</i>	-	-	-	6	-	-	-	3	-	.06
G	<i>Stipa lettermani</i>	_a -	_a -	_b 165	_b 176	-	-	58	61	5.61	3.22
Total for Annual Grasses		0	0	18	21	0	0	6	8	0.22	0.09
Total for Perennial Grasses		518	692	749	815	197	254	262	289	22.95	25.68
Total for Grasses		518	692	767	836	197	254	268	297	23.18	25.77
F	<i>Achillea millefolium</i>	52	46	30	30	19	22	13	14	.29	.46
F	<i>Agoseris glauca</i>	-	-	7	-	-	-	2	-	.01	-
F	<i>Allium acuminatum</i>	_a 29	_a 6	_a 14	_b 42	12	3	7	21	.08	.13
F	<i>Alyssum alyssoides</i> (a)	-	-	_a 6	_b 29	-	-	2	14	.01	.14
F	<i>Arabis</i> spp.	_a -	_b 13	_{ab} 7	_a -	-	5	3	-	.01	-
F	<i>Astragalus beckwithii</i>	-	-	2	1	-	-	1	1	.03	.00
F	<i>Aster chilensis</i>	_a 9	_b 34	_a 9	_a 13	5	13	3	6	.18	.42
F	<i>Astragalus convallarius</i>	_a 13	_a 12	_a 5	_b 34	6	7	2	16	.04	.60
F	<i>Balsamorhiza sagittata</i>	-	-	-	-	-	-	-	-	-	.00
F	<i>Calochortus nuttallii</i>	3	11	13	17	2	7	8	7	.04	.20
F	<i>Chenopodium fremontii</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Cirsium undulatum</i>	_c 137	_b 73	_a 38	_a 24	63	41	23	15	.61	.55
F	<i>Collomia linearis</i> (a)	-	-	-	26	-	-	-	13	-	.06
F	<i>Comandra pallida</i>	_a 15	_a 22	_b 50	_a 30	8	10	26	16	.38	.15
F	<i>Collinsia parviflora</i> (a)	-	-	_a -	_b 35	-	-	-	13	-	.06
F	<i>Crepis acuminata</i>	6	-	-	-	3	-	-	-	-	-
F	Cruciferae	-	2	-	-	-	1	-	-	-	-
F	<i>Cryptantha</i> spp.	4	-	-	-	2	-	-	-	-	-
F	<i>Cynoglossum officinale</i>	-	2	2	-	-	1	1	-	.03	-
F	<i>Delphinium nuttallianum</i>	-	-	3	-	-	-	1	-	.00	-
F	<i>Epilobium brachycarpum</i> (a)	-	-	_a -	_b 12	-	-	-	6	-	.05
F	<i>Erigeron pumilus</i>	_a 2	_b 34	_b 41	_b 29	1	17	21	14	.30	.09
F	<i>Eriogonum racemosum</i>	4	15	5	3	3	8	2	2	.01	.01
F	<i>Eriogonum umbellatum</i>	-	-	3	-	-	-	3	-	.01	-
F	<i>Gayophytum ramosissimum</i> (a)	-	-	_b 15	_a -	-	-	6	-	.05	-
F	<i>Gilia aggregata</i>	-	2	1	-	-	2	1	-	.03	-
F	<i>Hackelia patens</i>	-	-	6	1	-	-	2	1	.30	.00
F	<i>Holosteum umbellatum</i> (a)	-	-	_a 6	_b 40	-	-	2	13	.01	.21
F	<i>Lactuca serriola</i>	-	3	-	-	-	1	-	-	-	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Lithospermum ruderale	-	2	4	3	-	1	2	1	.03	.03
F	Lupinus argenteus	_a 2	_a 4	_b 22	_c 40	2	2	10	20	.74	1.28
F	Machaeranthera canescens	_{ab} 70	_c 128	_b 74	_a 19	31	57	38	10	.51	.12
F	Machaeranthera grindelioides	-	-	-	1	-	-	-	1	-	.00
F	Microsteris gracilis (a)	-	-	_a -	_b 68	-	-	-	27	-	.28
F	Navarretia intertexta (a)	-	-	-	3	-	-	-	1	-	.00
F	Orthocarpus tolmiei (a)	-	-	_a 5	_b 30	-	-	2	12	.06	.35
F	Penstemon spp.	-	2	-	-	-	1	-	-	-	-
F	Phlox longifolia	_a -	_b 22	_b 10	_b 15	-	11	5	8	.05	.04
F	Polygonum douglasii (a)	-	-	_b 81	_a 28	-	-	34	12	.22	.08
F	Ranunculus testiculatus (a)	-	-	_a 3	_b 22	-	-	1	9	.00	.09
F	Senecio integerrimus	_a -	_a -	_a -	_b 16	-	-	-	9	-	.15
F	Senecio multilobatus	3	-	-	4	1	-	-	2	-	.01
F	Sphaeralcea coccinea	_a 4	_b 18	_{ab} 14	_{ab} 8	2	8	5	3	.31	.06
F	Taraxacum officinale	_a 6	_b 34	_{ab} 26	_{ab} 32	3	16	12	18	.21	.26
F	Tragopogon dubius	_a 7	_b 56	_a 25	_a 19	4	28	14	11	.27	.24
F	Unknown forb-annual (a)	-	-	_b 12	_a -	-	-	5	-	.07	-
F	Verbascum thapsus	11	9	2	-	4	4	1	-	.03	-
F	Vicia americana	_a -	_b 15	_a -	_a -	-	6	-	-	-	-
F	Viguiera multiflora	1	-	-	-	1	-	-	-	-	-
F	Zigadenus paniculatus	-	3	1	8	-	1	1	5	.03	.15
Total for Annual Forbs		0	0	128	296	0	0	52	121	0.43	1.37
Total for Perennial Forbs		378	568	414	389	172	273	207	201	4.59	5.02
Total for Forbs		378	568	542	685	172	273	259	322	5.02	6.40

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 06 , Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	13	13	.97	1.42
B	Artemisia tridentata vaseyana	55	43	5.86	9.43
B	Chrysothamnus viscidiflorus viscidiflorus	85	86	3.79	6.31
B	Mahonia repens	21	17	.93	.22
B	Opuntia spp.	4	4	.91	.91
B	Purshia tridentata	11	16	.30	.89
B	Symphoricarpos oreophilus	28	25	3.65	5.55
B	Tetradymia canescens	3	2	-	.38
Total for Browse		220	206	16.44	25.13

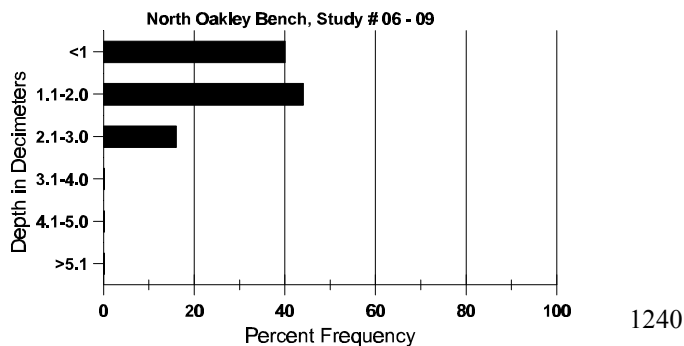
BASIC COVER --
Herd unit 06 , Study no: 9

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	376	374	7.75	12.00	46.85	55.62
Rock	62	52	2.00	1.50	1.37	1.79
Pavement	152	67	.25	1.50	.91	.32
Litter	389	357	60.50	47.00	39.72	38.70
Cryptogams	70	110	1.25	4.25	.97	2.75
Bare Ground	296	274	28.25	33.75	21.67	21.97

SOIL ANALYSIS DATA --
Herd Unit 06, Study no: 09, North Oakley Bench

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.6	64.4 (19.7)	7.0	38.9	33.1	28.0	4.2	43.8	217.6	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 06 , Study no: 9

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Sheep	1	-	-	-
Rabbit	3	3	9	N/A
Horse	-	3	-	-
Elk	5	21	383	29 (73)
Deer	15	11	252	19 (48)
Cattle	6	12	261	22 (54)

BROWSE CHARACTERISTICS --

Herd unit 06 , Study no: 9

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.		
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	2	-	-	-	-	-	-	-	1	-	1	-	133			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66	25	31	1
	96	-	4	7	2	-	-	-	-	-	13	-	-	-	260	25	30	13
	01	-	3	2	-	-	6	-	-	-	11	-	-	-	220	28	34	11
D	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	1	-	-	1	-	-	-	2	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		100%			00%			00%			+67%							
'90		67%			33%			33%			+29%							
'96		29%			50%			00%			- 7%							
'01		23%			77%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	100%			
												'90	199		0%			
												'96	280		0%			
												'01	260		15%			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4	5	6	7	8	9	1	2	3				4				
Artemisia tridentata vaseyana																					
S	84	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	37	-	-	-	-	-	-	-	-	-	-	-	37	-	-	-	2466		37	
	96	6	1	-	-	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	10	5	-	-	-	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	90	6	-	1	1	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	96	14	5	-	-	-	-	-	-	-	-	-	-	19	-	-	-	380		19	
	01	5	4	-	-	-	-	-	-	-	-	-	-	8	1	-	-	180		9	
M	84	4	16	1	-	-	-	-	-	-	-	-	-	21	-	-	-	1400	13	7	21
	90	6	5	-	1	-	-	-	-	-	-	-	-	9	2	1	-	800	14	17	12
	96	22	39	19	-	-	-	-	-	-	-	-	-	73	-	7	-	1600	20	28	80
	01	16	29	13	-	-	3	-	-	-	-	-	-	54	1	6	-	1220	22	35	61
D	84	-	10	9	-	-	-	-	-	-	-	-	-	16	-	3	-	1266		19	
	90	1	1	-	-	1	-	-	-	-	-	-	-	2	1	-	-	200		3	
	96	-	6	4	-	-	-	-	-	-	-	-	-	7	-	3	-	200		10	
	01	4	4	2	-	-	-	-	-	-	-	-	-	3	1	-	6	200		10	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	880		44	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>							
'84		56%				18%				05%				-58%							
'90		30%				04%				04%				+30%							
'96		46%				21%				09%				-27%							
'01		46%				23%				15%											
Total Plants/Acre (excluding Dead & Seedlings)												'84	3666	Dec:	35%						
												'90	1533		13%						
												'96	2180		9%						
												'01	1600		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				
Chrysothamnus viscidiflorus viscidiflorus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	17	-	-	-	-	-	-	-	-	17	-	-	-	1133		17	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	22	4	-	-	-	-	-	-	-	25	-	1	-	1733		26	
	96	38	-	-	-	-	-	-	-	-	38	-	-	-	760		38	
	01	32	-	-	-	-	-	-	-	-	30	2	-	-	640		32	
M	84	77	-	-	-	-	-	-	-	-	77	-	-	-	5133	16 15	77	
	90	57	29	7	5	-	-	-	-	-	77	-	21	-	6533	9 10	98	
	96	276	-	-	14	-	-	-	-	-	290	-	-	-	5800	11 16	290	
	01	326	8	-	4	-	-	1	-	-	323	16	-	-	6780	9 16	339	
D	84	27	-	-	-	-	-	-	-	-	27	-	-	-	1800		27	
	90	17	7	-	1	-	-	-	-	-	15	-	7	3	1666		25	
	96	4	1	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	4	-	-	-	-	-	-	-	-	-	3	-	1	80		4	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+30%							
'90		27%			05%			21%			-33%							
'96		.30%			00%			00%			+11%							
'01		02%			00%			.26%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	6933	Dec:	26%			
												'90	9932		17%			
												'96	6660		2%			
												'01	7500		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				
Mahonia repens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	16	-	-	-	-	-	-	-	-	16	-	-	-	320			16
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	18	2	-	-	-	-	-	-	-	20	-	-	-	1333			20
	96	252	-	-	-	-	-	-	-	-	252	-	-	-	5040			252
	01	22	-	-	-	-	-	-	-	-	22	-	-	-	440			22
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	2	-	6	-	-	-	-	-	9	-	-	-	600	3	4	9
	96	65	-	-	-	-	-	-	-	-	65	-	-	-	1300	3	5	65
	01	176	-	-	-	-	-	-	-	-	176	-	-	-	3520	2	3	176
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+97%							
'90		14%			00%			00%			+70%							
'96		00%			00%			00%			-38%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	66	Dec:	-				
											'90	1933		-				
											'96	6340		-				
											'01	3960		-				
Opuntia spp.																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	7	20	4
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	19	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	0		0%				
											'96	80		0%				
											'01	80		25%				

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	'84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'90	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	'84	-	2	1	-	-	-	-	-	-	3	-	-	-	200	30 34	3	
	'90	-	-	3	-	-	-	-	-	-	3	-	-	-	200	22 41	3	
	'96	-	1	7	-	4	1	-	-	-	13	-	-	-	260	14 40	13	
	'01	-	4	2	-	1	6	-	-	-	13	-	-	-	260	11 36	13	
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	-	-	-	-	-	1	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		50%			25%			00%			+ 0%							
'90		00%			100%			00%			- 2%							
'96		38%			62%			00%			+19%							
'01		31%			56%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	0%			
												'90	266		0%			
												'96	260		0%			
												'01	320		6%			

A Y 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	6	-	1	-	-	-	-	-	-	7	-	-	-	140		7	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	1	2	-	-	-	-	-	-	-	3	-	-	-	200	11	15	3
	90	-	3	1	-	-	-	-	-	-	4	-	-	-	266	12	14	4
	96	11	19	12	1	-	-	-	-	-	38	5	-	-	860	24	42	43
	01	18	2	1	3	-	-	-	-	-	24	-	-	-	480	29	49	24
D	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	1	-	-	-	-	-	-	-	-	-	-	1	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		75%			00%			00%			+43%							
'90		57%			14%			14%			+54%							
'96		38%			26%			00%			-44%							
'01		07%			04%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	25%			
												'90	465		14%			
												'96	1000		0%			
												'01	560		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				
Tetradymia canescens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	13	14	
	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40	11	19	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9	17	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+ 0%							
'90		100%			00%			00%			- 9%							
'96		100%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	60		-			
												'01	60		-			

Trend Study 6-10-01

Study site name: Mahogany Hills.

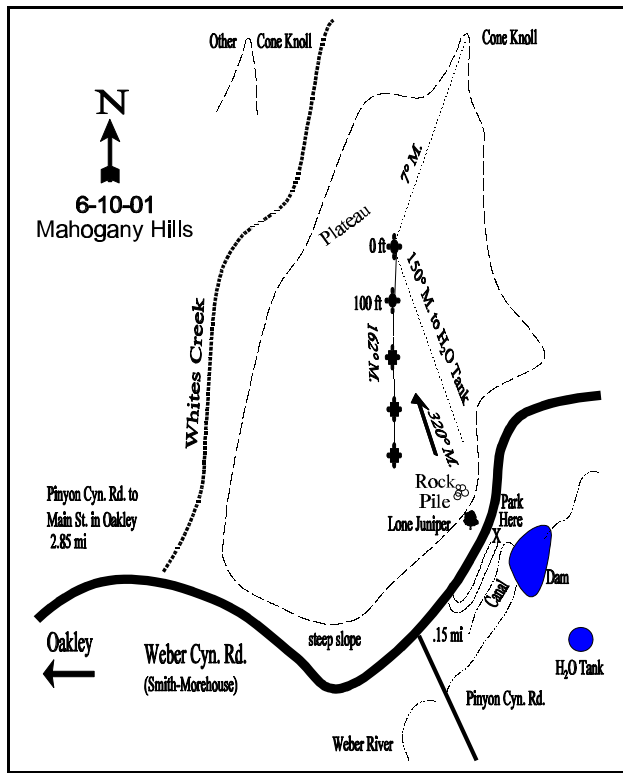
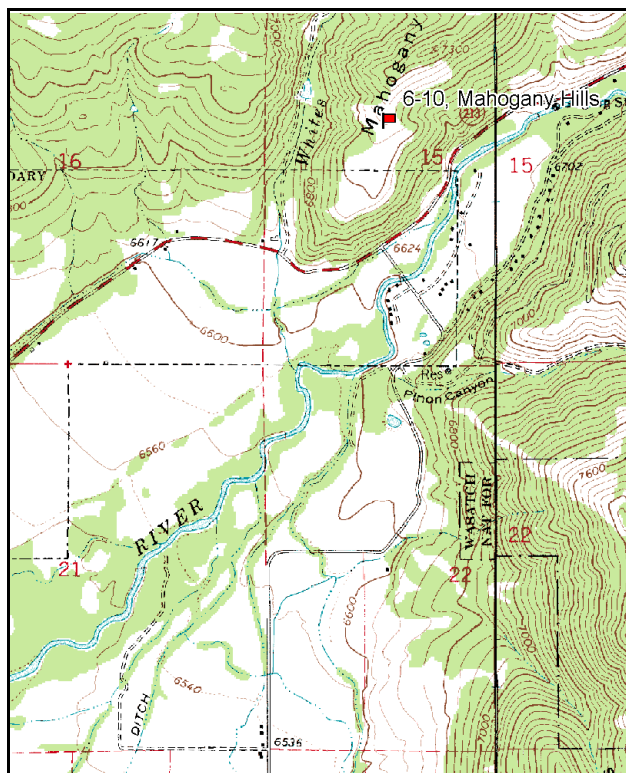
Vegetation type: Mountain brush.

Compass bearing: frequency baseline 162 degrees magnetic.

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

LOCATION DESCRIPTION

From Oakley, proceed up Weber Canyon watching for Pinyon Canyon Lane which is a right turn. From this road proceed 0.15 miles farther up Weber Canyon and park opposite a small irrigation canal dam. The main river dam to supply the canal is 100 yards upstream. From the river diversion walk up the steep slope at 273 degrees magnetic to a large lone juniper. From the lone juniper, a rock pile can be found 55 paces at 320 degrees magnetic. From the rock pile, the 0-foot baseline stake is approximately 80 paces at a bearing of 320 degrees magnetic. The 0-foot stake of the is marked by with browse tag #7952. To triangulate on the 0-foot stake when in the middle of plateau: from the stake to a cone-knoll to the north is 7 degree magnetic, from the stake to a water tank on the right at the mouth of Pinyon Canyon is 150 degrees magnetic.



Map Name: Kamas

Diagrammatic Sketch

Township 1S, Range 6E, Section 15

UTM 4509302 N 478425 E

DISCUSSION

Trend Study No. 6-10

The Mahogany Hills study was established in 1984 to sample critical big game winter range at the mouth of the Upper Weber River Canyon. Slope on this study varies from 5% to 12%, aspect is to the south. The site is best categorized as mountain big sagebrush-grass which also contains strong components of the mountain brush type. Elevation at the site is approximately 7,100 feet. Elk use has been moderate on the site, while deer use has been light. A pellet group transect read on the site in 2001 estimated 41 elk days use/acre (101 edu/ha), and 11 deer days use/acre (26 ddu/ha). There appears to be little or no livestock use.

Soil is a reddish color, moderately deep and well-drained. Effective rooting depth (see methods) was estimated at almost 13 inches. The soil texture is classified as a loam with a neutral soil reaction (6.7 pH). In 1996, this site had the highest amount of vegetative and litter cover and the lowest average soil temperature (58.4°F) of all sites within the management unit. It has the best site potential of all the sites on the unit. This area has a diverse plant composition, especially among grasses. Ground cover is excellent. No significant erosion can be detected. An erosion soil condition class assessment completed in 2001 showed soils to be stable.

Mountain big sagebrush dominates the browse component by contributing 45% of the browse cover in 2001. This species has gone through periods of high decadence, ranging from a high of 82% ('84) to a low of 40% ('96). In 2001, percent decadence slightly increased to 48%. Sagebrush density was estimated at 4,133 plants/acre during the initial sample in 1984, but has steadily declined since. In 2001, density was estimated at 1,920 plants/acre. Some of the decline in density is likely due to the greatly increased sample size used in 1996 and 2001 which better estimates browse populations. However, the dead age class has made up a significant portion of the population at 21% and 27% in 1996 and 2001 respectively. Density may continue to decline in the future with only half of the population being represented by mature plants in 2001. Recruitment from young plants is also low at less than 5% in all readings. Utilization on mountain big sagebrush has been moderate to heavy for almost all readings, and those classified with poor vigor have averaged 17% the last three sampling periods. Average leader growth on mountain big sagebrush was less than 2 inches in 2001.

The site also contains significant numbers of other valuable browse species that include mountain snowberry, serviceberry, true mountain mahogany, and antelope bitterbrush. These preferred species contribute an additional 43% of the browse cover in 2001. These species display moderate to heavy use, but low percent decadence and normal vigor. Annual leader growth averaged about 2½ inches for serviceberry and mountain mahogany in 2001. Also present are some less desirable shrubs such as stickyleaf low rabbitbrush and gray horsebrush. Stickyleaf low rabbitbrush has shown some dynamic changes in its density, but with very few young in the population, these increases are due mostly to the much larger sample size utilized in 1996, not an actual increase in the population size. Gambel oak density was estimated at 460 stems/acre in 1996, increasing to 1,120 stems/acre in 2001. A late snow storm and cold temperatures in June 2001 killed a lot of the leaf and meristematic biomass provided by oak.

Perennial grasses are a very prominent component on this site, as they provide on average about 34% cover for 1996 and 2001. This represents 86% of the herbaceous understory cover, and 53% of the total vegetative cover on the site in 2001. Of the 15 species of grasses identified on this site, three are seeded species more commonly found in meadows and pastures. Smooth brome is the most obvious example and also the most prevalent grass on the site. It has increased in abundance since 1984. Smooth brome accounts for 72% of the grass cover, 62% of the herbaceous understory cover, and 39% of the total vegetation cover on the site in 2001. Smooth brome is a sod-former and is highly shade tolerant. Within the mountain brush zone, smooth brome can totally dominate and exclude the herbaceous understory and exert a great deal of competition on

shrub recruitment, especially for sagebrush. Sandberg, Kentucky, and mutton bluegrasses are also fairly abundant on the site. Forbs also have a diverse composition and include several palatable and valuable species. Arrowleaf balsamroot, one-flowered helianthella, low penstemon, and redroot eriogonum are preferred forbs in many locations. Sum of nested frequency for perennial grasses and forbs decreased by 15% in 2001.

1984 APPARENT TREND ASSESSMENT

This is a quality site in good condition. Soil trend appears stable with little apparent erosion. A vigorous plant community provides good protection. Vegetative trend looks stable as well. In upcoming years the most important parameter to monitor will be age form and class structure of mountain big sagebrush.

1990 TREND ASSESSMENT

Compared to the wet years when this trend study was established in 1984, the data shows the effects of drought on the site. From the photographic comparisons, there is obviously less production for sagebrush and grass in 1990. The density of sagebrush has decreased, with the number of mature sagebrush increasing due to a decline in percent decadence. A majority of the population is moderately hedged, compared to 61% which were heavily browsed in 1984. Populations of the other palatable, but less common browse were unchanged. Most are now moderately hedged. This site has excellent vegetation and litter cover from high grass frequency and density. There is only 6% bare soil. Smooth brome is thick in the understory. There is a large diversity of forbs that provide a significant forage component. The site contains several palatable species for deer that inhabit the site year-round, especially this year due to its proximity to water. Elk use appears to be moderate in the winter.

TREND ASSESSMENT

soil - stable (3)

browse - stable for sagebrush (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

This site has some of the highest vegetative cover of any site in the area. Litter cover is very high at 75% with percent bare ground declining to less than 6%. Trend for soil is stable and in excellent condition. The browse trend is slightly down for mountain big sagebrush. This appears to be primarily from the very competitive and extremely abundant smooth brome, which is a sod-forming shade-tolerant grass. No seedlings were encountered on any reading and there are basically no safe sites for sagebrush seedlings to become established. The population is becoming more decadent and dying. Twenty-one percent of the population is currently dead. The other browse species are doing much better on the site. The herbaceous understory has improved since 1990 with values for nested frequency increasing for both grasses and forbs.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down for the key browse species (mountain big sagebrush) and stable for the other species of browse (2)

herbaceous understory - slightly up (4)

2001 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover remain high and well disbursed over the site. Bare soil declined to less than 4%. The key browse, mountain big sagebrush, shows a continuing slightly downward trend. Density continues to decline, and decadence is moderately high at 48%. The number of young recruited into the population is low at only 20 plant/acre. This species may continue to decline in the future without an increase in reproductive success, which is unlikely due to the dominance of the site by smooth brome. The other palatable, preferred browse on the site appear stable. Serviceberry, true mountain mahogany, and bitterbrush show stable densities, low decadency, and normal vigor. They also have much more extensive root structure that is more deeply rooted and more competitive with drought conditions. Trend for browse is slightly down overall because mountain big sagebrush is the dominant browse on the site. Trend for the herbaceous understory is slightly down. Sum of nested frequency of perennial grasses and forbs declined by 15% in 2001.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 10

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	11	7	8	5	5	3	4	2	.27	.03
G	Agropyron dasystachyum	13	8	2	17	6	4	1	7	.00	.52
G	Agropyron spicatum	_b 97	_b 120	_b 85	_a 37	43	47	29	13	2.52	.98
G	Bromus inermis	_a 159	_b 217	_c 278	_c 293	54	70	79	83	19.99	25.12
G	Bromus tectorum (a)	-	-	-	2	-	-	-	1	-	.00
G	Dactylis glomerata	1	-	5	1	1	-	2	1	.15	.00
G	Koeleria cristata	_a -	_a -	_b 33	_b 19	-	-	12	6	.82	.83
G	Melica bulbosa	-	-	7	-	-	-	2	-	.01	-
G	Phleum pratense	2	-	-	-	1	-	-	-	-	-
G	Poa bulbosa	-	8	9	3	-	3	4	2	.33	.06
G	Poa fendleriana	_{ab} 55	_a 35	_{ab} 65	_b 76	23	17	24	24	2.61	2.40
G	Poa pratensis	80	76	115	70	31	37	43	25	3.40	1.42
G	Poa secunda	_a 129	_{ab} 133	_a 117	_b 129	54	55	49	46	2.68	3.29
G	Stipa columbiana	_b 40	_b 25	_a -	_a -	18	10	-	-	-	-
G	Stipa comata	_{ab} 8	_{ab} 12	_b 22	_a 1	4	9	8	1	.58	.03
Total for Annual Grasses		0	0	0	2	0	0	0	1	0	0.00
Total for Perennial Grasses		595	641	746	651	240	255	257	210	33.41	34.70
Total for Grasses		595	641	746	653	240	255	257	211	33.41	34.71

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Achillea millefolium</i>	7	2	1	-	3	2	1	-	.00	-
F	<i>Agoseris glauca</i>	-	-	-	6	-	-	-	2	-	.01
F	<i>Alyssum alyssoides</i> (a)	-	-	14	23	-	-	6	10	.05	.27
F	<i>Allium</i> spp.	a-	b28	a3	a4	-	18	3	3	.01	.01
F	<i>Antennaria rosea</i>	1	-	1	-	1	-	1	-	.03	-
F	<i>Arabis</i> spp.	ab8	a1	b17	a-	4	1	9	-	.04	-
F	<i>Arenaria</i> spp.	-	4	-	-	-	2	-	-	-	-
F	<i>Artemisia ludoviciana</i>	-	-	3	3	-	-	1	1	.38	.15
F	<i>Astragalus convallarius</i>	a4	b32	c61	bc53	3	16	29	28	1.10	.84
F	<i>Balsamorhiza sagittata</i>	10	4	5	9	6	3	3	5	.57	.92
F	<i>Castilleja linariaefolia</i>	6	3	11	2	2	2	6	2	.52	.12
F	<i>Calochortus nuttallii</i>	-	5	-	-	-	4	-	-	-	-
F	<i>Cirsium undulatum</i>	3	4	6	5	2	3	3	2	.07	.15
F	<i>Comandra pallida</i>	a-	a2	b10	a2	-	1	5	1	.08	.16
F	<i>Collinsia parviflora</i> (a)	-	-	24	17	-	-	10	7	.12	.06
F	<i>Crepis acuminata</i>	a-	c97	b59	b56	-	50	26	31	.56	.60
F	<i>Erigeron pumilus</i>	3	4	5	5	1	2	3	3	.04	.01
F	<i>Eriogonum racemosum</i>	7	11	10	9	4	5	5	6	.24	.13
F	<i>Eriogonum umbellatum</i>	-	-	6	5	-	-	3	2	.12	.06
F	<i>Hackelia patens</i>	c88	b38	ab22	a4	45	22	13	2	.24	.03
F	<i>Helianthella uniflora</i>	a-	a-	b29	b18	-	-	9	9	1.39	1.51
F	<i>Holosteum umbellatum</i> (a)	-	-	b11	a3	-	-	5	1	.05	.00
F	<i>Lithospermum ruderales</i>	3	-	7	6	2	-	3	3	.21	.12
F	<i>Microsteris gracilis</i> (a)	-	-	a-	b15	-	-	-	7	-	.13
F	<i>Orthocarpus tolmiei</i> (a)	-	-	1	7	-	-	1	3	.00	.04
F	<i>Penstemon humilis</i>	b11	b13	ab5	a-	5	5	2	-	.06	-
F	<i>Phlox longifolia</i>	-	3	-	3	-	1	-	1	-	.00
F	<i>Polygonum douglasii</i> (a)	-	-	b15	a-	-	-	9	-	.04	-
F	<i>Schoenocrambe linifolia</i>	-	-	2	1	-	-	1	1	.00	.03
F	<i>Senecio integerrimus</i>	a-	a-	a-	b15	-	-	-	8	-	.10
F	<i>Zigadenus paniculatus</i>	-	-	3	3	-	-	2	1	.01	.03
Total for Annual Forbs		0	0	65	65	0	0	31	28	0.28	0.51
Total for Perennial Forbs		151	251	266	209	78	137	128	111	5.73	5.02
Total for Forbs		151	251	331	274	78	137	159	139	6.01	5.53

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 06 , Study no: 10

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	24	31	3.34	2.84
B	Artemisia tridentata vaseyana	80	69	16.30	11.05
B	Cercocarpus montanus	1	3	1.31	.18
B	Chrysothamnus depressus	4	6	.30	.27
B	Chrysothamnus viscidiflorus viscidiflorus	39	50	2.55	1.41
B	Purshia tridentata	9	10	1.49	1.10
B	Quercus gambelii	7	7	.91	1.08
B	Symphoricarpos oreophilus	54	46	10.48	6.54
B	Tetradymia canescens	4	5	.18	.18
Total for Browse		222	227	36.89	24.68

BASIC COVER --

Herd unit 06 , Study no: 10

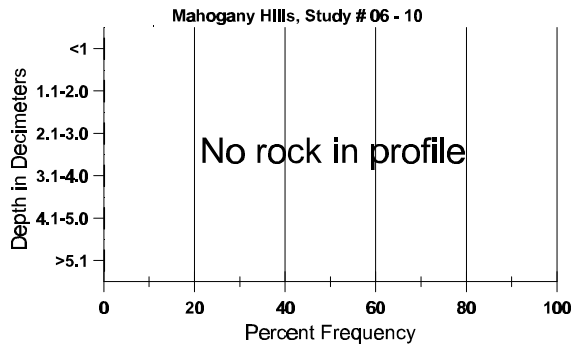
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	384	381	5.00	16.50	61.87	61.94
Rock	13	4	.50	0	.05	.03
Pavement	27	19	.50	0	.09	.14
Litter	400	393	80.50	76.00	75.13	70.69
Cryptogams	53	19	.50	.75	.74	.19
Bare Ground	98	52	13.00	6.75	5.88	3.95

SOIL ANALYSIS DATA --

Herd Unit 06, Study no: 10, Mahogany Hills

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.7	58.4 (14.5)	6.7	38.9	35.1	26.0	3.7	32.5	195.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 06 , Study no: 10

Type	Quadrat Frequency	
	'96	'01
Elk	22	17
Deer	12	3

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
01	01
531	41 (101)
139	11 (26)

BROWSE CHARACTERISTICS --

Herd unit 06 , 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				
Amelanchier alnifolia																		
Y	'84	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	'90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'96	2	9	6	1	1	-	-	-	-	13	5	1	-	380	33	39	
	'01	14	4	6	-	4	6	-	1	-	35	-	-	-	700	33	36	
D	'84	-	-	5	-	-	-	-	-	-	1	-	4	-	333		5	
	'90	-	2	1	-	-	-	-	-	-	2	-	1	-	200		3	
	'96	-	6	1	-	2	-	-	-	-	3	6	-	-	180		9	
	'01	1	2	-	1	-	1	-	-	2	7	-	-	-	140		7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			67%			-33%							
'90		75%			25%			25%			+53%							
'96		64%			25%			04%			+36%							
'01		23%			34%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec:	83%			
												'90	266		75%			
												'96	560		32%			
												'01	880		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				
Artemisia tridentata vaseyana																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	3	2	-	-	-	-	-	-	-	3	-	2	-	100		5	
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	84	1	4	6	-	-	-	-	-	-	10	-	1	-	733	32	41	11
	90	2	20	2	2	-	-	-	-	-	25	-	1	-	1733	27	30	26
	96	-	50	22	4	2	-	-	-	-	75	-	3	-	1560	28	39	78
	01	12	26	8	-	-	3	-	-	-	45	1	3	-	980	26	34	49
D	84	2	17	32	-	-	-	-	-	-	35	-	13	3	3400		51	
	90	5	17	-	-	-	-	-	-	-	15	-	1	6	1466		22	
	96	3	30	17	-	-	6	-	-	-	35	2	14	5	1120		56	
	01	7	26	9	2	2	-	-	-	-	29	3	6	8	920		46	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	720		36	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	700		35	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		34%			61%			27%			-21%							
'90		76%			04%			16%			-15%							
'96		60%			32%			17%			-31%							
'01		56%			21%			18%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	4133	Dec:	82%			
												'90	3265		45%			
												'96	2780		40%			
												'01	1920		48%			

A G R E	Y 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				
Cercocarpus montanus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	54	63	1
	01	-	-	1	-	-	-	-	-	1	2	-	-	-	40	40	37	2
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	1	-	-	-	-	-	-	-	-	-	1	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			50%			50%			-85%							
'96		00%			00%			00%			+67%							
'01		00%			67%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	132		50%			
												'96	20		0%			
												'01	60		0%			
Chrysothamnus depressus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	7	10	11
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200	8	9	10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			- 9%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	220		-			
												'01	200		-			

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				
Chrysothamnus viscidiflorus viscidiflorus												
S	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	0		0	
	01	2	-	-	-	-	-	-	40		2	
Y	84	1	-	-	-	-	-	-	66		1	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	20		1	
M	84	1	-	-	-	-	-	-	66	10	13	1
	90	1	-	-	-	-	-	-	66	13	3	1
	96	72	-	-	14	-	-	-	1720	14	16	86
	01	81	-	-	2	-	-	-	1660	12	15	83
D	84	4	-	-	-	-	-	-	266			4
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%		-83%				
'90		00%		00%		00%		+96%				
'96		00%		00%		01%		-3%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	398	Dec:	67%			
						'90	66		0%			
						'96	1740		0%			
						'01	1680		0%			
Opuntia spp.												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	0	6	9	0
	01	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		00%						
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	-			
						'90	0		-			
						'96	0		-			
						'01	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								
Purshia tridentata																
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1
M	84	-	-	7	-	-	-	-	-	4	-	3	-	466	23 39	7
	90	1	3	-	-	-	-	-	-	4	-	-	-	266	25 40	4
	96	-	4	5	2	1	-	-	-	12	-	-	-	240	16 36	12
	01	-	1	4	3	-	5	-	-	13	-	-	-	260	14 34	13
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'84		00%		100%		43%		-43%								
'90		75%		00%		00%		-10%								
'96		42%		42%		00%		+14%								
'01		07%		64%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'84	466	Dec:	-			
										'90	266		-			
										'96	240		-			
										'01	280		-			
Quercus gambelii																
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	4	-	-	1	-	-	-	-	3	-	2	-	100		5
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	96	3	19	1	-	-	-	-	-	23	-	-	-	460	32 22	23
	01	11	31	2	-	-	-	-	-	14	-	30	-	880	22 18	44
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	7	-	-	-	-	-	-	-	-	-	7	140		7
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	80		4
	01	-	-	-	-	-	-	-	-	-	-	-	-	240		12
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'84		00%		00%		00%										
'90		00%		00%		00%										
'96		83%		04%		00%		+59%								
'01		68%		04%		70%										
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	0%			
										'90	0		0%			
										'96	460		0%			
										'01	1120		13%			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3		4		
Symphoricarpos oreophilus																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	90	-	-	-	3	2	-	-	-	-	-	-	-	333			5
	96	19	3	-	4	-	-	-	-	-	-	-	-	520			26
	01	2	-	-	1	-	-	-	-	-	-	-	-	60			3
M	84	16	1	-	-	-	-	-	-	-	-	-	-	1133	20	30	17
	90	4	1	-	1	-	-	-	-	-	-	-	-	400	22	37	6
	96	101	26	-	15	-	-	-	-	-	-	-	-	2840	19	32	142
	01	73	-	-	13	-	-	-	-	-	-	-	-	1720	18	36	86
D	84	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	90	-	2	1	5	-	-	-	-	-	-	-	-	533			8
	96	-	1	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	4	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		05%				00%				00%				+ 0%			
'90		26%				05%				26%				+63%			
'96		18%				00%				00%				-45%			
'01		04%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	1265	Dec:	5%		
												'90	1266		42%		
												'96	3380		1%		
												'01	1860		4%		
Tetradymia canescens																	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	1	-	-	-	-	-	-	-	-	-	-	80	17	18	4
	01	5	-	-	-	-	-	-	-	-	-	-	-	100	15	22	5
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		00%				00%				00%							
'90		00%				00%				00%							
'96		25%				00%				00%				+20%			
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	80		-		
												'01	100		-		

Trend Study 6-12-01

Study site name: Stag Canyon

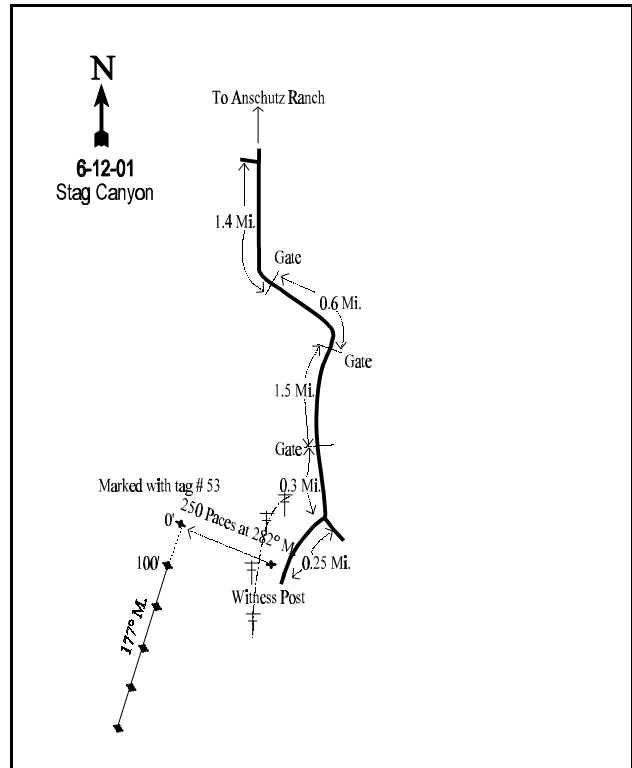
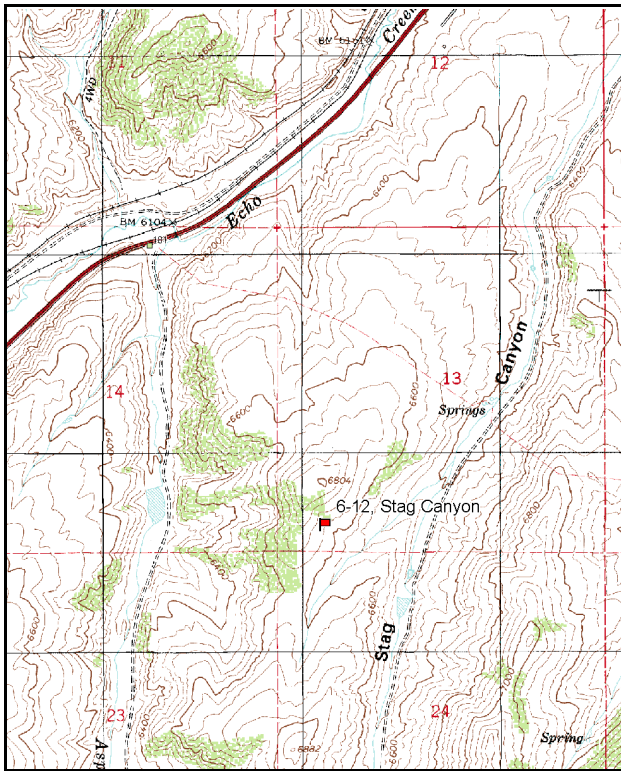
Vegetation type: Big sagebrush

Compass bearing: frequency baseline 177 degrees magnetic.

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

LOCATION DESCRIPTION

Take exit # 185 on I-80, up Echo Canyon and turn right on the frontage road (west). Drive 1.4 miles, turn left, and go through the locked gate (combo from Anschutz Ranch). Go 0.6 miles and turn off to the right through the gate next to the corral. Go 1.5 miles to a gate and proceed 0.3 miles from the gate to a fork. Turn right and drive 0.25 miles to a witness post on the right hand (west) side of the road. From the witness post walk 90 paces at 282 degrees magnetic to the 0-foot baseline stake, marked by browse tag #53. The baseline runs 177 degrees magnetic.



Map Name: Castle Rock

Diagrammatic Sketch

Township 4N, Range 6E, Section 13

UTM 4546607 N 481092 E

DISCUSSION

Trend Study No. 6-12

The Stag Canyon study was established in 1996 over concerns of elk use on an old burn. The site has an easterly aspect at an elevation of 6,600 feet. Slope varies from 10-15%. The location of the site was determined by the number elk pellet groups. In 1996, the study area had a pellet group quadrat frequency of 47% for elk, 10% for deer, and 6% for cattle. A pellet group transect read on the site in 2001 estimated 60 elk days use/acre (149 edu/ha), 15 deer days use/acre (36 ddu/ha), and 11 cow days use/acre (27 cdu/ha). Most of the elk pellet groups appeared to be from late winter, while deer pellets were more recent from spring and early summer. Adequate juniper thermal cover is a short distance up the ridge from the site.

Soil texture is classified as sandy clay loam with a slightly alkaline soil reaction (7.4 pH). There is little surface rock (<4%), but there is considerable rock throughout the profile. Average soil temperature was estimated at almost 71° F (at nearly 10 inches in depth), indicating that the site is quite dry and warm during the summer. Litter and vegetative cover values are below average when compared to other sites within the management unit. Bare soil was high at 34% in 1996, increasing to 45% in 2001. There are some signs of minor sheet erosion, but it is limited by the moderately gentle slopes. Even with abundant bare soil, soils appear stable for the most part.

The browse composition consists primarily of mountain big sagebrush and stickyleaf low rabbitbrush. Mountain big sagebrush provided 57% of the browse cover in 1996, increasing to 64% in 2001. The sagebrush population exhibited characteristics of an expanding population in 1996 with a biotic potential of 38% (percentage of seedlings to the population) and a young age class that made up 71% of the population. In 2001, density did increase by 10% to an estimated 5,720 plants/acre. Young plants continue to be abundant in 2001, making up 20% of the population. Most of the young plants occur in the more open areas throughout the site. Sagebrush exhibits very low percent decadence, light use, and normal vigor. Average leader growth on big sagebrush was less than 2 inches in 2001. Increaser species make up the remainder of the browse including stickyleaf low rabbitbrush, broom snakeweed, and prickly pear.

The herbaceous understory is marginal on this site, and best characterized as weedy. The major problem in 1996 was that three species, cheatgrass, thistle, and flannel mullein contributed 64% of the total herbaceous cover. In 2001, all three of these species significantly decreased in nested frequency. Elk will tend to congregate on areas with weedy forbs and select them in the spring. In 2001, sum of nested frequency for perennial grasses slightly increased, while that of perennial forbs drastically decreased. However, the loss of perennial forbs was mostly to the decline in thistle and mullein. Musk thistle was very thick on the road and surrounding meadows coming into the site in 2001.

1996 APPARENT TREND ASSESSMENT

Soils appear stable, but are in only fair condition. Bare ground is abundant, while herbaceous vegetation and litter cover are only marginal. Browse trend appears to be improving with abundant seedling and young sagebrush. Use is light and no decadent plants were sampled. The herbaceous understory is best characterized as weedy. Cheatgrass, thistle, and mullein are the dominate species.

2001 TREND ASSESSMENT

Trend for soil is stable, but remains in only fair condition. Although percent bare ground increased, vegetation and litter cover stayed fairly stable. The nested frequency ratio of bare soil to protective cover (vegetation, litter, and cryptogams) remained at 1:2.3, the same as in 1996. A soil condition class assessment

also determined soils to be stable at the present time. Trend for browse is up. Mountain big sagebrush increased in density, has low decadence, light use, and normal vigor. Young plants remain abundant in the population as well. Trend for the herbaceous understory is stable overall, but remains in poor condition. Although perennial forbs had a drastic decrease in sum of nested frequency, perennial grasses actually increased. Most of the loss in the perennial forb component was due to the decline in two species, thistle and mullein. The significant decline in cheatgrass frequency is also a positive aspect on this site.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - stable but in poor condition (3)

HERBACEOUS TRENDS --

Herd unit 06 , Study no: 12

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron dasystachyum	78	91	18	27	2.58	2.12
G	Agropyron spicatum	11	11	6	4	.18	.19
G	Bromus tectorum (a)	272	*154	80	56	4.43	1.85
G	Elymus cinereus	5	5	1	1	.03	.41
G	Oryzopsis hymenoides	57	64	21	26	2.05	1.42
G	Poa fendleriana	-	2	-	1	-	.00
G	Poa pratensis	14	*34	4	11	.45	1.35
G	Poa secunda	10	8	4	4	.12	.05
G	Stipa comata	15	14	6	5	.34	.42
Total for Annual Grasses		272	154	80	56	4.43	1.85
Total for Perennial Grasses		190	229	60	79	5.77	5.99
Total for Grasses		462	383	140	135	10.21	7.84
F	Alyssum alyssoides (a)	103	*342	39	93	.27	3.48
F	Allium spp.	-	2	-	1	-	.00
F	Arabis spp.	2	-	1	-	.00	-
F	Astragalus convallarius	3	9	1	4	.00	.07
F	Astragalus spp.	-	1	-	1	-	.15
F	Astragalus utahensis	2	-	2	-	.03	-
F	Cirsium undulatum	144	*32	59	15	4.98	.51
F	Collomia linearis (a)	-	4	-	1	-	.00
F	Collinsia parviflora (a)	18	*6	10	2	.07	.01
F	Cordylanthus ramosus (a)	1	*19	1	8	.03	.58
F	Epilobium brachycarpum (a)	1	-	1	-	.00	-
F	Erigeron pumilus	3	2	1	1	.00	.00
F	Gayophytum ramosissimum (a)	-	2	-	2	-	.01

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Gilia spp. (a)	-	4	-	1	-	.00
F	Holosteum umbellatum (a)	5	-	2	-	.01	-
F	Lithospermum spp.	-	-	-	-	-	.00
F	Machaeranthera spp	-	1	-	1	-	.15
F	Microsteris gracilis (a)	-	4	-	1	-	.00
F	Phlox longifolia	42	*19	18	9	.19	.09
F	Polygonum douglasii (a)	26	*-	11	-	.05	-
F	Ranunculus testiculatus (a)	5	3	3	1	.01	.00
F	Sisymbrium altissimum (a)	1	-	1	-	.00	-
F	Sphaeralcea coccinea	26	*9	12	5	.28	.05
F	Tragopogon dubius	6	-	2	-	.01	.00
F	Unknown forb-perennial	2	-	1	-	.03	-
F	Verbascum thapsus	59	*17	28	8	2.33	.32
Total for Annual Forbs		160	384	68	109	0.46	4.10
Total for Perennial Forbs		289	92	125	45	7.88	1.37
Total for Forbs		449	476	193	154	8.34	5.48

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 06 , Study no: 12

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	66	74	9.56	11.69
B	Chrysothamnus viscidiflorus viscidiflorus	59	61	5.48	5.69
B	Gutierrezia sarothrae	35	27	1.61	.86
B	Opuntia spp.	3	3	.15	.03
Total for Browse		163	165	16.80	18.27

BASIC COVER --

Herd unit 06 , Study no: 12

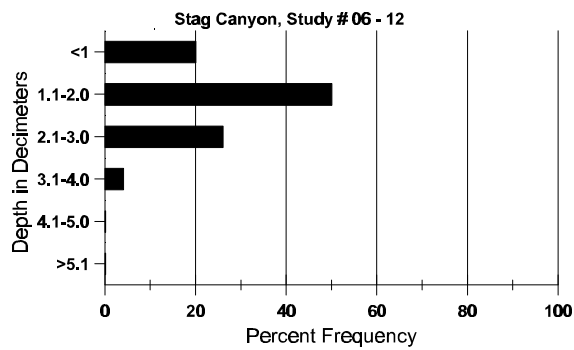
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	405	406	33.05	32.68
Rock	202	112	1.72	1.37
Pavement	264	336	2.63	5.55
Litter	494	457	40.31	36.14
Cryptogams	4	18	.04	.24
Bare Ground	386	391	34.56	45.35

SOIL ANALYSIS DATA --

Herd Unit 06, Study no: 12, Stag Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.8	70.8 (9.7)	7.4	47.3	26.7	26.0	2.9	11.9	169.6	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 06 , Study no: 12

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Rabbit	3	5	35	N/A
Elk	47	9	783	60 (149)
Deer	10	13	191	15 (36)
Cattle	6	4	131	11 (27)

BROWSE CHARACTERISTICS --

Herd unit 06 , 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				
<i>Artemisia tridentata vaseyana</i>																		
S	96	98	-	-	-	-	-	-	-	-	98	-	-	-	1960		98	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	182	-	-	-	-	-	-	-	-	182	-	-	-	3640		182	
	01	83	-	-	-	-	1	-	-	84	-	-	-	1680		84		
M	96	68	4	1	-	-	-	-	-	-	72	-	1	-	1460	33 40	73	
	01	188	7	-	-	-	-	-	-	195	-	-	-	3900	30 35	195		
D	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
	01	7	-	-	-	-	-	-	-	6	-	-	1	140		7		
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	660		33	
	01	-	-	-	-	-	-	-	-	-	-	-	-	60		3		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		02%			.78%			.39%			+10%							
'01		02%			00%			.34%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	5120	Dec:	0%				
											'01	5720		2%				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	111	3	1	8	-	-	-	-	-	123	-	-	-	2460	11 23	123	
	01	143	-	-	9	-	-	-	-	-	141	11	-	-	3040	9 21	152	
D	96	3	3	-	-	-	-	-	-	-	6	-	-	-	120		6	
	01	21	-	-	-	-	-	-	-	-	14	-	-	7	420		21	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		05%			.75%			00%			+24%							
'01		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	2660	Dec:	5%				
											'01	3480		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				
<i>Gutierrezia sarothrae</i>																		
Y	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560		28	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	126	-	-	-	-	-	-	-	-	126	-	-	-	2520	7 10	126	
	01	89	-	-	-	-	-	-	-	-	89	-	-	-	1780	7 11	89	
D	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
	01	3	-	-	-	-	-	-	-	-	-	-	-	3	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-41%							
'01		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	3120	Dec:	1%			
												'01	1840		3%			
<i>Opuntia spp.</i>																		
M	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	5 8	5	
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140	4 10	7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+29%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	100	Dec:	-			
												'01	140		-			
<i>Purshia tridentata</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10 63	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	0		-			

SUMMARY

MANAGEMENT UNIT 6 - CHALK CREEK

Of the 11 trend studies in this management unit, nine studies were reread in 2001, and two studies were not read because access through private lands was not obtained. The studies that were not read, Hixon Canyon and South Fork Chalk Creek, will be reevaluated during the next rotation.

Unit Wide Trends

Key browse is limited on several of the trend studies in this management unit. Trend studies at Echo Canyon Rest Area (6-2) and Spring Hollow Burn (6-3) have very little key browse due to fires burning through these areas. Trend studies at Echo Reservoir (6-4) and Spring Canyon (6-5) sample climax Utah juniper communities where key browse species have been nearly eliminated from the vegetation component due to high competition for resources with the juniper.

Cheatgrass decreased in nested frequency on five of the eight studies where it was sampled in 2001. It remained stable on two other studies, and increased on one study due to disturbance (Echo Canyon Rest Area, 6-2). There was no defined pattern in the overall abundance of grasses and forbs in 2001. Sum of nested frequency of perennial grasses and forbs remained stable or increased on about half of the studies in the unit, and decreased on the other half. Annuals grasses decreased on four studies, remained stable on four others, and increased on only one site (Echo Canyon Rest Area, 6-2). Annual forbs increased on five studies, remained stable on two sites, and decreased on two others.

Precipitation

Precipitation data from two weather stations within management unit 6, Echo Dam and Wanship Dam, was analyzed for the past two decades. From 1980-1986, both areas showed above normal annual precipitation, including the severe winters of the early-80's. Four consecutive years of below normal annual precipitation from 1987-1990 provides evidence to references made to extended drought in this and previous range trend studies reports. The early-to-mid-90's brought alternating years of above and below normal annual precipitation. The period from 1995-1998 again brought consecutive years of above normal annual precipitation. The spring and early summer of 2000 and 2001 were both very dry in this area, which helps explain the decline in cheatgrass frequency and/or cover on more than half of the studies in the unit.

Trend Summary

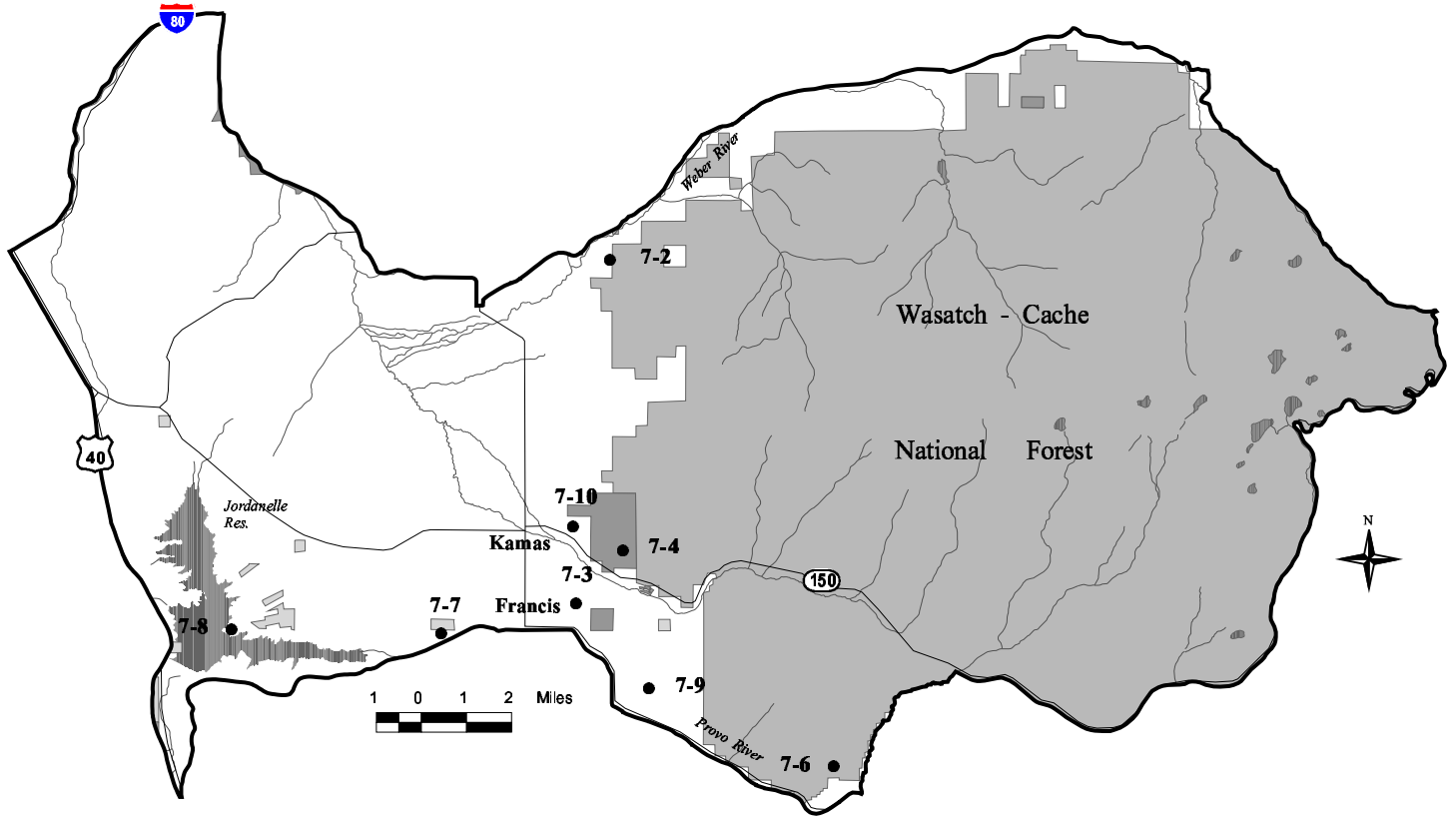
	Category	1984	1990	1996	2001
6-1 Anshutz Ranch	soil	est	3	4	3
	browse	est	3	4	3
	herbaceous understory	est	3	3	2
6-2 Echo Canyon Rest Area	soil			est	2
	browse			est	1
	herbaceous understory			est	3

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
 (est) = site established, (susp) = suspended, (NR) = not read

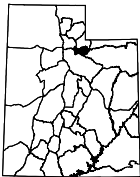
	Category	1984	1990	1996	2001
6-3 Spring Hollow Burn	soil	est	1	NR	3
	browse	est	1	NR	3
	herbaceous understory	est	3	NR	4
6-4 Echo Reservoir	soil	est	2	4	3
	browse	est	1	1	1
	herbaceous understory	est	4	2	4
6-5 Spring Canyon	soil	est	2	2	3
	browse	est	1	1	1
	herbaceous understory	est	1	3	3
6-6 Hixon Canyon	soil	est	1	3	NR
	browse	est	1	1	NR
	herbaceous understory	est	4	1	NR
6-7 Crandall Canyon	soil	est	1	4	2
	browse	est	1	4	3
	herbaceous understory	est	3	3	3
6-8 South Fork Chalk Creek	soil		est	4	NR
	browse		est	3	NR
	herbaceous understory		est	2	NR
6-9 North Oakley Bench	soil	est	3	4	3
	browse	est	3	4	3
	herbaceous understory	est	4	3	3
6-10 Mahogany Hills	soil	est	3	3	3
	browse	est	3	2	2
	herbaceous understory	est	3	4	2
6-12 Stag Canyon	soil			est	3
	browse			est	5
	herbaceous understory			est	3

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = site established, (susp) = suspended, (NR) = not read

Management Unit 7



Unit Location



- Transect Location
- ∕∕ Roads
- ∕∕ Water Courses
- Forest Service
- BLM
- State of Utah
- Private Land
- Water Body

WILDLIFE MANAGEMENT UNIT 7 - KAMAS

Boundary Description

Summit and Wasatch Counties - Boundary begins at the junction of I-80 and SR-32 (Wanship); south on SR-32 to the Weber Canyon Road at Oakley; east on this road to Holiday Park and the Weber River Trail; east on the Weber River Trail to SR-150 near Pass Lake; south on SR-150 to the North Fork of the Provo river; south along the North Fork of the Provo River to the Provo River; south along the Provo River to SR-35; west on SR-35 to Francis and SR-32; west on SR-32 to US-40 near Jordanelle; north on US-40 to I-80; north on I-80 to SR-32 and Wanship.

Management Unit Description

The Kamas herd unit is located between the Uinta and Wasatch Mountains in the north-central part of the state. The 1977 inventory of the Kamas unit, known as Herd Unit 20 at that time, included a total of 377,532 acres (Giunta 1979). Only about 10% of the range at that time was classified as winter range. Boundary changes in 1985 reduced the total acreage and shifted a portion of the winter range north of the Weber River into the Chalk Creek management unit. There was another realignment of the herd unit boundaries again in 1996, reducing the total acreage by approximately 25%. Even with these changes, the ratio of winter to summer range has stayed basically the same, with about 10% of the area being classified as winter range. The obvious limiting factor for big game in this management unit is the lack of adequate quantities of good quality winter range. With severe winters, the available range is reduced even further. A fairly current example of this problem can be illustrated by the large winter deer losses which occurred during the winter of 1992-93.

As with the Chalk Creek management unit, there is a prevalence of privately-owned land in the Kamas management unit, especially in the most critical low elevation wintering areas. For deer, over 67% of the winter range is under private ownership. The Forest Service manages another 28% of the normal winter range. There is abundant summer range in the Uinta Mountains to the east. These mountains contain the headwaters of the Weber and Provo Rivers, which flow west through the Rhodes and Heber Valleys. The south and west exposures along these rivers, in addition to land along Beaver Creek and the mountain face east and north of Kamas, provide the major deer wintering areas.

Because of the varying topography, the deer winter range is separated into several distinct areas. The upper limits vary considerably, but lower limits generally follow the canyon bottoms, roads, and the upper limits of cultivated land. Wintering areas north of the Weber River, on the Kamas face, Beaver Creek, and the Provo River, have long been recognized as critical to the deer herd on the western edge of the Uinta Mountains. However, there has been a controversy regarding which deer use the Weber River winter range. Data on migration patterns led to the boundary change which shifted this important winter range into the Chalk Creek unit. An area south of Wanship that was surveyed as winter range in 1977 was not considered winter range on the 1984 herd unit map, but the area was sampled with study 7-1 in the past. For a complete and detailed description of all the winter range areas and vegetation types sampled, consult the 1977 Range Inventory (Giunta 1979). The report includes an acreage breakdown by vegetation type and geographic area.

Fourteen different vegetation types were classified, but only nine of the more important types were sampled in the 1977 inventory. Of those, two emerge as the dominant and most valuable types. Together, the oakbrush and sagebrush-grass types occupied more than 70% of the normal winter range. The oakbrush type, dominated by Gambel oak with big sagebrush, serviceberry, and snowberry as the subdominant associates, is often found at the more mesic, higher elevations. The oakbrush range condition, in 1977, was considered generally satisfactory and exhibited light to moderate deer use. Sagebrush-grass, the second most abundant type, often occurs interspersed with the oak type. It normally occupies the lower, especially critical portions

of the winter range. Much of the lower areas have been converted to cropland or are heavily grazed by livestock. Other important types include the rather depleted sagebrush type and a significant mountain brush stand on the south-facing slope of Pinyon Canyon.

Big Game Management Objectives

Current management objectives for deer are to keep the herd in balance with the available range, which includes a yearly harvest of 1,300 bucks with normal conditions. The number of antlerless deer permits would depend on targeted population goals (9,000 wintering deer, modeled number) and condition and trend of the winter range. Management objectives for elk are to achieve a target population size of 650 wintering elk under normal conditions (modeled number), with a bull to cow ratio of 8:100, and with at least 4 of these bulls being 2½ years of age or older. To maintain these target populations, antlerless and either sex permits and a variety of harvest methods and seasons will be used (1998 Utah Big Game Management Plan).

The lack of winter range is the major limiting factor for the deer herd in this unit. A major concern is the continuing loss of habitat to housing and agriculture centered on private lands. Other management concerns for both deer and elk include increases in road building and the resultant highway mortality, minimizing crop depredation by wildlife on private lands, and predation. The construction of Jordanelle Reservoir has inundated several thousand acres of wildlife habitat as well, some of which was important deer winter range. Overuse by both livestock and big game has led to a deteriorating range condition in many critical locations.

The key solution to the deer problems on the herd unit is the protection of the remaining critical winter range. Land purchase in this unit is a high priority of the Division's land acquisition program. The Division has made purchases of critical land east of Kamas in which improvements should be made to enhance the quality of the range. It will be necessary to work with private landowners to discourage overgrazing, and insure hunter access and adequate depredation protection.

Range Trend Studies

There are nine trend studies in management unit 7. Seven of these were established in 1984, and two others were established in 1996. Trend studies in this management unit were reread in 1990, 1996, and 2001. One study, Stevens Hollow (7-1), was discontinued in 2001 by request of the Division biologist who manages the unit. The area surrounding the Stevens Hollow study is undergoing extensive development.

*****Suspended*****

Trend Study 7-1-96

Study site name: Steven's Hollow.

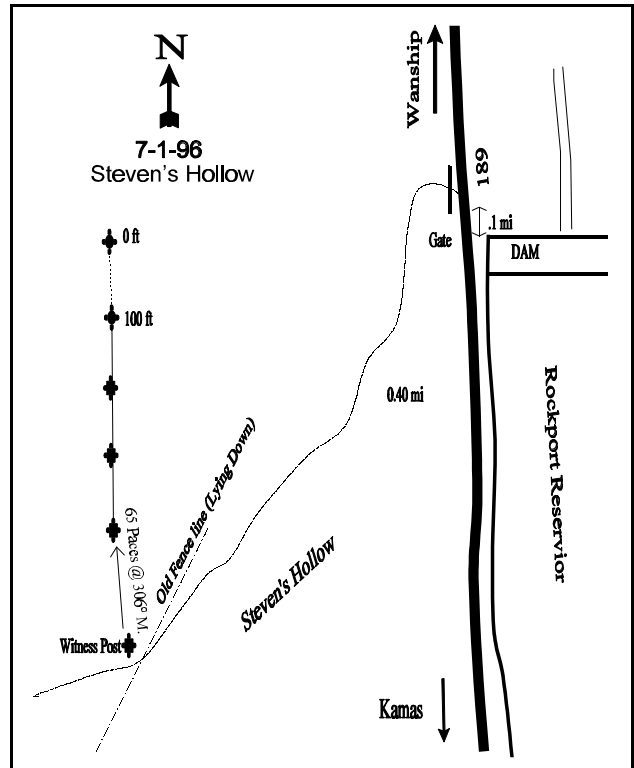
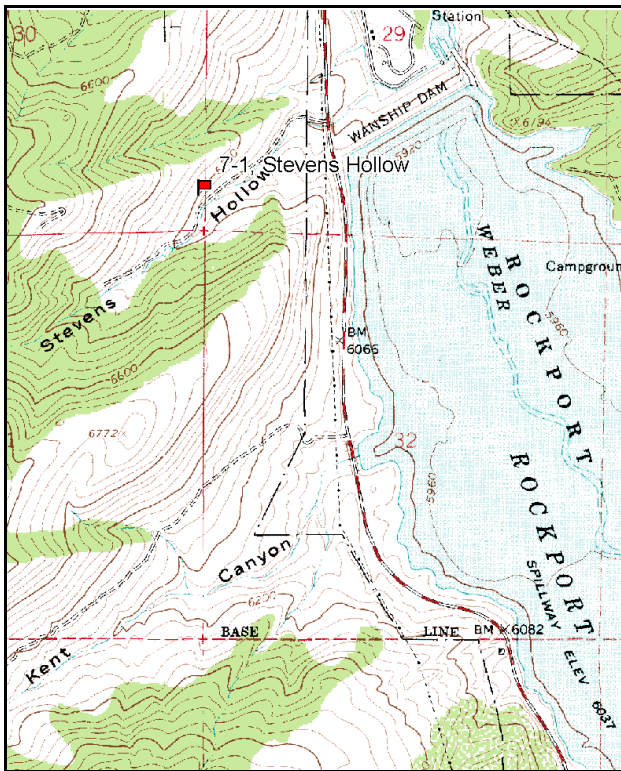
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 167 degrees magnetic.

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

LOCATION DESCRIPTION

From the west side of Wanship dam, travel north 0.1 miles, and turn left to a gated dirt road. Pass through the gate, and continue 0.4 miles to a witness post on the right hand side of the road. From the witness post, walk on a bearing of 306 degrees magnetic for approximately 65 paces up slope to the 400-foot stake of the baseline. The 0-foot baseline stake is 400 feet to the north at a bearing of 347 degrees magnetic. The 0-foot baseline stake is marked by browse tag #7965. The baseline runs 167 degrees magnetic.



Map Name: Wanship

Diagrammatic Sketch

Township 1N, Range 5E, Section 30

UTM 4515161 N 464750 E

DISCUSSION

Trend Study No. 7-1

***This study was discontinued in 2001 by request of the biologist who manages this unit. Development of the area was the primary reason for this. Maps, data tables, and a site narrative are included from the 1996 volume 2 Utah Big Game Range Trend Studies report.

The Stevens Hollow study is located on a moderately steep (30-35%), southeast-facing slope on the north side of Stevens Hollow. Elevation ranges from about 6,240 feet at the beginning of the transect to perhaps 6,500 feet at the upper end. Stevens Hollow is considered an important deer winter range that receives considerable use, although pellet group frequency currently indicates only light to moderate use by deer. The more palatable browse species in the past showed moderate to heavy use. A recent wildfire eliminated all of the sagebrush. The other preferred species, serviceberry and true mountain mahogany, have since begun to sprout vigorously and show good vigor. This site was originally classified as a typical mountain brush community with the dominating species being true mountain mahogany and mountain big sagebrush. Since the fire however, all of the sagebrush was lost. The area is now dominated by serviceberry and true mountain mahogany, with nearby sprouting Gambel oak clones. Land ownership is private with current use limited to livestock grazing. There is a high potential for future summer home or recreational subdivision development. Kent Canyon, a comparable canyon located immediately to the south, has already been developed.

Soils are moderately deep (effective rooting depth of more than 21 inches) with a clay texture and neutral soil reaction (7.3 pH). Percent cover for rock and bare soil is estimated at 7% and 17% respectively. The soil surface shows signs of being lightly eroded in the shrub interspaces where vegetation and litter cover is limited. Soil trend appears to be stable even with the recent wildfire.

This particular area had a diverse shrub and grass composition in the past, dominated by two preferred browse, mountain big sagebrush and true mountain mahogany. Now, total browse cover is less than 5%. In 1996, the preferred browse was made up of serviceberry, true mountain mahogany, and snowberry which together contributed less than 2% of the total cover. Grasses and forbs provided 42% average cover, or nine times more cover than all the browse put together. The most common herbaceous species is cheatgrass. It now makes up 57% of the total grass cover. Three weedy annual forbs make up 83% of the total forb cover. The herbaceous understory is distinctly characteristic of being dominated by annual weeds making the community more susceptible to wildfire again.

Although shrub species such as Oregon hollygrape and stickyleaf low rabbitbrush didn't appear to influence the plant community much in the past, now with the loss of the sagebrush, there are many open niches for them to quickly become established. With the anticipated increase in weedy shrubs, they will have a greater influence on what the community will be composed of in the future. Broom snakeweed and prickly pear cactus will also most likely increase in numbers. The amount of utilization of the sprouting shrubs will determine their growth form in the future. In the past, most of the preferred browse showed moderate to heavy use.

Grasses have responded well following the fire with a fourfold increase in sum of nested frequency. Sum of nested frequency for forbs has more than doubled since the fire. This increase will have a stabilizing effect on soil condition, but may make it difficult for sagebrush to become as abundant as it was before the fire as much of the increase in herbaceous species comes from annuals.

1984 APPARENT TREND ASSESSMENT

Reviewing the 1977 line intercept data and photo points, it appears that soil trend is stable or perhaps even improving. However, vegetative trend may be declining slightly. The most revealing clues are changes in form class structure of the key browse species and some indications that density of mountain big sagebrush and true mountain mahogany may have declined since 1977. While there is some evidence indicating increases in forage production of these species, this is a subjective conclusion. In addition, age structures of almost all the more palatable browse species occurring within the site appeared to be rather heavily utilized, certainly heavier than in 1977.

1990 TREND ASSESSMENT

This trend study samples winter range on property above Rockport Reservoir controlled by the Weber Basin Water Conservancy District. It was noted in the 1984 report that mountain big sagebrush had decreased since the original 1977 line intercept was read. However in 1990, density was higher due to an increase in the number of young sagebrush. Canopy cover is less in 1990 averaging only 6%. The sagebrush were classified as heavily hedged in 1984. Although the shrubs appear in worse shape now, it is due more to the drought and lack of leader growth than continued heavy use. The true mountain mahogany was also heavily hedged. Half of the population was decadent. The only real increase came for broom snakeweed, which increased significantly on the density portions of the study. Grass frequency is similar between years. The most common forb species are undesirable species such as stickseed, thistle, and bastard toadflax. A slight increase in the percentage of bare soil was recorded, however there is still good vegetative and litter cover.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

This trend study originally sampled a “critical” winter range, has now been largely altered by a recent wildfire. The soil trend would be considered improving with an increase in herbaceous cover even though it is mostly characterized by weeds. Percent bare ground has decreased from 23% to about 17%. The browse trend would be assessed as down with the loss of all the sagebrush to fire. The other preferred browse which are moderately fire tolerant, are in the preliminary stages of sprouting. Vigor appeared to be good on the sprouting species, but condition and trend for browse will not be know for a few years. The herbaceous understory has a stable trend. Perennial grasses increased in sum of nested frequency, while perennials forbs decreased. The majority of the understory is now characterized as annuals and weedy increasers which could eventually cause a greater frequency of possibly destructive fires.

TREND ASSESSMENT

soil - improving (4)

browse - down with the loss of sagebrush to the wildfire (1)

herbaceous understory - stable (3) but composition is poor

HERBACEOUS TRENDS --

Herd unit 07 , Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	<i>Agropyron spicatum</i>	a38	a49	b114	21	22	40	7.90
G	<i>Bromus tectorum</i> (a)	-	-	302	-	-	89	16.48
G	<i>Oryzopsis hymenoides</i>	ab43	a27	b46	19	14	27	2.84
G	<i>Poa fendleriana</i>	2	4	1	1	2	1	.03
G	<i>Poa pratensis</i>	-	-	3	-	-	2	.06
G	<i>Poa secunda</i>	a32	b65	b72	20	27	40	1.41
Total for Annual Grasses		0	0	302	0	0	89	16.48
Total for Perennial Grasses		115	145	236	61	65	110	12.25
Total for Grasses		115	145	538	61	65	199	28.73
F	<i>Agoseris glauca</i>	-	-	2	-	-	1	.00
F	<i>Allium acuminatum</i>	a2	b13	a-	1	8	-	-
F	<i>Alyssum alyssoides</i> (a)	-	-	277	-	-	90	5.80
F	<i>Camelina microcarpa</i> (a)	-	-	25	-	-	16	.38
F	<i>Calochortus nuttallii</i>	-	-	1	-	-	1	.00
F	<i>Chaenactis douglasii</i>	b14	b17	a-	7	7	-	-
F	<i>Cirsium</i> spp.	b67	b71	a19	30	34	14	1.55
F	<i>Comandra pallida</i>	b97	a18	a19	39	12	10	.08
F	<i>Crepis acuminata</i>	-	2	-	-	1	-	-
F	<i>Cryptantha</i> spp.	c72	b20	a-	36	8	-	-
F	<i>Cymopterus</i> spp.	-	1	-	-	1	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	20	-	-	13	.21
F	<i>Gayophytum ramosissimum</i> (a)	-	-	3	-	-	2	.01
F	<i>Hackelia patens</i>	a-	b73	b59	-	36	29	3.34
F	<i>Hedysarum boreale</i>	b7	a-	c24	3	-	12	1.43
F	<i>Lactuca serriola</i>	-	-	3	-	-	2	.01
F	<i>Lithospermum ruderae</i>	3	-	-	2	-	-	-
F	<i>Lomatium</i> spp.	-	-	3	-	-	1	.03
F	<i>Penstemon</i> spp.	b23	b17	a-	11	6	-	-
F	<i>Phlox longifolia</i>	a-	a3	b15	-	2	9	.04
F	<i>Ranunculus testiculatus</i> (a)	-	-	13	-	-	5	.02
F	<i>Schoenrambe linifolia</i>	-	-	3	-	-	2	.01
F	<i>Sisymbrium altissimum</i> (a)	-	-	2	-	-	1	.00
F	<i>Tragopogon dubius</i>	-	-	1	-	-	1	.01
Total for Annual Forbs		0	0	340	0	0	127	6.45
Total for Perennial Forbs		285	235	149	129	115	82	6.54
Total for Forbs		285	235	489	129	115	209	13.00

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 1

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier alnifolia	13	.81
B	Cercocarpus montanus	13	.72
B	Chrysothamnus viscidiflorus viscidiflorus	48	1.67
B	Gutierrezia sarothrae	29	.72
B	Mahonia repens	8	.25
B	Opuntia spp.	10	.06
B	Symphoricarpos oreophilus	4	.15
B	Tetradymia canescens	9	.39
Total for Browse		134	4.80

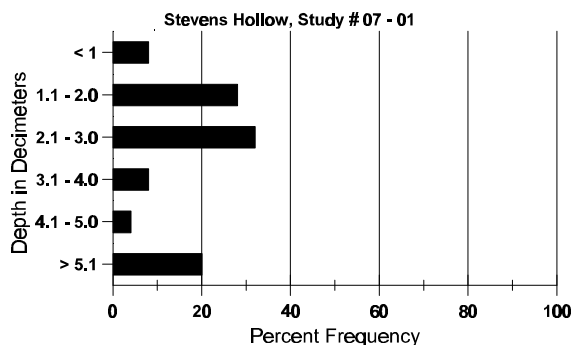
BASIC COVER --
Herd unit 07 , Study no: 1

Cover Type	Nested Frequency	Average Cover %		
		'96	'84	'90
Vegetation	377	4.25	11.50	48.95
Rock	208	11.00	11.00	7.28
Pavement	75	4.50	3.00	.27
Litter	391	62.75	51.00	52.07
Cryptogams	1	0	.25	.00
Bare Ground	248	17.50	23.25	17.20

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 01, Stevens Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
21.3	67.2 (45.4)	7.3	29.3	26.4	44.4	2.6	6.9	115.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 07 , Study no: 1

Type	Quadrat Frequency '96
Rabbit	5
Deer	17

BROWSE CHARACTERISTICS --

Herd unit 07 , Study no: 1

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 alnifolia																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	96	30	-	-	-	-	-	-	-	-	30	-	-	-	600		30
M	84	-	-	1	-	-	-	-	-	-	-	-	1	-	66	28 24	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	12 6	1
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100	25 35	5
D	84	-	2	1	-	-	-	-	-	-	1	2	-	-	200		3
	90	-	2	1	-	-	1	-	-	-	3	-	-	1	266		4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	180		9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		50%			50%			25%			+33%						
'90		33%			33%			17%			+43%						
'96		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'84	266	Dec:	75%			
											'90	398		67%			
											'96	700		0%			

A G R E	Y 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	4	5	-	-	-	-	-	-	10	-	-	-	666	25 31	10	
	90	2	2	-	-	-	-	-	-	-	4	-	-	-	266	19 32	4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
D	84	-	-	11	-	-	-	-	-	-	9	-	1	1	733		11	
	90	2	5	6	-	-	1	-	-	-	8	-	-	6	933		14	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		19%			76%			10%			+ 0%							
'90		33%			33%			29%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1399	Dec:	52%			
												'90	1399		67%			
												'96	0		0%			
<i>Cercocarpus montanus</i>																		
Y	84	1	1	2	-	-	-	-	-	-	3	-	1	-	266		4	
	90	1	1	-	-	-	1	-	-	-	3	-	-	-	200		3	
	96	6	2	-	4	-	-	-	-	-	12	-	-	-	240		12	
M	84	-	2	7	-	-	1	-	-	-	3	7	-	-	666	53 43	10	
	90	-	-	3	-	-	-	-	-	-	3	-	-	-	200	35 35	3	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	21 26	3	
D	84	-	-	3	-	-	-	-	-	-	1	1	1	-	200		3	
	90	-	-	6	-	-	-	-	-	-	6	-	-	-	400		6	
	96	1	1	-	-	-	-	-	-	-	1	-	1	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		18%			76%			12%			-29%							
'90		08%			83%			00%			-58%							
'96		18%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1132	Dec:	18%			
												'90	800		50%			
												'96	340		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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	96	26	-	-	-	-	-	-	-	-	26	-	-	-	520		26	
M	84	34	2	-	-	-	-	-	-	-	36	-	-	-	2400	14	14	36
	90	33	-	-	-	-	-	-	-	-	33	-	-	-	2200	11	12	33
	96	120	2	-	-	-	-	-	-	-	122	-	-	-	2440	11	15	122
D	84	19	-	-	-	-	-	-	-	-	15	-	4	-	1266		19	
	90	16	-	-	-	-	-	-	-	-	12	-	-	4	1066		16	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		04%			00%			07%			+ 2%							
'90		00%			00%			07%			-22%							
'96		01%			00%			.67%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	3732	Dec:	34%			
												'90	3799		28%			
												'96	2980		1%			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	21	-	-	-	-	-	-	-	-	21	-	-	-	1400		21	
	96	38	-	-	-	-	-	-	-	-	38	-	-	-	760		38	
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333	16	17	5
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	533	6	5	8
	96	50	-	-	-	-	-	-	-	-	50	-	-	-	1000	9	10	50
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	-	-	1	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+83%							
'90		00%			00%			03%			-12%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%			
												'90	1999		3%			
												'96	1760		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				
Mahonia repens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	83	-	-	-	-	-	3	-	-	86	-	-	-	5733		86	
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560		28	
M	84	381	-	-	-	-	-	-	-	-	381	-	-	-	25400	4	4	381
	90	104	-	-	-	-	-	3	-	-	107	-	-	-	7133	3	4	107
	96	34	-	-	4	-	-	-	-	-	38	-	-	-	760	4	8	38
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-49%							
'90		00%			00%			00%			-90%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	25400	Dec:	-			
												'90	12866		-			
												'96	1320		-			
Opuntia spp.																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333	6	13	5
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	7	10	1
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	5	12	15
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	-	-	1	66		1	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	340		17	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-20%							
'90		00%			00%			25%			+30%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%			
												'90	265		25%			
												'96	380		11%			

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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	84	2	2	1	-	-	-	-	-	-	5	-	-	-	333	23	23	5
	90	1	1	-	4	-	-	-	-	-	6	-	-	-	400	15	9	6
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	18	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		40%			20%			00%			+17%							
'90		17%			00%			00%			-65%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	-			
												'90	400		-			
												'96	140		-			
Tetradymia canescens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266	6	15	4
	90	-	10	-	-	-	-	-	-	-	10	-	-	-	666	12	22	10
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	12	19	15
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+60%							
'90		100%			00%			00%			-28%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	-			
												'90	666		-			
												'96	480		-			

Trend Study 7-2-01

Study site name: Pinyon Canyon.

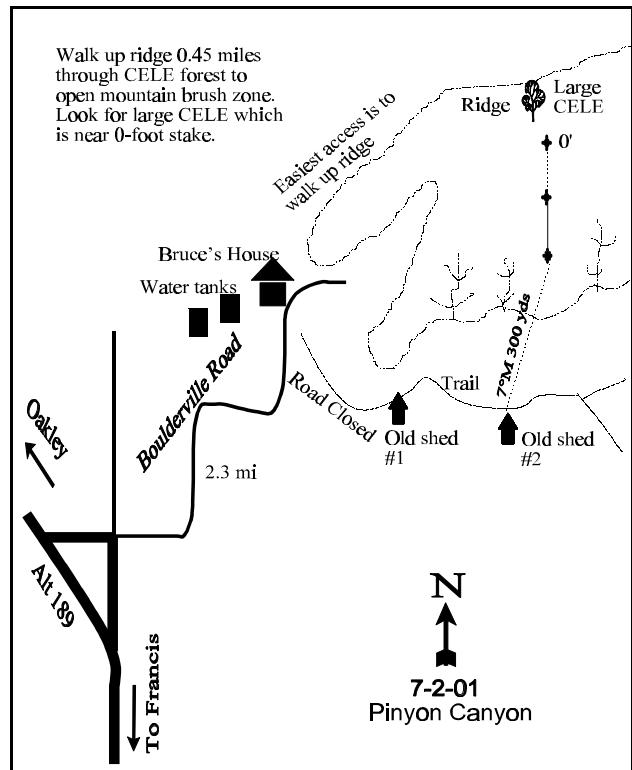
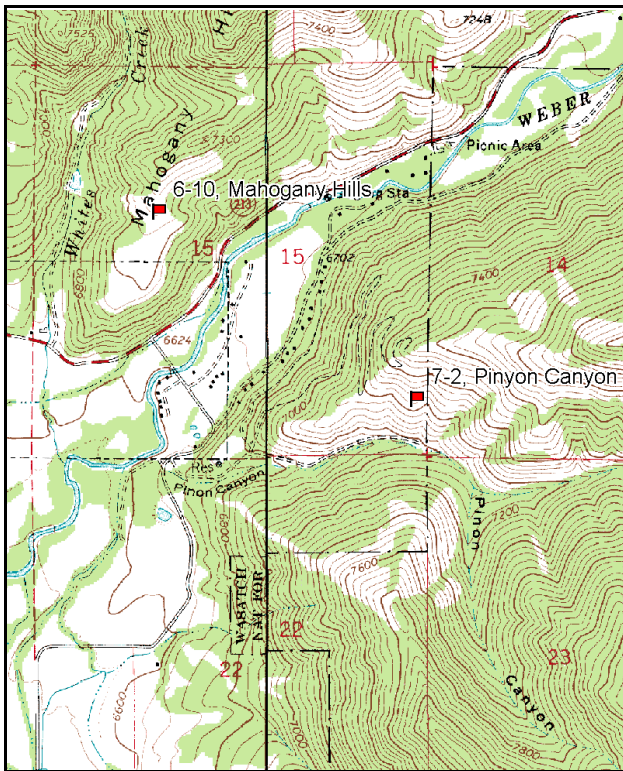
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

Where Highway 189 turns northwest between Kamas and Oakley, proceed north for 0.15 miles. At this intersection turn right (east) onto Boulderville Road and travel 2.8 miles. Turn right onto a dirt road proceeding up Pinyon Canyon to a private home, passing two water storage tanks. Contact landowner before proceeding through private land. From the land owners home, walk up the ridge through a Curlleaf mahogany and pinyon forest for about a half mile. As the forest opens up into a mountain brush vegetation type look for a lone, large Curlleaf mahogany on the southwest facing slope. The 0-foot baseline stake is just below this mahogany. The 0-foot stake is marked by browse tag #7957.



Map Name: Hoyt Peak

Diagrammatic Sketch

Township 1S, Range 6E, Section 15

UTM 4508531 N 479481 E

DISCUSSION

Trend Study No. 7-2

The Pinyon Canyon study is located in a drainage containing one of the better and more important mountain brush big game wintering areas in the herd unit. The study extends up a moderately steep (35-40%), south to southwest-facing slope at an elevation of 7,100 feet. This site is rather high for winter range, but with the favorable aspect and slope, the area remains available to big game during all but the most severe winters. Forage utilization appears moderate to heavy. Pellet group quadrat frequencies have indicated that elk utilize the area about three times more than deer. This is supported by pellet group transect data collected in 2001 which estimated 69 elk days use/acre (170 edu/ha) and 30 deer days use/acre (74 ddu/ha). Several moose pellet groups have also been observed on the site, but occurred outside the sampling area. The mountain brush community in this area exhibits considerable variation in overstory dominance. The mixture of shrubs includes varying densities of true mountain mahogany, serviceberry, mountain big sagebrush, antelope bitterbrush, Gambel oakbrush, mountain snowberry, and a few scattered curlleaf mountain mahogany.

Soils are moderately rocky on the surface and throughout the profile. Surface rock and pavement combine to provide nearly 22% average cover in 2001. Parent material appears to be limestone, sandstone, and shale. In places, the soil has a reddish color, indicating a high iron oxide content. Effective rooting depth was estimated at about 12 inches. This should not be a limiting factor to vegetative growth. Soil texture is classified as a loam with a slightly alkaline soil reaction (7.7 pH). Permeability would be moderately slow when combined with the steep slope and high surface rock cover. There is a moderately high potential for runoff and erosion. Vegetation and litter cover are moderately good. Under most conditions this will help prevent erosion from most high intensity summer rain events. A condition class assessment estimated slight soil erosion in 2001.

The browse component is composed of many species that include true mountain mahogany, mountain snowberry, mountain big sagebrush, antelope bitterbrush, Gambel oak, and Saskatoon serviceberry. The browse component provides one-third of the total vegetation cover on the site in 2001, an increase from 23% in 1996. The preferred species, serviceberry, mountain big sagebrush, and true mountain mahogany have on average a markedly reduced decadence in 1996 and 2001 compared to the 1984 and 1990 readings. The level of use exhibited on these species has been moderate to heavy in most readings, with generally less use in the last readings. Utilization on mountain big sagebrush has shown the most improvement since 1984 when heavy use was estimated at 100%. Currently ('01), use on big sagebrush is light to moderate. Recruitment from young plants has been moderate to high for serviceberry and true mountain mahogany in all samples. Sagebrush recruitment was high in 1996 (37%), but much lower in 2001 at only 7%. In 2001, annual leader growth on serviceberry averaged nearly 4 inches, while mountain mahogany annual leader growth averaged just over 2 inches.

The herbaceous composition consists of an excellent grass cover, dominated primarily by bluebunch wheatgrass. Bluebunch wheatgrass contributed 65% of the grass cover in 1996, but significantly decreased in both frequency and cover in 2001. Sandberg bluegrass is the second most abundant perennial grass on the site, maintaining a stable frequency in 2001. Cheatgrass is also moderately abundant, although in 2001, nested frequency significantly declined with quadrat frequency decreasing from 88% to 73%. These decreases were due to the dry spring of 2001. Forbs occur only occasionally. All forbs combined provide only 9% and 14% of the total vegetation cover on the site in 1996 and 2001 respectively. None of the forbs provide significant amounts of forage or ground cover except for rock goldenrod. Species such as yellow salsify, thistle, and rock goldenrod are typical of rocky soils such as those that occur on this study.

1984 APPARENT TREND ASSESSMENT

Soil condition varies widely and depends on small differences in site quality. Although the entire study area is steep and has a basic south or southwest exposure, there are many smaller slopes where exposures are more westerly or easterly. These micro sites have better vegetative cover and appear less eroded. Erosion is obvious within the shrub interspaces on the remaining area. On this site, soil trend is probably only marginally stable. Vegetative trend also seems stable but may vary slightly. The mountain brush community can be expected to maintain itself. However, composition may change slightly. Species such as Gambel oak can be expected to increase, while more palatable and/or less browsing resistant shrubs such as true mountain mahogany and mountain big sagebrush may decline. Although examination of the data summary indicates a population of Oregon hollygrape composed totally of young plants, it is doubtful that this species is a reliable trend indicator or will ever be important as a forage species.

1990 TREND ASSESSMENT

The moderately steep, southwest facing slope is available to big game in most winters. The true mountain mahogany is heavily to severely hedged. Its density has slightly decreased since 1984. The density of young and mature plants also declined slightly, while decadent mahogany shrubs increased to 36% of the population. Contrasting data was found for the serviceberry population. These palatable shrubs are moderately to heavily hedged but have normal vigor. Density is stable to slightly increasing. The percentage of decadent plants decreased from 65% to 11% of the population. Oregon grape is still the most numerous woody species. In comparison with the 1977 line intercept transect data from the same site, mountain big sagebrush continues on the downward trend that was noted in 1984. The moderately dense grass understory of bluebunch wheatgrass and small bluegrasses is almost unchanged. Sum of nested values for perennial forbs slightly increased. Protective soil cover remains adequate.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - improving slightly (4)

1996 TREND ASSESSMENT

The soil trend for this site has improved, with percent bare ground decreasing to less than 15%. There is good herbaceous understory and litter cover which are well dispersed. The key browse for the site, serviceberry, mountain big sagebrush, and true mountain mahogany, provide 59% of the total browse cover. Overall, there has been a decrease in those plants classified as heavily browsed, vigor has improved, and percent decadence has decreased for all key species. Overall, the trend for browse is improving. The herbaceous understory is improved from 1990, with nested frequency increasing for bluebunch wheatgrass. The trend for cheatgrass should be monitored closely.

TREND ASSESSMENT

soil - slightly improved (4)

browse - slightly improved (4)

herbaceous understory - slightly up (4)

2001 TREND ASSESSMENT

Trend for soil is slightly down. With the drought conditions in 2000 and 2001, vegetation and litter cover both decreased, resulting in increased bare ground (14% to 33%). Trend for browse is stable. Serviceberry,

mountain big sagebrush, and true mountain mahogany have stable densities and low decadence. Use remains moderate to heavy on serviceberry and mountain mahogany, but mostly light on mountain big sagebrush. Trend for the herbaceous understory is stable. Bluebunch wheatgrass decreased in nested frequency, but Sandberg bluegrass increased. Perennial forbs increased in sum of nested frequency although they continue to be in low abundance.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 07 , Study no: 2

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	5	-	-	-	2	-	-	-	-	-
G	Agropyron spicatum	ab275	a266	c322	b286	93	98	99	93	19.45	11.37
G	Bromus tectorum (a)	-	-	b274	a215	-	-	88	73	6.51	5.66
G	Poa fendleriana	c107	bc65	ab50	a28	46	37	21	13	.67	.60
G	Poa secunda	a93	b172	b175	b196	47	73	69	79	3.40	4.27
Total for Annual Grasses		0	0	274	215	0	0	88	73	6.51	5.66
Total for Perennial Grasses		480	503	547	510	188	208	189	185	23.54	16.25
Total for Grasses		480	503	821	725	188	208	277	258	30.05	21.92
F	Agoseris glauca	a-	a-	a-	b10	-	-	-	5	-	.05
F	Allium acuminatum	b34	b37	a5	b50	18	21	2	28	.01	.25
F	Alyssum alyssoides (a)	-	-	a28	b64	-	-	12	25	.16	.61
F	Astragalus spp.	-	1	-	2	-	1	-	2	-	.01
F	Balsamorhiza sagittata	3	-	-	-	1	-	-	-	-	-
F	Camelina microcarpa (a)	-	-	b117	a51	-	-	44	25	.61	.23
F	Calochortus nuttallii	6	3	-	4	3	2	-	3	-	.01
F	Chaenactis douglasii	b6	c28	b13	a-	2	14	5	-	.05	-
F	Chenopodium fremontii (a)	-	-	-	1	-	-	-	1	-	.00
F	Cirsium undulatum	b41	b40	a9	a12	19	20	4	5	.10	.54
F	Comandra pallida	24	21	26	21	8	9	12	9	.23	.31
F	Collinsia parviflora (a)	-	-	-	2	-	-	-	1	-	.00
F	Crepis acuminata	-	3	1	2	-	2	1	1	.03	.03
F	Cymopterus spp.	-	-	2	5	-	-	1	4	.03	.36
F	Descurainia pinnata (a)	-	-	-	7	-	-	-	4	-	.07
F	Epilobium brachycarpum (a)	-	-	-	9	-	-	-	4	-	.02
F	Erigeron pumilus	-	-	2	2	-	-	1	2	.15	.03
F	Erigeron strigosus	-	-	2	-	-	-	1	-	.00	-

Type	Species	Nestled Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Gayophytum ramosissimum (a)	-	-	6	-	-	-	3	-	.01	-
F	Gilia spp. (a)	-	-	-	4	-	-	-	1	-	.00
F	Helianthus spp.	-	-	7	-	-	-	3	-	.06	-
F	Holosteum umbellatum (a)	-	-	8	8	-	-	3	3	.09	.01
F	Ipomopsis aggregata	-	-	-	2	-	-	-	1	-	.00
F	Lomatium spp.	-	-	1	-	-	-	1	-	.01	-
F	Microsteris gracilis (a)	-	-	a-	b68	-	-	-	29	-	.24
F	Penstemon humilis	14	22	19	11	7	10	9	6	.43	.27
F	Petradoria pumila	ab41	b61	ab38	a34	19	25	15	14	1.62	1.86
F	Phlox longifolia	-	-	1	-	-	-	1	-	.00	-
F	Polygonum douglasii (a)	-	-	3	-	-	-	1	-	.00	-
F	Ranunculus testiculatus (a)	-	-	a8	b47	-	-	5	19	.02	.41
F	Streptanthus cordatus	-	3	-	-	-	1	-	-	-	-
F	Tragopogon dubius	a4	a-	a7	b21	2	-	4	11	.09	.38
F	Unknown forb-perennial	-	2	-	-	-	1	-	-	-	-
F	Viguiera multiflora	2	3	-	5	1	2	-	2	-	.03
F	Zigadenus paniculatus	-	1	-	-	-	1	-	-	-	-
Total for Annual Forbs		0	0	170	261	0	0	68	112	0.91	1.63
Total for Perennial Forbs		175	225	133	181	80	109	60	93	2.84	4.18
Total for Forbs		175	225	303	442	80	109	128	205	3.75	5.82

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 07 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	27	25	1.41	.66
B	Artemisia tridentata vaseyana	17	13	.68	1.86
B	Cercocarpus montanus	35	32	3.99	4.24
B	Chrysothamnus viscidiflorus viscidiflorus	0	0	-	-
B	Gutierrezia sarothrae	3	0	.18	-
B	Mahonia repens	3	4	.15	.24
B	Purshia tridentata	4	3	1.14	1.66
B	Quercus gambelii	1	3	.33	.93
B	Symphoricarpos oreophilus	19	19	2.37	3.75
Total for Browse		109	99	10.26	13.35

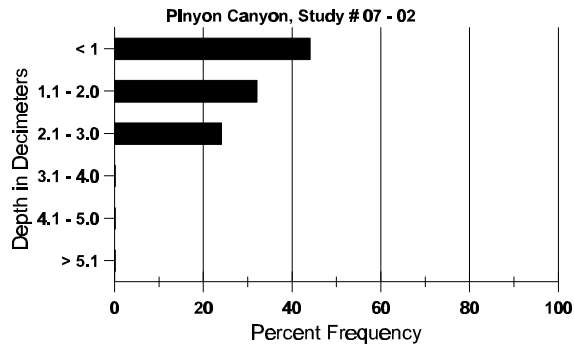
BASIC COVER --
Herd unit 07 , Study no: 2

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	375	346	3.50	9.50	43.43	39.25
Rock	284	296	23.00	25.25	17.19	15.94
Pavement	222	274	8.25	4.00	6.61	5.94
Litter	393	351	45.75	40.00	41.18	30.26
Cryptogams	33	10	1.75	0	.39	.15
Bare Ground	249	310	17.75	21.25	14.82	33.31

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 02, Pinyon Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.9	60.3 (11.0)	7.7	40.6	32.4	27.0	3.8	8.4	89.6	.8

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 2

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Elk	32	43	896	69 (170)
Deer	11	14	392	30 (74)

BROWSE CHARACTERISTICS --

Herd unit 07 , 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				
Amelanchier alnifolia																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	-	2	-	-	-	-	-	-	2	-	1	-	200		3	
	90	4	-	-	2	-	-	2	-	-	8	-	-	-	533		8	
	96	11	10	-	-	-	-	-	-	-	21	-	-	-	420		21	
	01	30	2	-	-	-	-	-	-	-	30	-	2	-	640		32	
M	84	-	1	2	-	-	-	-	-	-	2	-	1	-	200	27	21	3
	90	-	3	3	-	-	-	2	-	1	9	-	-	-	600	22	22	9
	96	-	7	4	5	8	1	-	-	-	25	-	-	-	500	29	37	25
	01	1	8	7	-	2	5	-	-	-	23	-	-	-	460	30	39	23
D	84	-	-	11	-	-	-	-	-	-	2	-	7	2	733		11	
	90	-	-	1	-	1	-	-	-	-	2	-	-	-	133		2	
	96	-	-	1	-	-	-	-	-	-	-	-	-	1	20		1	
	01	-	-	1	6	-	1	-	-	-	1	-	-	7	160		8	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		06%			88%			65%			+11%							
'90		21%			26%			00%			-26%							
'96		53%			13%			02%			+25%							
'01		19%			22%			14%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1133	Dec:	65%			
												'90	1266		11%			
												'96	940		2%			
												'01	1260		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				
Artemisia tridentata vaseyana																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	6	1	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66	24	20	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	4	-	-	1	-	-	-	-	8	-	-	-	160	21	31	8
	01	8	2	-	1	-	-	-	-	-	10	-	1	-	220	22	34	11
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	2	-	1	1	-	-	-	-	2	-	-	2	80			4
	01	2	-	-	-	-	-	-	-	-	1	1	-	-	40			2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			-50%							
'90		100%			00%			00%			+83%							
'96		47%			00%			11%			-26%							
'01		14%			00%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	132	Dec:	50%			
												'90	66		100%			
												'96	380		21%			
												'01	280		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		1	2				
Cercocarpus montanus												
S	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	20		1	
Y	84	7	-	-	-	-	-	-	466		7	
	90	3	2	-	-	-	-	-	333		5	
	96	6	3	-	-	1	-	-	200		10	
	01	5	1	-	-	-	-	-	120		6	
M	84	-	-	5	-	-	1	-	400	46	28	6
	90	-	-	4	-	-	-	-	266	42	27	4
	96	-	9	12	-	4	3	-	560	34	40	28
	01	1	9	11	-	1	5	-	540	34	37	27
D	84	-	-	3	-	-	-	-	200			3
	90	-	-	5	-	-	-	-	333			5
	96	-	-	1	-	-	-	-	20			1
	01	-	2	3	-	-	-	-	100			5
X	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		56%		00%		-13%				
'90		14%		64%		00%		-16%				
'96		44%		41%		00%		-3%				
'01		34%		50%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	1066	Dec:	19%
									'90	932		36%
									'96	780		3%
									'01	760		13%
Chrysothamnus viscidiflorus viscidiflorus												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	0	14	21	0
	01	-	-	-	-	-	-	-	0	19	27	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%						
'90		00%		00%		00%						
'96		00%		00%		00%						
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	0	Dec:	-
									'90	0		-
									'96	0		-
									'01	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>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140	7	10	7
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	32	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	140		-			
												'01	0		-			
<i>Mahonia repens</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	129	-	-	-	-	-	-	-	-	129	-	-	-	8600			129
	90	72	-	-	-	-	-	-	-	-	72	-	-	-	4800			72
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	83	-	-	-	-	-	2	-	-	85	-	-	-	5666	4	4	85
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	4	5	15
	01	34	-	-	-	-	-	-	-	-	34	-	-	-	680	4	6	34
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+18%							
'90		00%			00%			00%			-96%							
'96		00%			00%			00%			+44%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	8600	Dec:	-			
												'90	10466		-			
												'96	380		-			
												'01	680		-			

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																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	9	3	-	-	-	-	-	-	12	-	-	-	240	19	47	12
	'01	-	3	-	-	-	-	-	-	-	3	-	-	-	60	22	84	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		75%			25%			00%			-75%							
'01		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	240		-			
												'01	60		-			
Quercus gambelii																		
Y	'84	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	'90	8	9	-	-	-	-	1	-	-	18	-	-	-	1200			18
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'84	2	5	12	-	-	2	-	-	-	21	-	-	-	1400	47	19	21
	'90	1	10	-	-	-	-	-	-	-	11	-	-	-	733	43	29	11
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	64	65	0
	'01	1	-	-	5	-	-	-	-	-	6	-	-	-	120	58	34	6
D	'84	-	-	3	-	-	3	-	-	-	6	-	-	-	400			6
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		15%			61%			00%			-12%							
'90		66%			00%			00%			-99%							
'96		00%			00%			00%			+83%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2200	Dec:	18%			
												'90	1933		0%			
												'96	20		0%			
												'01	120		0%			

A G R E	Y 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				
Sambucus cerulea																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	66	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			
Symphoricarpos oreophilus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	96	7	-	-	1	-	-	-	-	-	8	-	-	-	160			8
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	2	12	1	-	-	-	-	-	-	15	-	-	-	1000	22	23	15
	90	7	8	-	2	-	-	-	-	-	17	-	-	-	1133	21	26	17
	96	12	8	-	2	-	-	-	-	-	22	-	-	-	440	18	33	22
	01	18	3	-	-	-	-	-	-	-	21	-	-	-	420	20	43	21
D	84	-	3	2	-	-	-	-	-	-	5	-	-	-	333			5
	90	3	6	-	-	-	-	1	-	-	9	-	-	1	666			10
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		65%			13%			00%			+30%							
'90		42%			00%			03%			-73%							
'96		27%			00%			00%			-30%							
'01		14%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1533	Dec:	22%			
												'90	2199		30%			
												'96	600		0%			
												'01	420		0%			

Trend Study 7-3-01

Study site name: Foothill Drive

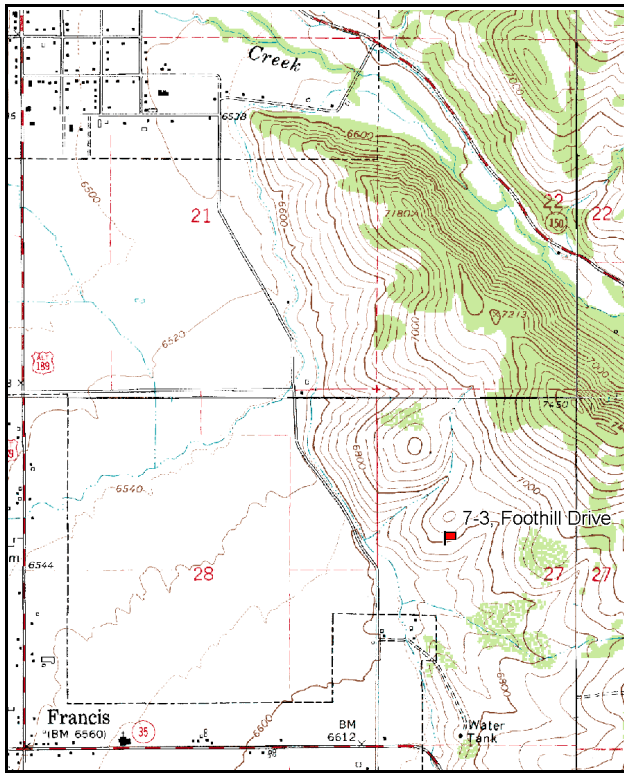
Vegetation type: Big Sagebrush-Grass

Compass bearing: frequency baseline 168 degrees magnetic.

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

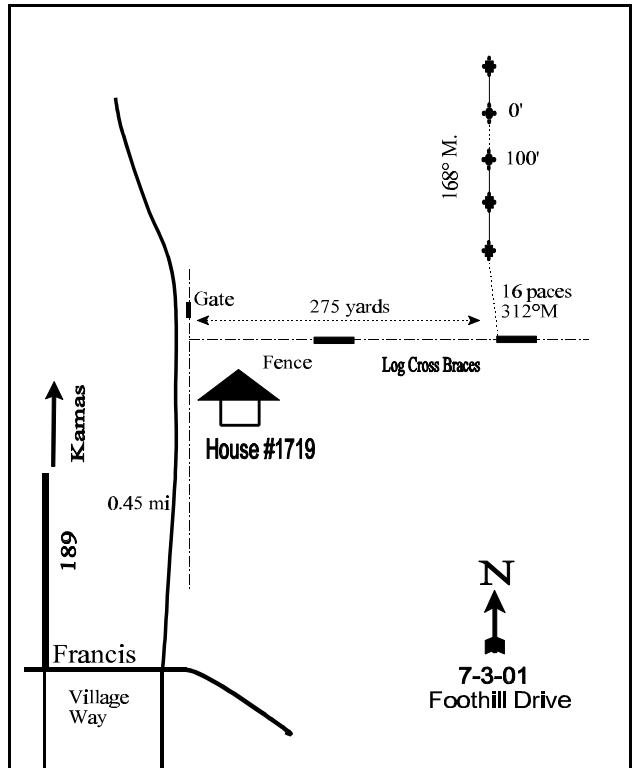
LOCATION DESCRIPTION

At the junction of 189 and Village Way in Francis, proceed east for 1.0 mile. Turn left (north) onto Foothill Drive, and proceed 0.45 miles to house #1719 on the right. Park here and walk east along the east-west running fence, just north of the house, for approximately 275 yards to the second large log cross-brace on the fence. Walk 16 paces at 312 degrees magnetic to the 300-foot baseline stake. Three hundred feet to the north at a bearing of 348 degrees magnetic is the 0-foot baseline stake. The 0-foot stake is marked by browse tag #7958. The first 300 feet of the baseline runs 168 degrees magnetic. Line 4 runs off the 0-foot baseline stake at a bearing of 348 degrees magnetic.



Map Name: Francis

Township 2S, Range 6E, Section 27



Diagrammatic Sketch

UTM 4496275 N 478254 E

DISCUSSION

Trend Study No. 7-3

The Foothill Drive study is located southeast of Kamas and north of the Provo River on critical deer winter range. This study samples an open mountain big sagebrush-grass ridge that is surrounded by adjacent ridges dominated by Gambel oakbrush. The Kamas area is dominated by intermixed communities of sagebrush-grass and Gambel oakbrush. Slope on the site is moderately steep (30%), aspect is to the southeast, and elevation is approximately 6,900 feet. Animal use during winter comes from deer and to a lesser extent elk. Domestic cattle use the area in spring and summer. The overall intensity of use has been heavy in the past and the impact of grazing and browsing animals is evident. The field crew in 1984 observed the remains of seven winter-killed deer in the immediate study area. Pellet group transect data collected from 2001, estimated 56 deer days use/acre (139 ddu/ha) on the site. Use by elk and cattle was low in 2001 at an estimated 2 elk days use/acre (5 edu/ha) and 7 cow days use/acre (16 cdu/ha).

Soils are clay loam in texture and a slightly acidic soil reaction (6.4 pH). Soil depth is quite shallow due to the abundance of rock on the soil surface and in the profile. Effective rooting depth was estimated at only 9 inches (refer to methods section) in 1996. Vegetation and litter cover are moderately good further up the slope, and coupled with the high amount of surface rock cover (37%), erosion is mostly minimal. However, protective cover at the bottom of the slope is poor where there has been noticeable trampling damage from cattle. An erosion condition class assessment showed stable soils in 2001. Bare ground is low being estimated at less than 5% in 1996 and 2001.

This area initially contained a moderately dense stand of heavily utilized and decadent mountain big sagebrush. In 1984, approximately 84% of the population was classified as heavily browsed. The level of use has steadily declined with each reading, where currently ('01) use is mostly light. Sagebrush vigor has been generally good, except in 1984, when 33% of the population showed poor vigor. Decadence in the sagebrush population has drastically improved on this site since it was initially read in 1984. Percent decadence was estimated at 90% in 1984, decreasing to 17% in 2001. The population appears to have undergone a period of thinning during the mid-80's and early-90's due to a drier climatic cycle compared to the wet years of the early-80's. Sagebrush density has since stabilized at about 1,200 plants/acre. Annual leader growth on sagebrush averaged 2.2 inches in 2001. Sagebrush contributed 64% of the browse cover on this site in 2001.

Most of the other browse on this site consists of low value increasers including broom snakeweed, Oregon hollygrape, Woods rose, prickly pear, and dwarf rabbitbrush. A few isolated, heavily browsed serviceberry plants are also found on the site.

The herbaceous understory provides three-fourths of the total vegetation cover on the site, although composition is dominated by annuals and weeds. Cheatgrass is especially abundant as it contributes about 70% of the grass cover and one-fourth of the total vegetative cover in 1996 and 2001. Cheatgrass is spread uniformly over the site and thus poses a fire hazard, especially for the key browse, mountain big sagebrush which is not fire tolerant. Kentucky bluegrass is the most abundant perennial grass on the site, significantly increasing in nested frequency in 2001. Showy goldeneye was the most abundant perennial forb in 1996, but this species significantly decreased in 2001. Louisiana sagebrush and hairy goldaster were the most abundant perennial forbs in 2001, both significantly increasing in nested frequency. Abundant annual forbs include storksbill and willowweed.

1984 APPARENT TREND ASSESSMENT

Although some erosion is discernible in the area, it is within acceptable limits and is not a significant factor affecting the potential plant community. Soil trend appears stable. Vegetative trend on the lower portions of the site and the more favorable exposures appears down. This is part of the site that was sampled by the 1977 line intercept study. This area is quickly losing its mountain big sagebrush component. Photo point comparisons, line intercept comparisons, and the density data all point to a continuing decline of mountain big sagebrush and a concurrent increase of herbaceous plants, especially Kentucky bluegrass and a variety of forbs. On the upper areas (i.e., above 6,800 feet) this trend is not so noticeable and deer use is markedly less. Presumably, snow depth is great enough to discourage the heavier use occurring slightly lower on the slope.

1990 TREND ASSESSMENT

This study is located on a sagebrush slope above a privately-owned pasture. Mountain big sagebrush is the key species for deer on this critical winter range. The 1984 reading found a highly decadent (90%) and apparently declining population. In 1990, although there are still dying shrubs, it appears that the sagebrush population is stabilizing. There is an abundance of sagebrush seedlings (43%), and percent decadence decreased to 45%. Use also declined to a more moderate level with improved vigor. Sagebrush cover is variable, but averages 6% across the site. One negative change since 1984 is the great increase in the density of broom snakeweed. Nested frequency of Kentucky bluegrass declined significantly with the extended drought (1987- 1990). There was an increase in nested frequency for thistle, but low fleabane, Louisiana sagebrush, and showy goldeneye also increased. The percentage of surface rock cover has increased, indicating some continued soil movement.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - stable overall (3)

1996 TREND ASSESSMENT

The soil trend is slightly up with a decrease in bare ground with almost 75% of the vegetative cover coming from herbaceous species. The major drawback is that most of the herbaceous cover is provided by “weedy species.” These species provide high amounts of fine fuel that could provide the stimulus for a destructive wildfire where all the sagebrush could be lost. The browse trend is limited to only one species, mountain big sagebrush. It has decreased significantly in density and average height, but it now appears to have stabilized with improved vigor and decreased decadence. All these parameters indicate a stable population. The herbaceous understory is made up of weedy increasers. Annuals and biennials dominate this site. Trend for perennial grasses and forbs is stable with sum of nested frequency for all perennial species remaining stable.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable, even with a slight increase in bare ground and a decrease litter cover. Protective ground cover provided by vegetation and litter remains well disbursed and erosion is minimal. The high proportion of surface rock also helps armor the soil surface. Trend for browse is stable. Mountain big sagebrush has a stable density, percent decadence slightly decreased, and use is mostly light. The number of

young sagebrush remains stable at 10% of the population. Trend for the herbaceous understory is stable. Nested frequency of Kentucky bluegrass significantly increased, while showy goldeneye significantly decreased. Annuals are abundant.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 07 , Study no: 3

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	14	17	19	15	5	9	7	7	.30	.41
G	Bromus japonicus (a)	-	-	150	123	-	-	46	48	2.35	1.10
G	Bromus tectorum (a)	-	-	298	292	-	-	88	96	10.20	10.08
G	Poa pratensis	c138	ab91	a54	b100	50	36	25	38	1.06	2.16
G	Poa secunda	48	41	59	42	24	18	25	18	1.25	.43
Total for Annual Grasses		0	0	448	415	0	0	134	144	12.55	11.19
Total for Perennial Grasses		200	149	132	157	79	63	57	63	2.61	3.00
Total for Grasses		200	149	580	572	79	63	191	207	15.17	14.20
F	Allium spp.	-	-	-	2	-	-	-	1	-	.00
F	Antennaria rosea	-	3	-	-	-	1	-	-	-	-
F	Arabis spp.	-	-	-	5	-	-	-	3	-	.01
F	Artemisia ludoviciana	a10	ab28	b36	c67	4	12	15	23	2.03	3.72
F	Aster spp.	5	-	3	-	3	-	1	-	.03	-
F	Astragalus spp.	9	-	-	2	4	-	-	1	-	.00
F	Cirsium undulatum	b51	c94	ab47	a16	30	43	20	9	1.09	1.32
F	Collomia linearis (a)	-	-	-	3	-	-	-	1	-	.00
F	Comandra pallida	3	-	-	-	1	-	-	-	-	-
F	Collinsia parviflora (a)	-	-	a-	b7	-	-	-	5	-	.02
F	Crepis acuminata	1	-	-	-	1	-	-	-	-	-
F	Cryptantha spp.	10	3	1	2	5	2	1	1	.00	.00
F	Descurainia pinnata (a)	-	-	-	2	-	-	-	1	-	.00
F	Draba spp. (a)	-	-	2	-	-	-	1	-	.00	-
F	Epilobium brachycarpum (a)	-	-	b164	a81	-	-	61	30	2.44	.41
F	Erodium cicutarium (a)	a18	-	a20	b220	7	-	10	72	.27	7.85
F	Erigeron pumilus	a-	c37	b11	a-	-	18	7	-	.40	-
F	Eriogonum racemosum	9	6	9	16	4	2	5	8	.13	.60
F	Grindelia squarrosa	-	-	-	3	-	-	-	1	-	.00

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Heterotheca villosa</i>	a-	b15	b31	c55	-	8	13	23	1.60	4.15
F	<i>Holosteum umbellatum</i> (a)	-	-	59	41	-	-	23	17	.44	.11
F	<i>Lactuca serriola</i>	a-	ab7	b22	a1	-	4	9	1	.07	.00
F	<i>Lepidium</i> spp. (a)	-	-	b38	a8	-	-	18	4	.16	.07
F	<i>Lupinus argenteus</i>	b15	b12	a-	a-	7	8	-	-	.00	-
F	<i>Machaeranthera canescens</i>	2	-	-	-	2	-	-	-	-	-
F	<i>Marrubium vulgare</i>	-	-	-	-	-	-	-	-	-	.03
F	<i>Phlox longifolia</i>	-	-	-	1	-	-	-	1	-	.00
F	<i>Polygonum douglasii</i> (a)	-	-	17	8	-	-	9	4	.04	.07
F	<i>Potentilla gracilis</i>	-	-	2	2	-	-	1	1	.00	.00
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Sphaeralcea grossulariaefolia</i>	-	-	1	-	-	-	1	-	.00	-
F	<i>Tragopogon dubius</i>	3	2	11	9	3	2	6	4	.05	.04
F	<i>Verbascum thapsus</i>	-	-	5	-	-	-	2	-	.33	-
F	<i>Viguiera multiflora</i>	a3	b63	c115	a21	3	31	51	12	3.50	.73
Total for Annual Forbs		18	0	300	373	7	0	122	135	3.37	8.56
Total for Perennial Forbs		121	270	294	202	67	131	132	89	9.27	10.66
Total for Forbs		139	270	594	575	74	131	254	224	12.64	19.23

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Amelanchier alnifolia</i>	1	2	.15	.06
B	<i>Artemisia tridentata vaseyana</i>	42	39	5.77	7.40
B	<i>Chrysothamnus depressus</i>	3	2	.03	-
B	<i>Gutierrezia sarothrae</i>	52	55	2.41	1.66
B	<i>Mahonia repens</i>	28	29	.42	1.12
B	<i>Opuntia</i> spp.	13	17	.21	.45
B	<i>Rosa woodsii</i>	6	7	.59	.81
Total for Browse		145	151	9.60	11.51

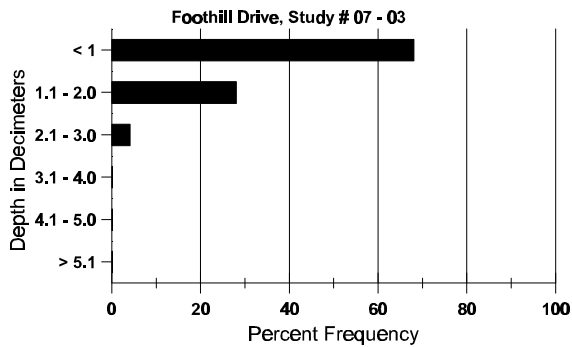
BASIC COVER --
Herd unit 07 , Study no: 3

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	368	362	3.00	5.50	40.96	47.83
Rock	336	320	29.00	34.25	32.87	37.01
Pavement	145	161	1.00	2.50	1.21	3.64
Litter	377	360	52.50	50.50	41.41	30.40
Cryptogams	28	-	.75	.75	.31	0
Bare Ground	129	145	13.75	6.50	1.34	4.97

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 03, Foothill Drive

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.0	57.4 (9.8)	6.4	42.2	29.1	28.7	5.0	27.4	243.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 3

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Rabbit	-	7	96	N/A
Deer	23	11	731	56 (139)
Cattle	7	-	78	7 (16)
Elk	-	-	26	2 (5)
Horse	-	-	9	N/A

BROWSE CHARACTERISTICS --

Herd unit 07 , 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 alnifolia																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	19	29	1
	'01	-	1	-	-	-	1	-	-	-	2	-	-	-	40	30	37	2
D	'84	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			+ 0%							
'90		100%			00%			00%			-39%							
'96		100%			00%			00%			+50%							
'01		50%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	100%			
												'90	33		0%			
												'96	20		0%			
												'01	40		0%			

A Y G R E	Form Class (No. of Plants)	1				2				3				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	84	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	100		3
	90	25	-	-	-	-	-	-	-	-	-	-	25	-	-	-	833		25
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	6	-	-	-	-	-	-	-	-	-	-	6	-	-	-	200		6
	96	6	-	-	-	-	-	-	-	-	-	-	6	-	-	-	120		6
	01	6	-	-	-	-	-	-	-	-	-	-	6	-	-	-	120		6
M	84	-	1	4	-	-	-	-	-	-	-	-	5	-	-	-	166	15 13	5
	90	13	12	1	-	-	-	-	-	-	-	-	25	1	-	-	866	27 28	26
	96	27	13	1	-	-	-	-	-	-	-	-	41	-	-	-	820	18 34	41
	01	41	2	-	-	-	-	-	-	-	-	-	43	-	-	-	860	21 38	43
D	84	-	7	37	-	-	-	-	-	-	-	-	28	-	8	8	1466		44
	90	6	17	3	-	-	-	-	-	-	-	-	18	4	-	4	866		26
	96	6	6	-	-	-	-	-	-	-	-	-	12	-	-	-	240		12
	01	8	1	1	-	-	-	-	-	-	-	-	5	-	-	5	200		10
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	660		33
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200		10
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'84		16%				84%				33%				+16%					
'90		50%				07%				07%				-39%					
'96		32%				02%				00%				+ 0%					
'01		05%				02%				08%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	1632	Dec:	90%				
												'90	1932		45%				
												'96	1180		20%				
												'01	1180		17%				
<i>Chrysothamnus depressus</i>																			
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	96	3	1	-	-	-	-	-	-	-	-	-	4	-	-	-	80	9 18	4
	01	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	40	-	2
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'84		00%				00%				00%									
'90		00%				00%				00%									
'96		25%				00%				00%				-50%					
'01		00%				00%				00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-				
												'90	0		-				
												'96	80		-				
												'01	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			
Gutierrezia sarothrae																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	110	-	-	-	-	-	-	-	-	110	-	-	-	3666		110
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	33	-	-	-	-	-	-	-	-	33	-	-	-	1100	9 12	33
	90	208	-	-	-	-	-	-	-	-	208	-	-	-	6933	9 13	208
	96	209	-	-	-	-	-	-	-	-	209	-	-	-	4180	9 12	209
	01	130	-	-	-	-	-	-	-	-	130	-	-	-	2600	9 12	130
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	4	-	-	-	-	-	-	-	-	3	-	-	1	80		4
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		00%			00%			00%			+90%						
'90		00%			00%			00%			-59%						
'96		00%			00%			00%			-39%						
'01		00%			00%			.74%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	1100	Dec:	0%		
												'90	10599		0%		
												'96	4360		0%		
												'01	2680		3%		

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				
Mahonia repens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	1	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	28	-	-	-	-	-	-	-	-	28	-	-	-	933			28
	90	34	-	-	-	-	-	-	-	-	11	23	-	-	1133			34
	96	18	-	-	-	-	-	-	-	-	18	-	-	-	360			18
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133	4	3	4
	96	143	-	-	2	-	-	-	-	-	145	-	-	-	2900	5	8	145
	01	350	-	-	-	-	-	-	-	-	350	-	-	-	7000	3	4	350
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+26%							
'90		00%			00%			00%			+61%							
'96		00%			00%			00%			+53%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	933	Dec:	-			
												'90	1266		-			
												'96	3260		-			
												'01	7000		-			

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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	8	-	-	-	-	-	-	-	-	8	-	-	-	266	4 6	8	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133	4 9	4	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	5 11	17	
	01	27	-	-	1	-	-	-	-	-	28	-	-	-	560	5 12	28	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	33		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-55%							
'90		00%			00%			20%			+59%							
'96		00%			00%			00%			+35%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	366	Dec:	0%			
												'90	166		20%			
												'96	400		5%			
												'01	620		3%			

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				
Rosa woodsii																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	25	-	-	-	-	-	-	-	-	25	-	-	-	500		25	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560	16	18	28
	01	3	48	18	-	-	-	-	-	-	69	-	-	-	1380	8	7	69
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+24%							
'01		69%			26%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	1060		0%			
												'01	1400		1%			

Trend Study 7-4-01

Study site name: Above Samak.

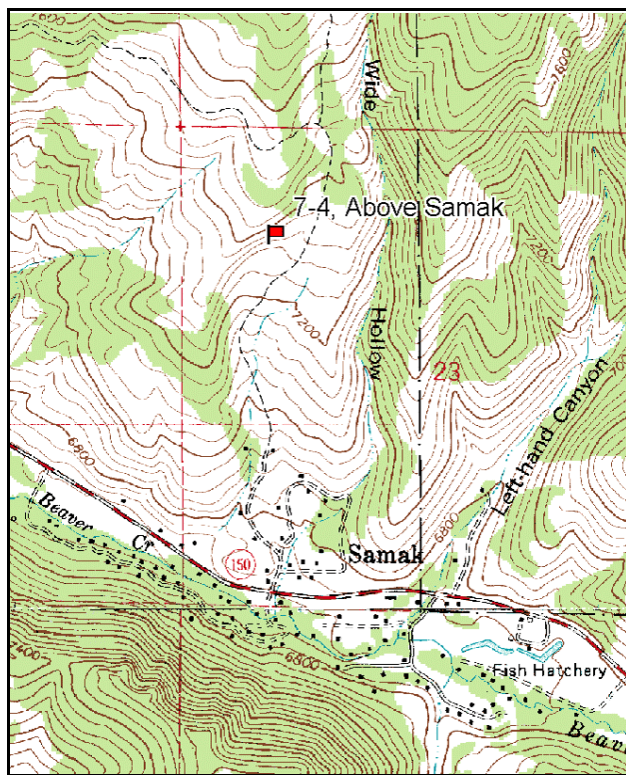
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 180 degrees magnetic.

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

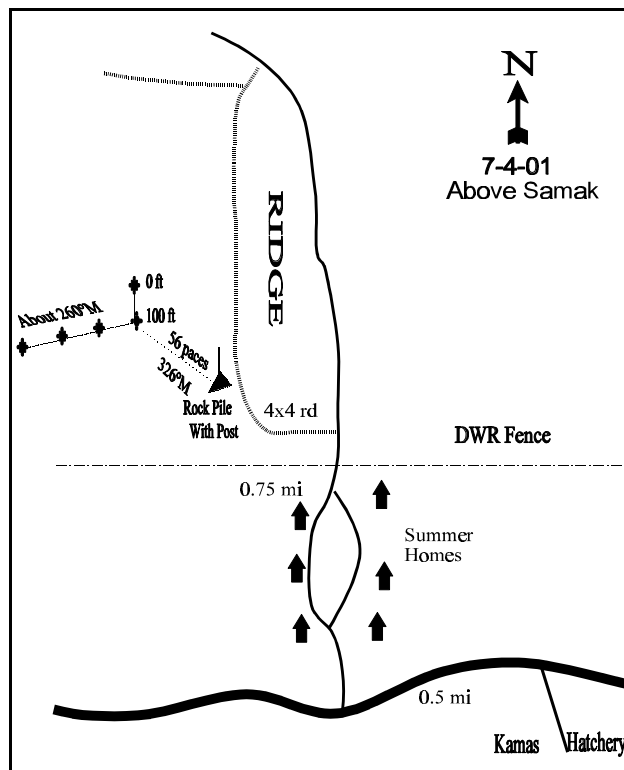
LOCATION DESCRIPTION

From the Kamas fish hatchery proceed west 0.5 miles. Turn right onto a dirt road and proceed north. The road will split (go left) around the summer houses and reunite in 0.2 miles. After passing the homes, you will come to a DWR fence and gate. Proceed 0.1 miles past the gate and turn left, proceeding up a very steep hill (4X4 recommended). After reaching the top, proceed north until you see a green steel stake in a rockpile on the left. The rockpile is 0.75 miles from the highway. From the rockpile, walk 56 paces at 326 degrees magnetic to the 100-foot stake of the baseline. The 0-foot stake is marked by browse tag #7959. The rest of the baseline doglegs at the 100-foot baseline stake and runs 260 degrees magnetic.



Map Name: Hoyt Peak

Township 2S, Range 6E, Section 22



Diagrammatic Sketch

UTM 4498170 N 479900 E

DISCUSSION

Trend Study No. 7-4

The Above Samak study is located on Division of Wildlife Resources property in Beaver Creek Canyon. The site is at a moderately high elevation (7,200 feet) with a slope of 23%. Exposure is to the southwest. This area can be classified as deer and elk winter range during more mild winters, or transitional spring-fall range during the more harsh winters. The site and surrounding area was burned and seeded in the early-1960's. Domestic livestock also graze the area during the summer. The community was originally dominated by Gambel oak with some mountain brush species and little herbaceous cover. The site is now made up of scattered openings of mountain brush and seeded grasses interspersed with Gambel oak clones. Animal use on the site is quite variable, depending on wintering conditions. There was moderate to heavy use on all browse species during the harsh winter of 1983-84. In 2001, pellet group transect data collected along the study baseline estimated 23 elk days use/acre (56 edu/ha), 31 deer days use/acre (76 ddu/ha), and 9 cow days use/acre (23 cdu/ha).

Soils on the site are very rocky and well-drained with high permeability. Cover from surface rock and pavement is moderately high at around 21%. Percent bare ground was also estimated at about 21% in 2001. Effective rooting depth was estimated at nearly 16 inches in 1996. Soil texture was classified as a clay loam with a neutral soil reaction (6.8 pH). With the high amount of rock in the upper soil profile, the moderately steep slope (23%), and the southwest aspect, this site can get rather dry during the summer. Litter and vegetative cover appears adequate to prevent serious erosion. Some "trailing" and trampling damage associated with livestock use is apparent but not serious. An erosion condition class assessment determined soils to be stable in 2001.

Browse composition consists of a mix of Gambel oak, mountain snowberry, mountain big sagebrush, Saskatoon serviceberry, and several less numerous shrubs. Gambel oak could eventually become the ecologically dominant species with suppression of fire or excessive grazing. Density was estimated at 1,360 stems/acre in 1996, increasing to 3,340 stems/acre in 2001. Oak provided 24% of the total browse cover in 1996, decreasing to 15% in 2001. The oak population has consisted of a preponderance of young plants in the past. In 2001, young plants still make up 38% of the population. Oak clones vary in height throughout the site, with the larger ones being estimated at 12-15 feet. Due to a late frost in this area in June of 2001, many of the oak showed leaf damage and death when the site was sampled in September of 2001. As a result, 18% of the plants sampled were classified with poor vigor.

Other shrub populations appear stable at the present time ('01). Browse utilization has been heaviest on serviceberry and bitterbrush in the past. Serviceberry density is estimated at just under 300 plants/acre in 1996 and 2001. Decadence has remained steady at around 20% for the last three sampling periods. In 1996 and 2001, mountain big sagebrush provided the largest proportion of the browse cover of any species at 39% and 44% respectively. Density of mountain big sagebrush was estimated at 1,180 plants/acre in 2001. Use on sagebrush was moderate to heavy in 1984, but has been more moderate to light since. In 2001, percent decadence increased from 6% to 17%. Recruitment from young plants is fairly low at only 2% of the population. Mountain snowberry had an estimated density of 1,500 plants/acre in 2001, which provides an additional 29% of the browse cover. In 2001, annual leader growth averaged 1.3 inches for mountain big sagebrush and 2.3 inches for serviceberry.

The composition of the herbaceous understory is dominated by seeded species, primarily grasses. Smooth brome, crested wheatgrass, and intermediate wheatgrass are all very common. These three species contribute to over half of the total herbaceous cover in 1996 and 2001. Crested and intermediate wheatgrass decreased in nested frequency in 2001, although neither was a statistically significant decline from the 1996 frequency

values. Grasses showed evidence of heavy grazing in the past, but currently show only light use. Alfalfa, also a seeded species, is the most abundant forb on the site in terms of cover. Alfalfa showed utilization in 2001. It was characterized as low growing with a sprawling growth form.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable to improving. This area has a very rocky, well-drained soil with good cover from vegetation, litter, and rock. During the period from 1977 to 1984, there appears to have been some improvement in vegetative cover. The apparent erosion rate is minimal. Depending upon location, vegetative trend also appears stable to improving. On previously unburned sites, mature oakbrush prevails over a good grass-forb understory. These burned areas still have developing oak and other browse populations. However, oak is the likely dominant. Grasses and forbs seem relatively stable. Seeded grasses appear especially persistent and should continue to provide the bulk of livestock and early spring big game forage.

1990 TREND ASSESSMENT

The data indicates several changes in the mountain big sagebrush population. There has been a significant decline in sagebrush density (from 2,399 plants/acre to 1,665 plants/acre), there are few seedlings and young, and the amount of hedging is somewhat lighter compared to 1984 levels. The reduced vigor and increased percent decadence is most likely related to moisture stress (extended drought) and competition. Sagebrush cover averages about 9%. Oakbrush has not expanded, although there are a large number of young sprouts. Grass abundance is high due to the presence of seeded grasses. Grass species identification was difficult due to heavy utilization before the study was sampled in mid-September. Total sum of nested frequency for grasses was higher. Frequency and density of alfalfa is unchanged and remains, along with low penstemon, the most common perennial forb. There were slight shifts in the percentage of litter and basal vegetative cover, but the percentage of bare soil remained stable.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down for sagebrush (2)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The trend for soil is slightly up with percent bare ground declining to less than 10%, and the nested frequency for grasses and forbs showing substantial increases. As on other sites, the key browse species (mountain big sagebrush) is now stable at a lower density. Vigor has improved and percent decadence is only 6%. Browse trend is stable at this time. The herbaceous understory has improved slightly with increased sum of nested frequency values for both grasses and forbs.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - up slightly (4)

2001 TREND ASSESSMENT

Soil trend is slightly down. Bare ground increased from 10% to 21%, and percent litter cover declined from 45% to 35%. Even with these changes in ground cover parameters, soil erosion is minimal at the present time. Trend for browse is stable. Mountain big sagebrush slightly decreased in density and level of use, but

increased in percent decadence. However, the current level of decadence (17%) is not extreme, while recruitment remains fairly low (2%). The herbaceous understory shows a stable trend. Perennial grasses slightly decreased in sum of nested frequency, conversely perennial forbs have increased in sum of nested frequency in 2001. Seeded species remain dominate on the site, especially smooth brome.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 07 , Study no: 4

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	ab117	a100	b145	ab124	55	45	51	49	5.53	2.86
G	Agropyron dasystachyum	a-	a-	a-	b11	-	-	-	6	-	.27
G	Agropyron intermedium	a55	a47	b103	ab77	28	28	39	28	4.07	1.88
G	Agropyron spicatum	26	20	16	5	10	9	9	3	.46	.04
G	Bromus inermis	243	267	249	266	85	85	78	86	12.64	10.56
G	Bromus japonicus (a)	-	-	-	3	-	-	-	1	-	.03
G	Poa bulbosa	a-	a-	ab3	b9	-	-	1	5	.00	.16
G	Poa fendleriana	a-	b20	a1	a5	-	8	1	2	.00	.18
G	Poa pratensis	-	4	-	-	-	1	-	-	-	-
G	Poa secunda	3	8	7	14	2	4	5	6	.10	.25
G	Stipa lettermani	-	7	-	-	-	3	-	-	-	-
Total for Annual Grasses		0	0	0	3	0	0	0	1	0	0.03
Total for Perennial Grasses		444	473	524	511	180	183	184	185	22.83	16.22
Total for Grasses		444	473	524	514	180	183	184	186	22.83	16.25
F	Achillea millefolium	5	4	1	2	2	3	1	1	.06	.03
F	Agoseris glauca	-	-	-	3	-	-	-	1	-	.00
F	Allium acuminatum	ab10	b18	a6	a-	6	11	3	-	.04	-
F	Alyssum alyssoides (a)	-	-	-	2	-	-	-	1	-	.00
F	Allium spp.	a-	a-	a-	b27	-	-	-	11	-	.10
F	Arabis spp.	-	4	4	9	-	3	3	4	.04	.07
F	Astragalus convallarius	3	2	6	-	1	1	2	-	.06	-
F	Astragalus spp.	a-	a-	a-	b15	-	-	-	9	-	.34
F	Calochortus nuttallii	-	-	-	4	-	-	-	2	-	.01
F	Chaenactis douglasii	-	-	1	-	-	-	1	-	.00	-
F	Cirsium spp.	1	6	-	-	1	2	-	-	-	-
F	Comandra pallida	-	-	-	5	-	-	-	3	-	.07
F	Collinsia parviflora (a)	-	-	a31	b86	-	-	14	31	.14	.33

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Cryptantha spp.	_b 20	_a -	_a -	_a -	8	-	-	-	-	-
F	Epilobium brachycarpum (a)	-	-	-	2	-	-	-	1	-	.00
F	Erigeron pumilus	_b 15	_b 10	_b 15	_a -	7	5	7	-	.13	-
F	Eriogonum racemosum	-	-	-	7	-	-	-	3	-	.09
F	Machaeranthera canescens	_b 35	_a 6	_a 4	_a -	17	3	3	-	.04	-
F	Medicago sativa	42	40	55	59	18	19	29	30	2.96	4.21
F	Microsteris gracilis (a)	-	-	_a -	_b 51	-	-	-	24	-	.22
F	Penstemon humilis	55	55	55	29	23	25	23	14	1.02	.32
F	Petradoria pumila	_a -	_a -	_b 25	_b 38	-	-	10	14	1.08	2.44
F	Phlox longifolia	_a -	_{ab} 8	_{ab} 2	_b 9	-	3	1	5	.00	.05
F	Polygonum douglasii (a)	-	-	_b 21	_a 3	-	-	8	1	.04	.00
F	Ranunculus testiculatus (a)	-	-	_a 21	_b 94	-	-	9	32	.07	1.78
F	Senecio integerrimus	_a -	_a 2	_a -	_b 12	-	1	-	6	-	.08
F	Veronica biloba (a)	-	-	117	116	-	-	47	40	.46	.50
F	Verbascum thapsus	_a -	_a -	_a -	_b 28	-	-	-	9	-	.48
F	Zigadenus paniculatus	-	2	4	4	-	2	4	2	.09	.06
Total for Annual Forbs		0	0	190	354	0	0	78	130	0.72	2.84
Total for Perennial Forbs		186	157	178	251	83	78	87	114	5.55	8.38
Total for Forbs		186	157	368	605	83	78	165	244	6.27	11.23

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 07 , Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	13	12	1.27	1.42
B	Artemisia tridentata vaseyana	39	38	6.27	8.01
B	Chrysothamnus depressus	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	3	7	.12	.06
B	Mahonia repens	34	35	.90	.21
B	Opuntia spp.	0	0	-	-
B	Purshia tridentata	1	2	.03	.48
B	Quercus gambelii	19	21	3.82	2.72
B	Symphoricarpos oreophilus	29	36	3.82	5.22
Total for Browse		138	152	16.25	18.13

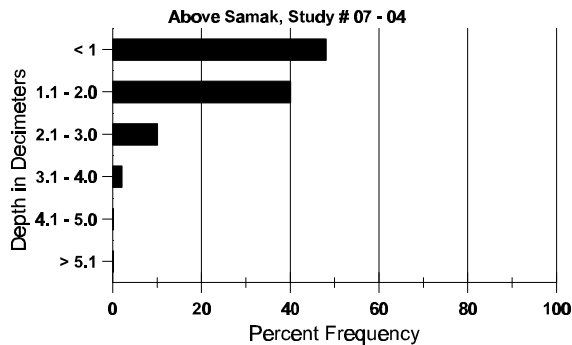
BASIC COVER --
Herd unit 07 , Study no: 4

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	366	360	5.00	11.00	44.96	44.24
Rock	254	225	12.50	13.25	16.81	15.30
Pavement	177	239	9.25	15.00	3.97	5.63
Litter	393	371	54.75	40.50	45.09	35.33
Cryptogams	38	12	0	.75	.66	.33
Bare Ground	221	262	18.50	19.50	9.90	21.62

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 04, Above Samak

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.6	N/A (N/A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 4

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Rabbit	-	1	01	01
Elk	8	17	17	N/A
Deer	12	8	296	23 (56)
Cattle	3	4	400	31 (76)
			113	9 (23)

BROWSE CHARACTERISTICS --

Herd unit 07 , 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				
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	2	-	-	2	-	-	-	133		2	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	1	5	-	-	-	-	-	-	6	-	-	-	400	40 37	6	
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	133	34 30	2	
	96	1	-	7	1	1	1	-	-	-	11	-	-	-	220	31 43	11	
	01	-	2	2	1	1	4	-	-	-	10	-	-	-	200	29 33	10	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	2	-	1	-	-	-	-	2	-	-	1	60		3	
	01	-	2	-	-	1	-	-	-	-	2	-	-	1	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		29%			71%			00%			-29%							
'90		20%			60%			00%			-16%							
'96		14%			71%			07%			- 7%							
'01		46%			46%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	466	Dec:	0%			
												'90	332		20%			
												'96	280		21%			
												'01	260		23%			

A Y G R E	Form Class (No. of Plants)	1				2				3				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	84	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	-	10	-	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	90	-	1	-	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	10	11	-	-	-	-	-	-	-	-	21	-	-	-	1400	20	29	21
	90	6	10	-	-	-	-	-	-	-	-	-	13	1	2	-	1066	19	23	16
	96	19	36	4	-	-	-	-	-	-	-	-	59	-	-	-	1180	21	35	59
	01	22	19	6	1	-	-	-	-	-	-	-	48	-	-	-	960	25	34	48
D	84	-	2	3	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	3	2	2	-	-	-	-	-	-	-	-	6	-	-	1	466		7	
	96	-	4	-	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	3	5	2	-	-	-	-	-	-	-	-	5	1	2	2	200		10	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200		10	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>						
'84		61%				39%				00%				-31%						
'90		52%				08%				12%				-21%						
'96		61%				06%				00%				-11%						
'01		41%				14%				07%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2399	Dec:	14%					
												'90	1665		28%					
												'96	1320		6%					
												'01	1180		17%					
<i>Chrysothamnus depressus</i>																				
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>						
'84		00%				00%				00%										
'90		00%				00%				00%										
'96		00%				00%				00%										
'01		100%				00%				00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%					
												'90	0		0%					
												'96	0		0%					
												'01	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				
Chrysothamnus viscidiflorus viscidiflorus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	12	17	3
	01	9	-	-	-	-	-	-	-	-	9	-	-	-	180	10	12	9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	00%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%			+67%							
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
												'01	180		-			
Mahonia repens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	59	-	-	3	-	-	1	-	-	63	-	-	-	4200			63
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	16	-	-	-	-	-	-	-	-	16	-	-	-	320			16
M	84	237	-	-	-	-	-	-	-	-	237	-	-	-	15800	4	6	237
	90	5	-	-	6	-	-	1	-	-	12	-	-	-	800	4	5	12
	96	139	-	-	-	-	-	-	-	-	139	-	-	-	2780	3	5	139
	01	186	-	-	42	-	-	-	-	-	228	-	-	-	4560	3	3	228
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'84	00%			00%			00%			-68%							
	'90	00%			00%			00%			-42%							
	'96	00%			00%			00%			+41%							
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	15800	Dec:	-			
												'90	5000		-			
												'96	2880		-			
												'01	4880		-			

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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	8	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			
Purshia tridentata																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20	11	41	1
	01	-	1	-	1	-	-	-	-	-	2	-	-	-	40	19	68	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			100%			00%			+50%							
'01		50%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	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				
Quercus gambelii																		
S	84	46	-	-	-	-	-	-	-	-	46	-	-	-	3066			46
	90	47	2	-	11	-	-	3	-	-	59	2	2	-	4200			63
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	32	118	-	-	-	-	-	-	-	150	-	-	-	10000			150
	90	90	13	-	23	-	-	-	-	-	115	11	-	-	8400			126
	96	29	6	-	-	-	-	-	-	-	35	-	-	-	700			35
	01	50	-	-	14	-	-	-	-	-	64	-	-	-	1280			64
M	84	-	23	16	-	-	-	-	-	-	39	-	-	-	2600	47	37	39
	90	2	9	-	2	-	-	-	-	-	13	-	-	-	866	58	29	13
	96	21	10	-	-	-	-	-	-	-	31	-	-	-	620	31	25	31
	01	69	-	-	-	-	-	-	12	-	64	-	17	-	1620	51	20	81
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	19	3	-	1	-	-	-	-	-	17	1	3	2	1533			23
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	19	-	-	3	-	-	-	-	-	9	-	10	3	440			22
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	420			21
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		75%			08%			00%			-14%							
'90		15%			00%			03%			-87%							
'96		24%			00%			00%			+59%							
'01		00%			00%			18%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	12600	Dec:	0%				
											'90	10799		14%				
											'96	1360		3%				
											'01	3340		13%				

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	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	2	-	-	-	-	-	-	2	-	-	-	133		2	
	90	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	6	-	-	-	-	-	-	-	6	-	-	-	120		6	
	01	7	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	84	-	14	-	-	-	-	-	-	14	-	-	-	933	18 29	14	
	90	3	4	2	11	-	-	-	-	17	-	3	-	1333	14 15	20	
	96	17	21	1	7	-	-	-	-	46	-	-	-	920	16 31	46	
	01	60	-	-	6	-	-	-	-	62	4	-	-	1320	15 28	66	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	2	-	3	-	-	-	-	1	-	3	4	533		8	
	96	-	2	6	-	-	-	-	-	4	-	-	4	160		8	
	01	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'84		100%		00%		00%		+47%									
'90		20%		07%		33%		-40%									
'96		38%		12%		07%		+20%									
'01		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'84	1066	Dec:	0%				
										'90	1999		27%				
										'96	1200		13%				
										'01	1500		3%				
Tetradymia canescens																	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	8 20	0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'84		00%		00%		00%											
'90		00%		00%		00%											
'96		00%		00%		00%											
'01		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	-				
										'90	0		-				
										'96	0		-				
										'01	0		-				

Trend Study 7-6-01

Study site name: Cedar Hollow.

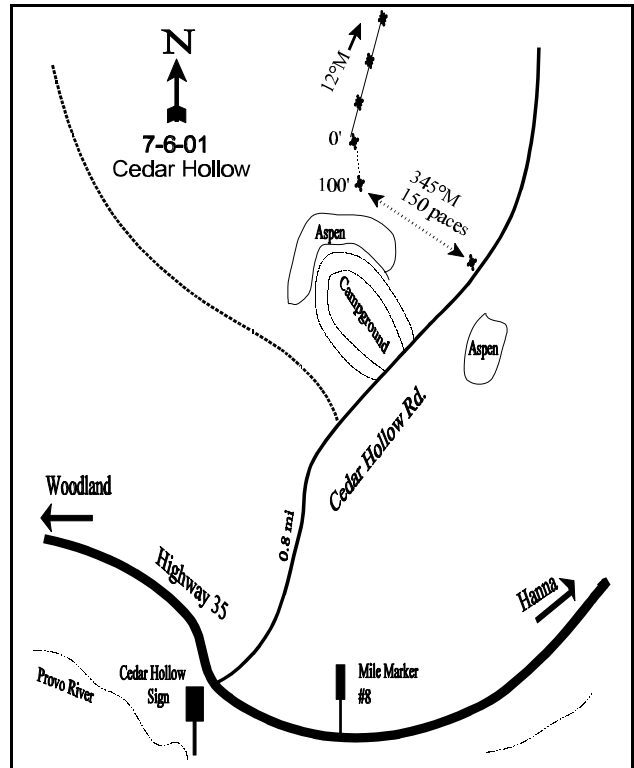
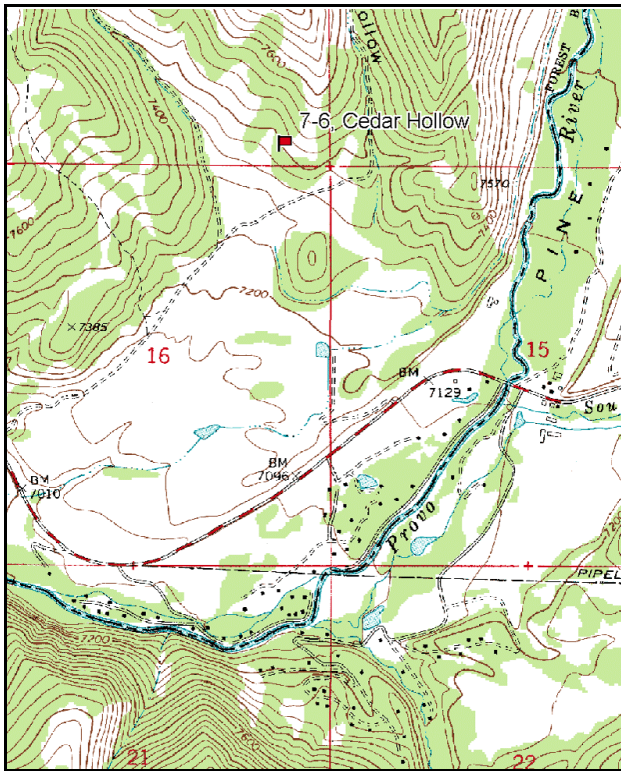
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 166 degrees magnetic.

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

LOCATION DESCRIPTION

Eastbound on Highway 35 from Woodland, turn left (north) at the Cedar Hollow sign. If you pass mile-marker 8 you have gone too far. Travel 0.8 miles on the main dirt road passing two left turns, and stop next to a small witness post on the left side of the road. There is a small stand of aspen on the right. From the witness post walk at a bearing of 345 degrees magnetic for 150 paces to the 0-foot baseline stake. The 0-foot stake is marked by browse tag #416.



Map Name: Woodland

Diagrammatic Sketch

Township 3S, Range 7E, Section 16

UTM 4490451 N 487453 E

DISCUSSION

Trend Study No. 7-6

The Cedar Hollow study is located near the top end of normal winter range. This study lies at an elevation of approximately 7,400 feet on a moderately steep (15%), south-facing exposure. Because of the moderately high elevation, this area probably does not constitute critical range, more likely it acts as transitional spring-fall range for big game. There are generally few signs of heavy or excessive big game use on browse, except for bitterbrush and serviceberry because of their relatively low populations. The vegetative make up of the area consists of varying sized clumps of serviceberry, moderately tall Gambel oakbrush clones, and quaking aspen intermixed with more open areas dominated by mountain big sagebrush-grass and mountain snowberry. Pellet groups of deer, elk, and moose are present, yet none are very abundant. Cattle also graze the area. A pellet group transect read along the vegetation baseline in 2001 estimated 5 elk days use/acre (12 edu/ha), 20 deer days use/acre (50 ddu/ha), and 1 moose day use/acre (2 mdu/ha).

Soils appear to be moderately deep and well-drained. Effective rooting depth (refer to methods) was estimated at almost 11 inches in 1996. Soil texture is classified as a clay loam with a neutral soil reaction (7.0 pH). Surface rock is of varying size and covers an estimated 21% of the soil surface (pavement included). Parent material is sandstone and limestone. This area probably receives at least 20 inches of annual precipitation and thus has a fairly extensive vegetative cover. However, there are interspaces where the soil appears compacted where noticeable sheet and gully erosion has occurred. Overall soil condition is fair to good. An erosion condition class assessment determined stable soils on the site in 2001.

Vegetatively, the site is similar to that of other transitional ranges described earlier. Gambel oak occurs frequently in the study area but consists of clumps of mature plants that are partially unavailable because of their height. Oak probably has an ecological influence in the area greater than the data summary might indicate. The most important species based on abundance, cover, and relative palatability is mountain big sagebrush. Mountain big sagebrush density is estimated at about 1,800 plants/acre in 1996 and 2001. The sagebrush population had a very high incidence of decadent plants in 1984 at 75%. Percent decadence has been much lower since 1984, with current ('01) estimates at 29%. The proportion of the population showing poor vigor has been moderate in all years except 1996. Use was moderate to heavy on sagebrush in 1984, but has since declined to a level that is light to moderate. In past reports, it was noted that the sagebrush population on this site may be showing similar characteristics of other sagebrush communities where moderately high densities and prolonged drought had caused increased decadence and reduced vigor due to high intraspecific competition. These strongly competitive conditions would be moderated during periods of normal precipitation. Another plausible explanation for high decadence and reduced vigor on sagebrush at this elevation is winter injury. Annual leader growth on sagebrush averaged just under 2 inches in 2001.

Serviceberry and bitterbrush provide additional preferred forage, but they occur in low densities at an estimated 600 and 380 plants/acre in 2001 respectively. Both species show moderate to heavy use. Average annual leader growth was estimated at 2 inches for bitterbrush and 1.8 inches for serviceberry during the 2001 sample. Gambel oak occurs in scattered clones throughout the area, but this species is not extensively sampled by this particular study. Oak density was estimated at 900 stems/acre in 2001, and the entire population was classified as having poor vigor. Reduced vigor in the population of Gambel oak occurred because of a late snow storm and cold temperatures in June 2001. The resultant cold temperatures caused widespread meristematic and leaf death on oak, including this particular study.

This site only has a fair herbaceous understory component. Grasses are more productive than forbs, providing 33% of the total vegetation cover in 2001. Forbs provide 11% of the vegetation cover in 2001, with most coming from perennial species. Grasses are diverse on the site, which include several aggressive increasers

which provide an effective ground cover and an important source of livestock forage. A Carex, bulbous bluegrass, mutton bluegrass, and bluebunch wheatgrass are the most abundant grasses. Utilization on grasses was light to moderate in 1996, with no utilization apparent in 2001.

1984 APPARENT TREND ASSESSMENT

Almost all of the data and apparent trend parameters suggest a stable or even improving soil trend. Although some bare interspaces persist, they are not serious erosion sources and may in fact be stabilizing. Vegetative trend is more complex, but is also basically stable. The fate of mountain big sagebrush is unclear although there are a few indications of a declining population. Sagebrush density has remained relatively stable, but a decadent age structure may indicate a future change. Grass abundance and production is at least stable and may be increasing. In the future, it will be important to closely observe species such as Kentucky bluegrass and bulbous bluegrass. These increasers will be the most likely to benefit from a decline in big sagebrush or increased livestock grazing.

1990 TREND ASSESSMENT

Browse composition is basically unchanged. The oakbrush, although it has not greatly expanded, appears to be more productive and have a greater influence in 1990. Mountain big sagebrush shows a slightly lower density, which is not surprising based on the highly decadent population (75%) encountered during the initial sampling. Young shrubs have replaced some of the decadent plants, but overall density is down. Vigor is less than optimum on half of the sagebrush even though there has been only light to moderate utilization the last several years. Sagebrush cover averages about 10%. Serviceberry has increased in density. The 1990 data shows an increase in grass frequency and number of species encountered. A larger number of forb species were identified, surprising for late in a dry year. A slightly higher percent cover for rock and pavement was recorded in 1990. Vegetative and litter cover are adequate to minimize soil movement.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The trend for soil is stable with slightly lower amounts of rock/pavement cover and bare ground. The browse trend is still considered stable. The increased density of mountain big sagebrush is primarily a function of the larger sampling design that picked up more plants. Mountain big sagebrush currently makes up 40% of the browse cover, has improved vigor, and a significantly lower percent decadence in the population. Bitterbrush and mountain snowberry are also in good health. The herbaceous understory is considered stable. Perennial grasses maintained stable sum of nested frequency values, while forbs declined in sum of nested frequency. However, grasses provide more than six times the amount of cover as forbs, so trend is considered stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Soils have a stable trend. Bare ground slightly increased, but vegetation cover also increased. Trend for browse is stable. Mountain big sagebrush shows a stable density with use remaining light to moderate. Decadence is moderate at 29%, but much lower than that reported in 1984 and 1990. Sum of nested frequency increased for both perennial grasses and perennial forbs. Trend is considered slightly up overall.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 07 , Study no: 6

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	-	-	-	2	-	-	-	1	-	.00
G	Agropyron spicatum	_b 152	_b 151	_{ab} 145	_a 107	60	55	55	43	2.03	2.06
G	Bromus carinatus	_a -	_a 6	_a -	_b 23	-	2	-	9	-	.20
G	Bromus inermis	-	12	-	-	-	4	-	-	-	-
G	Bromus tectorum (a)	-	-	1	-	-	-	1	-	.00	-
G	Carex spp.	73	92	68	78	22	29	26	26	4.08	4.29
G	Festuca spp.	-	-	3	-	-	-	1	-	.00	-
G	Koeleria cristata	-	-	-	2	-	-	-	1	-	.03
G	Melica bulbosa	-	-	3	1	-	-	1	1	.00	.03
G	Poa bulbosa	_a -	_b 79	_b 107	_c 199	-	37	35	67	3.57	4.99
G	Poa fendleriana	_a 97	_{ab} 130	_{ab} 105	_b 140	41	53	41	53	1.47	2.79
G	Poa pratensis	_a 46	_b 83	_b 107	_a 48	18	31	37	21	2.80	.81
G	Poa secunda	_{ab} 31	_a 19	_b 56	_a 23	16	11	25	8	.71	.33
G	Stipa columbiana	_{ab} 9	_b 28	_a 9	_a 7	5	12	4	3	.09	.21
Total for Annual Grasses		0	0	1	0	0	0	1	0	0.00	0
Total for Perennial Grasses		408	600	603	630	162	234	225	233	14.79	15.77
Total for Grasses		408	600	604	630	162	234	226	233	14.80	15.77
F	Agoseris glauca	-	4	-	4	-	2	-	2	-	.01
F	Allium spp.	_a -	_a -	_a 5	_b 24	-	-	3	10	.01	.10
F	Aster chilensis	_b 105	_b 121	_a 48	_a 35	39	48	21	14	.47	.44
F	Astragalus spp.	_a -	_a -	_a 2	_b 65	-	-	2	30	.01	.84
F	Balsamorhiza sagittata	7	16	11	14	5	10	6	9	.54	1.64
F	Castilleja linariaefolia	3	1	6	6	1	1	3	3	.04	.21
F	Calochortus nuttallii	-	2	3	4	-	1	1	2	.00	.01
F	Cirsium undulatum	14	17	8	8	8	10	4	4	.07	.09

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Collomia linearis</i> (a)	-	-	_a 12	_b 39	-	-	4	18	.02	.16
F	<i>Comandra pallida</i>	80	83	58	69	35	33	23	27	.29	.78
F	<i>Collinsia parviflora</i> (a)	-	-	-	8	-	-	-	4	-	.02
F	<i>Crepis acuminata</i>	-	1	3	-	-	1	1	-	.00	-
F	<i>Epilobium brachycarpum</i> (a)	-	-	_a -	_b 26	-	-	-	11	-	.05
F	<i>Eriogonum racemosum</i>	_a 1	_{ab} 8	_b 12	_{ab} 7	1	4	7	4	.16	.04
F	<i>Eriogonum umbellatum</i>	-	4	-	6	-	3	-	3	-	.21
F	<i>Hackelia patens</i>	_b 10	_a -	_a -	_a -	5	-	-	-	-	-
F	<i>Holosteum umbellatum</i> (a)	-	-	2	2	-	-	1	1	.00	.00
F	<i>Ligusticum</i> spp.	-	5	-	-	-	2	-	-	-	-
F	<i>Lupinus argenteus</i>	-	8	-	7	-	3	-	4	.03	.21
F	<i>Machaeranthera canescens</i>	_b 30	_a 6	_a -	_a -	11	3	-	-	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	_a -	_b 7	-	-	-	5	.00	.02
F	<i>Penstemon leonardi</i>	_a -	_b 17	_b 26	_b 18	-	9	12	9	.65	.34
F	<i>Phlox longifolia</i>	_a -	_c 32	_b 15	_{ab} 10	-	17	9	4	.04	.05
F	<i>Polygonum douglasii</i> (a)	-	-	8	-	-	-	3	-	.01	-
F	<i>Senecio integerrimus</i>	_a -	_a 1	_a 7	_b 21	-	1	4	12	.07	.18
F	<i>Solidago</i> spp.	_b 41	_a -	_a -	_a -	19	-	-	-	-	-
F	<i>Streptanthus cordatus</i>	1	2	-	3	1	1	-	1	-	.00
F	<i>Tragopogon dubius</i>	_a -	_a -	_a 1	_b 7	-	-	1	3	.00	.01
F	<i>Zigadenus paniculatus</i>	-	3	-	3	-	1	-	1	-	.00
Total for Annual Forbs		0	0	22	82	0	0	8	39	0.04	0.27
Total for Perennial Forbs		292	331	205	311	125	150	97	142	2.42	5.23
Total for Forbs		292	331	227	393	125	150	105	181	2.47	5.50

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 6

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	19	20	.22	.87
B	Artemisia tridentata vaseyana	59	58	8.10	8.01
B	Ceanothus velutinus	2	2	-	.15
B	Chrysothamnus depressus	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	51	53	1.85	1.98
B	Eriogonum heracleoides	0	4	-	.06
B	Eriogonum microthecum	17	0	.22	-
B	Mahonia repens	65	60	1.16	2.63
B	Opuntia spp.	3	3	.03	-
B	Pachistima myrsinites	4	0	.03	-
B	Purshia tridentata	15	16	2.93	3.94
B	Quercus gambelii	3	5	1.25	1.63
B	Symphoricarpos oreophilus	67	65	4.55	7.30
Total for Browse		305	287	20.35	26.61

CANOPY COVER --
Herd unit 07 , Study no: 6

Species	Percent Cover	
	'96	'01
Quercus gambelii	3	3

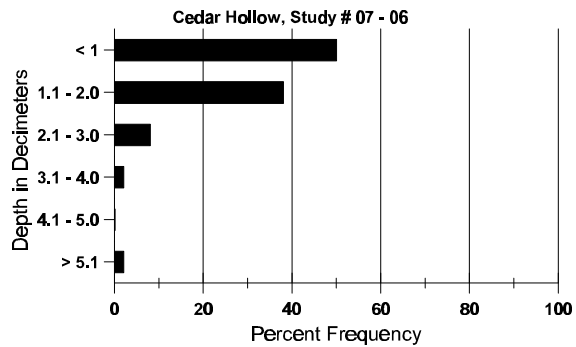
BASIC COVER --
Herd unit 07 , Study no: 6

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	350	366	3.75	16.50	39.31	51.52
Rock	265	223	12.00	12.25	15.11	14.48
Pavement	213	221	7.00	11.75	4.56	7.09
Litter	384	366	60.00	46.75	42.47	35.27
Cryptogams	28	9	.25	0	.53	.21
Bare Ground	235	262	17.00	12.75	11.13	17.47

SOIL ANALYSIS DATA --
 Herd Unit 07, Study no: 06, Cedar Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.6	53.8 (14.5)	7.0	40.2	30.4	29.4	4.9	11.5	166.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 07 , Study no: 6

Type	Quadrat Frequency	
	'96	'01
Moose	-	2
Elk	5	-
Deer	7	11
Cattle	1	2
Rabbit	-	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
17	1 (2)
61	5 (12)
261	20 (50)
-	-
17	N/A

BROWSE CHARACTERISTICS --

Herd unit 07 , Study no: 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				
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	2	-	-	1	-	-	5	-	-	-	333			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	3	1	1	1	-	-	3	-	-	7	-	2	-	600			9
	96	-	2	-	3	-	-	-	-	-	4	1	-	-	100			5
	01	11	1	-	-	-	-	-	-	-	12	-	-	-	240			12
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	1	1	-	-	-	66	89	71	1
	96	1	8	1	2	-	-	-	-	-	6	4	2	-	240	30	32	12
	01	2	-	2	1	2	-	-	-	-	6	-	1	-	140	43	31	7
D	84	-	-	-	-	-	1	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	96	-	2	-	-	-	-	-	-	-	1	1	-	-	40			2
	01	3	2	-	-	-	6	-	-	-	7	1	2	1	220			11
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			+91%							
'90		09%			18%			18%			-48%							
'96		63%			05%			11%			+37%							
'01		17%			27%			13%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	100%			
												'90	732		9%			
												'96	380		11%			
												'01	600		37%			

A Y G R E	Form Class (No. of Plants)	1				2				3				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	84	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	1	-	-	-	-	-	-	1	-	-	-	-	-	2	-	133		2
	96	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	60		3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	-	3	2	-	-	-	-	-	-	-	-	5	-	-	-	333	23 35	5
	90	3	3	-	1	-	-	-	1	-	-	-	4	3	-	1	533	26 28	8
	96	50	19	-	1	-	-	-	-	-	-	-	69	-	1	-	1400	21 33	70
	01	46	11	6	1	-	-	-	-	-	-	-	61	-	3	-	1280	25 37	64
D	84	-	6	9	-	-	-	-	-	-	-	-	12	-	2	1	1000		15
	90	5	2	-	-	-	-	-	-	-	-	-	5	-	-	2	466		7
	96	6	11	1	-	-	-	-	-	-	-	-	14	-	-	4	360		18
	01	16	7	3	-	-	-	-	-	-	-	-	13	1	8	4	520		26
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700		35
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	320		16
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'84		45%				55%				15%				-15%					
'90		29%				00%				18%				+38%					
'96		33%				01%				05%				-1%					
'01		20%				10%				17%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	1333	Dec:	75%				
												'90	1132		41%				
												'96	1820		20%				
												'01	1800		29%				
<i>Ceanothus velutinus</i>																			
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	96	-	-	-	2	-	-	-	-	-	-	-	-	2	-	-	40	24 90	2
	01	4	-	-	-	-	-	-	-	-	-	-	-	4	-	-	80	19 50	4
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'84		00%				00%				00%									
'90		00%				00%				00%									
'96		00%				00%				00%				+50%					
'01		00%				00%				00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-				
												'90	0		-				
												'96	40		-				
												'01	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				
Chrysothamnus depressus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	20		-			
Chrysothamnus viscidiflorus viscidiflorus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	4	1	-	-	-	-	1	-	-	5	-	1	-	400	12	9	6
	96	89	1	-	9	-	-	-	-	-	99	-	-	-	1980	12	16	99
	01	81	3	-	3	-	-	-	-	-	86	1	-	-	1740	10	16	87
D	84	1	2	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	4	-	-	1	-	-	-	-	-	2	-	-	3	333			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		67%			00%			00%			+75%							
'90		08%			00%			33%			+62%							
'96		.94%			00%			00%			- 7%							
'01		03%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	100%			
												'90	799		42%			
												'96	2120		0%			
												'01	1980		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				
Eriogonum heracleoides																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	2	-	-	2	-	-	-	-	-	4	-	-	-	80	10	10	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	80		-			
Eriogonum microthecum																		
Y	'84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'84	6	1	-	-	-	-	-	-	-	7	-	-	-	466	5	6	7
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	15	-	-	2	-	-	-	-	-	17	-	-	-	340	7	12	17
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		10%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	666	Dec:	-			
												'90	0		-			
												'96	360		-			
												'01	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				
Mahonia repens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	50	-	-	3	-	-	-	-	-	53	-	-	-	3533		53	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	296	-	-	-	-	-	-	-	-	296	-	-	-	19733		296	
	90	368	-	-	107	-	-	28	-	-	503	-	-	-	33533		503	
	96	105	-	-	21	-	-	-	-	-	126	-	-	-	2520		126	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	13	-	-	-	-	-	-	-	-	13	-	-	-	866	6	4	13
	90	271	1	-	78	-	-	74	-	-	424	-	-	-	28266	6	4	424
	96	323	-	-	34	-	-	-	-	-	357	-	-	-	7140	4	6	357
	01	696	-	-	15	-	-	-	-	-	711	-	-	-	14220	4	5	711
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+67%							
'90		.10%			00%			00%			-84%							
'96		00%			00%			00%			+32%							
'01		00%			00%			.14%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	20599	Dec:	0%			
												'90	61799		0%			
												'96	9660		0%			
												'01	14260		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				
Opuntia spp.																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	11	3
	01	1	-	-	7	-	-	-	-	-	8	-	-	-	160	4	10	8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+67%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
												'01	180		-			
Pachistima myrsinites																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	3	-	-	-	-	-	4	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	12	36	6
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	200		-			
												'01	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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	4	9	2	-	-	-	-	-	-	15	-	-	-	300	15	60	15
	01	9	2	5	1	-	1	-	-	-	18	-	-	-	360	16	70	18
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		56%			13%			00%			+16%							
'01		11%			32%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	320		0%			
												'01	380		5%			

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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	2	-	-	2	-	-	5	-	-	-	333		5	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	3	1	-	8	-	-	4	-	-	16	-	-	-	1066		16	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	1	-	1	-	2	-	-	-	133	67	57	2
	90	17	-	-	-	-	-	-	2	-	19	-	-	-	1266	72	23	19
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	77	98	3
	01	7	-	4	34	-	-	-	-	-	-	-	45	-	900	-	-	45
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			14%			00%			+81%							
'90		03%			00%			00%			-98%							
'96		00%			00%			00%			+93%							
'01		00%			09%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	466	Dec:	0%			
												'90	2465		5%			
												'96	60		0%			
												'01	900		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				
Rosa woodsii																		
Y	'84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	'90	-	-	-	2	-	-	-	-	-	2	-	-	-	133		2	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	-	-	2	-	-	-	-	-	-	1	-	1	-	133	25	5	2
	'90	2	-	-	-	-	-	-	-	-	2	-	-	-	133	18	7	2
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			40%			20%			-20%							
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	-			
												'90	266		-			
												'96	0		-			
												'01	0		-			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3			
Symphoricarpos oreophilus																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	7	-	-	-	-	-	1	-	-	-	-	-	533		8
	96	4	-	-	-	-	-	-	-	-	-	-	-	80		4
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	11	9	1	-	-	-	-	-	-	-	-	-	1400		21
	90	15	8	-	10	-	-	-	-	-	-	-	-	2200		33
	96	17	-	-	1	-	-	-	-	-	-	-	-	360		18
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	12	5	1	-	-	-	-	-	-	-	-	-	1200	23 36	18
	90	13	22	-	25	-	-	8	-	-	-	-	-	4533	18 24	68
	96	98	3	-	10	-	-	-	-	-	-	-	-	2220	17 28	111
	01	90	4	-	7	1	-	-	-	-	-	-	-	2040	16 28	102
D	84	2	3	-	-	-	-	-	-	-	-	-	-	333		5
	90	2	3	1	-	-	-	-	-	-	-	2	-	400		6
	96	3	-	-	-	-	-	-	-	-	-	1	-	60		3
	01	3	-	-	-	-	-	-	-	-	-	-	-	60		3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>		
'84		39%				05%				05%				+59%		
'90		31%				.93%				18%				-63%		
'96		02%				00%				05%				-20%		
'01		05%				00%				00%						
Total Plants/Acre (excluding Dead & Seedlings)												'84	2933	Dec:	11%	
												'90	7133		6%	
												'96	2640		2%	
												'01	2100		3%	

Trend Study 7-7-01

Study site name: Provo River Canyon.

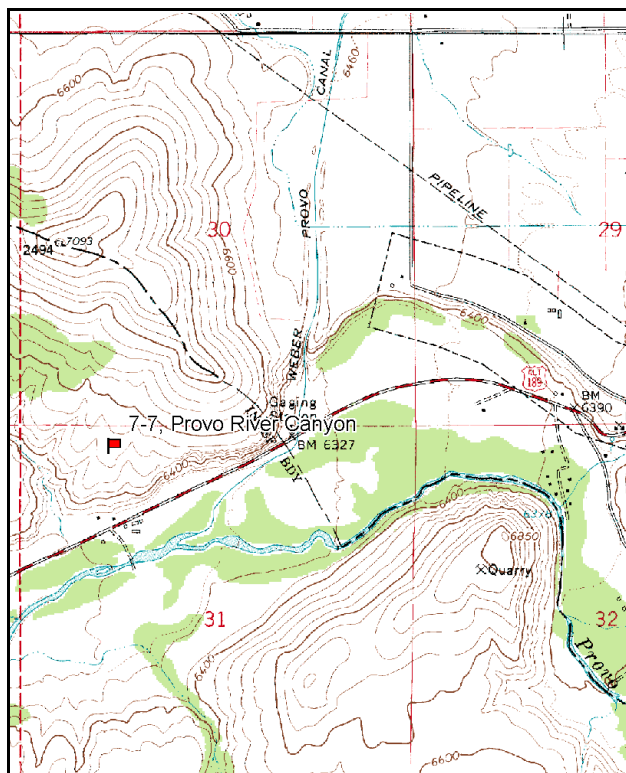
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 160 degrees.

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

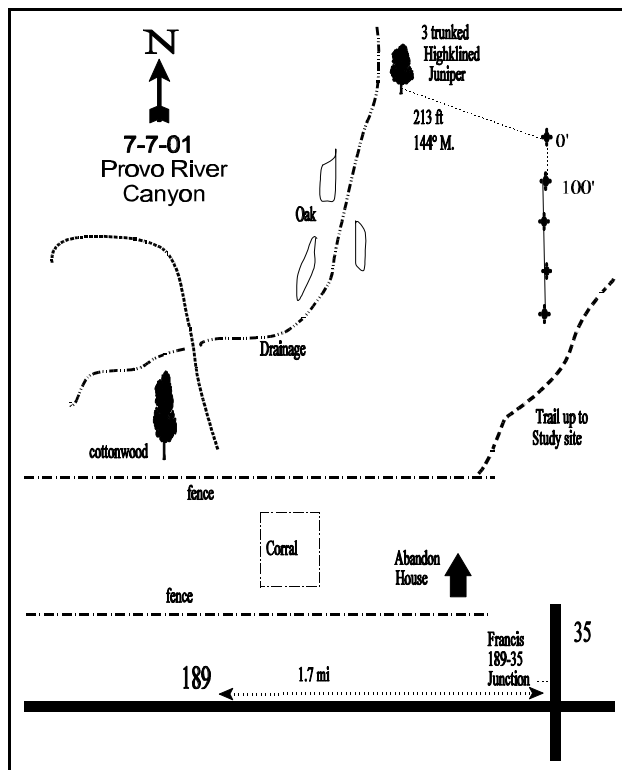
LOCATION DESCRIPTION

From the 189/35 junction in Francis, proceed west on 189 for 1.7 miles and stop at an old corral in a marshy pasture on the right (north). Walk to the large, narrow-leaf cottonwood northwest of the corral. The tree is at the mouth of a small canyon. Walk up the canyon approximately 500 feet until reaching the first drainage on the right. A drainage begins where the road crosses the creek for the second time. Walk up this drainage past the oak clumps to a point where the gully flattens out. To the right locate a 3-trunked, high-lined juniper. From the juniper, walk 213 feet at 144 degrees magnetic to the 0-foot stake of the baseline, marked with browse tag #7960. The baseline runs in a direction of 160 degrees magnetic.



Map Name: Francis

Township 2S, Range 6E, Section 31



Diagrammatic Sketch

UTM 4495230 N 473439 E

DISCUSSION

Trend Study No. 7-7

The Provo River Canyon site samples a narrow band of critical deer winter range located north of the Provo River and west of Francis. The physiography of this study area is characterized by steep, sometimes sheer bluffs bordering the Provo river valley. The principal winter range lies on gentle rolling terrain above the bluffs. Apart from isolated patches of Gambel oak and mixed mountain brush, the remaining area is occupied by the big sagebrush/grass type with scattered individuals of bitterbrush. Most of the area has a southern aspect. The study is on a nearly flat ridge (5% slope) with an elevation of approximately 6,700 feet.

Judging from frequency of pellet groups and the level of forage utilization, use by grazing and browsing animals is light to moderate. Cattle and sheep alternately use the area in the spring-fall period, but obtain little benefit because of the shortage of herbaceous forage. Winter big game use includes elk and mostly deer. In 1996, pellet group quadrat frequency was only 2% for elk and 30% for deer. During the 2001 reading, deer pellet group quadrat frequency remained similar at 26%. A pellet group transect read on site in 2001 estimated 35 deer and 3 elk days use/acre (86 ddu/ha and 7 edu/ha). Rabbit pellets were abundant. Deer pellet groups were primarily from winter use but some groups were recent indicating a few resident deer use the area during the spring and summer.

Soil at the site is relatively deep with an effective rooting depth of almost 15 inches. It has a clay loam texture with a neutral soil reaction (6.6 pH). Vegetation, litter, and cryptogamic cover are high leaving little unprotected bare ground. Where limited erosion has occurred in the past, it is now stabilized and the erosion condition class was determined to be stable in 2001.

The site supports a dense stand of mountain big sagebrush (*Artemisia tridentata vaseyana*) which displays some characteristics of basin big sagebrush (*Artemisia tridentata tridentata*). Mature plants are tall averaging 3 feet in height with a crown of nearly 4 feet. Population density was estimated at over 4,000 plants/acre in 1996 and 2001. Average cover of sagebrush is over 30% which limits herbaceous understory production. Utilization of sagebrush was moderate to heavy in 1984 and 1990, but light to moderate in 1996 and 2001. Percent decadence was high in 1990 at 57% with one-third of the plants sampled expressing poor vigor. Percent decadence declined and poor vigor improved in 1996, which was a wetter year than 1990. Precipitation was again low in 2001, as percent decadence rose from 20% in 1996 to 37%. Twenty-two percent the sagebrush were classified with poor vigor. Both conditions obviously caused by drought combined with intense interspecific competition. This area would benefit from some sagebrush thinning.

The most preferred browse is antelope bitterbrush. It tends to be heavily hedged and somewhat decadent because of its relatively low density compared to all other browse species. This is an area where antelope bitterbrush comprises, on average, only about 5% of the shrub cover. In the past, bitterbrush would have been much more numerous. The population has been lost, mostly because of competition with sagebrush combined with heavy use and being on a southern aspect. Density of bitterbrush was estimated at 866 plants/acre in 1984, declining steadily to 180 plants/acre in 1996. Only 240 plants/acre were estimated in 2001. The population was mostly decadent in 1984 and 1990. It appears that all of the decadent plants have died off and no decadent plants were sampled in 2001. Recruitment is poor with no seedlings or young plants encountered in 1996 or 2001. The only other browse species found on the site include a few serviceberry, stickyleaf low rabbitbrush, and pricklypear cactus.

The herbaceous understory is poor for this high of a site with grasses and forbs combining to produce only 15% cover in 1996 and 17% in 2001. Perennial grasses are represented by bluebunch wheatgrass, Sandberg bluegrass, bottlebrush squirreltail, and small amounts of crested wheatgrass and Great basin wildrye.

Cheatgrass, an annual, was abundant in 1996, when it accounted for over half of the grass cover. Due to the dry conditions of 2001, cheatgrass has declined significantly in nested frequency and cover has dropped from 8% to 2%. Forbs are diverse but few species are abundant. Perhaps due to the decline in cheatgrass, annual and perennial forbs have increased in sum of nested frequency and cover in 2001. Most notable is silky milkvetch which was not sampled in 1996 but in 2001, it provided 56% of the forb cover. The only other common perennial forb consists of small numbers of silvery lupine and longleaf phlox. Several small annual forbs are abundant and include slenderleaf collomia, blue-eyed Mary, owllover, and pale alyssum.

1984 APPARENT TREND ASSESSMENT

Soil and vegetative trends both appear stable but at a rather low condition rating. Understory composition and production are generally lacking, but have not obviously declined further since 1977 studies. Moreover, soil condition has not greatly changed over such a short period. The poor potential sites are unlikely to improve over any short period of time, while the better, deeper soil sites could erode if shrub cover were to be seriously depleted. However, the potential for that occurring are not serious.

1990 TREND ASSESSMENT

The slopes above Provo River support extensive stands of dense sagebrush. The site has a southwest exposure. There is a consistent 32% canopy cover for sagebrush. The moderately hedged hybrid sagebrush are relatively tall, nevertheless still identified as *Artemisia tridentata vaseyana*. Since 1984, density has decreased slightly and the proportion of decadent plants in the population increased to 57%. The somewhat scarce bitterbrush are sought out by livestock and deer. With continued heavy utilization, competition, and extended drought (1987-90), it has resulted in a decline in density. There are as many bitterbrush skeletons as living plants. The remaining plants are severely clubbed and decadent with poor vigor. Due to the extremely low leader growth this year, little forage production is available. Eighty-eight percent of the population was classified as decadent. Rabbitbrush and prickly-pear cactus have not increased. Grass density is low and forbs are still uncommon. Even with the limited perennial understory (cheatgrass is common), there is adequate ground cover with no sign of erosion.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The trend for soil is stable with good litter and vegetative cover and percent bare ground has decreased slightly. Bitterbrush appears to have stabilized at a lower density, with improved vigor. In addition, percent decadence has dropped from 88% down to only 11% even though use is about the same as it was in 1990. The key browse species for this site is mountain big sagebrush which makes up 96% of the browse cover. It also has greatly improved vigor, lower use, and percent decadence has decreased from 57% to 20%. The age structure for both species is mostly mature, but both species are long-lived and appear to have "weathered" the extended drought (1987-90) for now. Trend for browse is slightly improving. Trend for the herbaceous understory is slightly down. Perennial grass sum of nested frequency is down slightly, as it is for perennial forbs.

TREND ASSESSMENT

soil - stable (3)

browse - slightly improved (4)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is down slightly due to a 40% increase in cover of bare ground and a slight decline in litter cover. There is still good protective ground cover and erosion is not currently a problem. The soil erosion condition class was determined as stable. Trend for browse is down slightly. Density and utilization of the key species, mountain big sagebrush, has remained similar to 1996 estimates. However, due to the high interspecific competition combined with drought, percent decadence has increased from 20% to 37%. In addition, 22% of the sagebrush sampled display poor vigor, up from 3% in 1996. The sagebrush on this site needs thinning. Average cover is estimated at 31% which is high enough to suppress understory species. Thinning would also improve the general health of the stand. Sagebrush recruitment is currently poor and the population will likely decline slightly in density in the future. Antelope bitterbrush is of secondary importance due to its low abundance. It displays continued moderate to heavy use but vigor is good and no decadent plants were sampled. Trend for the herbaceous understory is up. Sum of nested frequency for perennial grasses and forbs has increased while nested frequency of cheatgrass has declined significantly. Sandberg bluegrass increased significantly in nested frequency as all other perennial grasses remained stable. Perennial forbs are still lacking but nested frequency for silky milkvetch increased significantly. It now produces over half of the forb cover. Several small annual forbs also increased significantly in nested frequency.

TREND ASSESSMENT

soil - down slightly (2)

browse - down slightly (2)

herbaceous understory - up (5)

HERBACEOUS TRENDS --

Herd unit 07 , Study no: 7

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	8	13	10	19	3	4	3	6	.68	.48
G	Agropyron dasystachyum	c87	b34	a3	ab11	38	13	1	5	.00	.08
G	Agropyron spicatum	a25	b79	c124	bc87	14	30	39	35	2.71	2.32
G	Bromus japonicus (a)	-	-	-	3	-	-	-	1	-	.00
G	Bromus tectorum (a)	-	-	b276	a157	-	-	84	62	7.47	1.51
G	Elymus cinereus	-	-	7	-	-	-	2	-	.03	.00
G	Poa secunda	a38	c141	b84	c169	16	60	35	61	2.37	5.51
G	Sitanion hystrix	a13	ab25	b33	b36	6	15	19	18	.92	.60
Total for Annual Grasses		0	0	276	160	0	0	84	63	7.47	1.51
Total for Perennial Grasses		171	292	261	322	77	122	99	125	6.72	9.02
Total for Grasses		171	292	537	482	77	122	183	188	14.19	10.53
F	Agoseris glauca	a-	b9	ab2	a-	-	5	1	-	.01	-
F	Allium acuminatum	3	-	-	-	2	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	18	20	-	-	8	8	.04	.07
F	Allium spp.	-	-	-	2	-	-	-	1	-	.00

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Arabis spp.	-	1	-	6	-	1	-	2	-	.03
F	Astragalus cibarius	_a -	_a -	_a -	_b 113	-	-	-	49	-	3.39
F	Astragalus convallarius	8	6	3	10	4	3	1	3	.00	.04
F	Astragalus spp.	2	-	5	-	1	-	3	-	.01	-
F	Calochortus nuttallii	1	-	-	-	1	-	-	-	-	-
F	Collomia linearis (a)	-	-	_a 18	_b 76	-	-	8	37	.09	.40
F	Collinsia parviflora (a)	-	-	_a 15	_b 103	-	-	5	37	.02	1.18
F	Crepis acuminata	8	13	7	6	4	9	3	2	.06	.06
F	Draba spp. (a)	-	-	-	2	-	-	-	2	-	.03
F	Epilobium brachycarpum (a)	-	-	1	-	-	-	1	-	.00	-
F	Erigeron pumilus	7	3	-	-	4	2	-	-	-	-
F	Gayophytum ramosissimum (a)	-	-	-	4	-	-	-	1	-	.03
F	Holosteum umbellatum (a)	-	-	-	11	-	-	-	6	-	.08
F	Lomatium triternatum	-	-	3	1	-	-	1	1	.00	.00
F	Lupinus argenteus	_a -	_a -	_{ab} 2	_b 19	-	-	2	7	.15	.14
F	Microsteris gracilis (a)	-	-	_a -	_b 13	-	-	-	6	-	.03
F	Orthocarpus spp. (a)	-	-	_a 4	_b 36	-	-	4	16	.08	.42
F	Phlox longifolia	_a -	_b 23	_a 2	_b 23	-	12	1	10	.00	.07
F	Ranunculus testiculatus (a)	-	-	-	1	-	-	-	1	-	.00
F	Senecio integerrimus	-	-	-	2	-	-	-	1	-	.03
F	Taraxacum officinale	-	-	-	1	-	-	-	1	-	.03
F	Unknown forb-perennial	_b 16	_a -	_a -	_a -	8	-	-	-	-	-
F	Vicia americana	-	4	-	-	-	2	-	-	-	-
Total for Annual Forbs		0	0	56	266	0	0	26	114	0.23	2.26
Total for Perennial Forbs		45	59	24	183	24	34	12	77	0.25	3.81
Total for Forbs		45	59	80	449	24	34	38	191	0.50	6.08

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 7

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	0	0	-	.00
B	Artemisia tridentata vaseyana	94	92	32.32	31.06
B	Chrysothamnus viscidiflorus viscidiflorus	1	1	.00	.03
B	Opuntia spp.	5	3	.03	.03
B	Purshia tridentata	9	9	1.14	1.87
Total for Browse		109	105	33.51	33.00

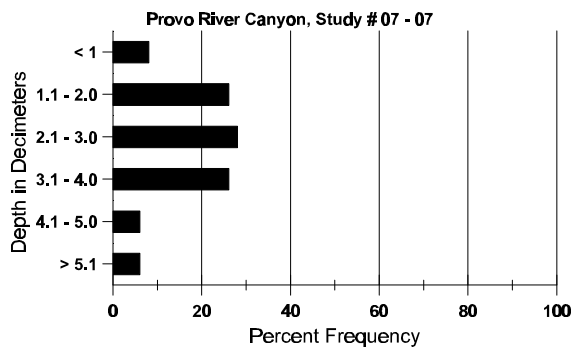
BASIC COVER --
Herd unit 07 , Study no: 7

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	350	332	2.00	6.50	50.12	50.18
Rock	91	52	.25	1.25	1.44	1.78
Pavement	106	114	1.75	3.75	.66	1.12
Litter	398	386	69.50	66.25	58.95	50.43
Cryptogams	106	96	13.25	14.00	4.69	7.43
Bare Ground	149	182	13.25	8.25	7.22	18.03

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 07, Provo River Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.7	55.6 (15.6)	6.6	41.8	27.4	30.7	3.6	23.2	275.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 07 , Study no: 7

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	9	31	1027	N/A
Elk	2	-	35	3 (7)
Deer	30	26	452	35 (86)
Cattle	-	-	17	1 (3)

BROWSE CHARACTERISTICS --

Herd unit 07 , Study no: 7

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			
Amelanchier alnifolia																	
S	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	1	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		00%			00%			00%									
'90		00%			00%			00%									
'96		00%			00%			00%									
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-			
											'90	0		-			
											'96	0		-			
											'01	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			
Artemisia tridentata vaseyana																	
S	'84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	'90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	'84	5	-	-	-	-	-	-	-	-	4	-	1	-	333		5
	'90	6	1	1	5	-	-	-	-	-	10	-	3	-	866		13
	'96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6
	'01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
M	'84	13	28	18	-	-	-	-	-	-	57	-	2	-	3933	33 28	59
	'90	4	14	6	2	-	-	-	-	-	22	-	4	-	1733	30 27	26
	'96	86	67	4	1	-	-	-	-	-	158	-	-	-	3160	34 51	158
	'01	65	47	7	11	-	-	-	-	-	108	1	21	-	2600	36 43	130
D	'84	5	10	16	-	-	-	-	-	-	23	-	8	-	2066		31
	'90	14	25	10	2	1	-	-	-	-	31	1	7	13	3466		52
	'96	23	9	7	2	1	-	-	-	-	35	-	-	7	840		42
	'01	48	21	7	2	-	2	-	-	-	52	2	6	20	1600		80
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	920		46
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	720		36
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		40%			36%			12%			- 4%						
'90		45%			19%			30%			-32%						
'96		37%			05%			03%			+ 4%						
'01		32%			07%			22%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	6332	Dec:	33%		
												'90	6065		57%		
												'96	4120		20%		
												'01	4280		37%		

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				
Chrysothamnus viscidiflorus viscidiflorus												
Y	84	1	-	-	-	-	-	-	1	66		1
	90	-	-	-	-	-	-	-	-	0		0
	96	-	-	1	-	-	-	-	1	20		1
	01	-	-	-	-	-	-	-	-	0		0
M	84	2	-	-	-	-	-	-	2	133	11 10	2
	90	1	-	-	1	-	1	-	1	200	12 14	3
	96	-	-	-	-	-	-	-	-	0	- -	0
	01	-	-	-	-	-	1	-	1	20	- -	1
D	84	2	-	-	-	-	-	-	2	133		2
	90	1	-	-	-	-	-	-	1	66		1
	96	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%		-20%				
'90		00%		00%		50%		-92%				
'96		00%		00%		00%		+ 0%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'84	332	Dec:	40%		
							'90	266		25%		
							'96	20		0%		
							'01	20		0%		
Opuntia spp.												
M	84	1	-	-	-	-	-	-	1	66	6 21	1
	90	-	-	-	-	-	2	-	2	133	6 7	2
	96	8	-	-	1	1	-	-	10	200	6 22	10
	01	2	-	-	1	-	-	-	3	60	5 18	3
X	84	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	40		2
	01	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%		+50%				
'90		00%		00%		00%		+34%				
'96		10%		00%		00%		-70%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'84	66	Dec:	-		
							'90	133		-		
							'96	200		-		
							'01	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				
Purshia tridentata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	2	-	-	-	-	-	-	3	-	-	-	200	33	34	3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	4	1	1	1	-	-	-	8	-	-	-	160	25	47	8
	01	-	4	4	2	-	2	-	-	-	12	-	-	-	240	29	42	12
D	84	-	-	10	-	-	-	-	-	-	5	-	5	-	666		10	
	90	-	2	3	-	-	-	1	-	1	1	-	-	6	466		7	
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			92%			38%			-39%							
'90		25%			63%			75%			-66%							
'96		11%			67%			00%			+25%							
'01		33%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	866	Dec:	77%			
												'90	532		88%			
												'96	180		11%			
												'01	240		0%			

Trend Study 7-8-01

Study site name: Hailstone.

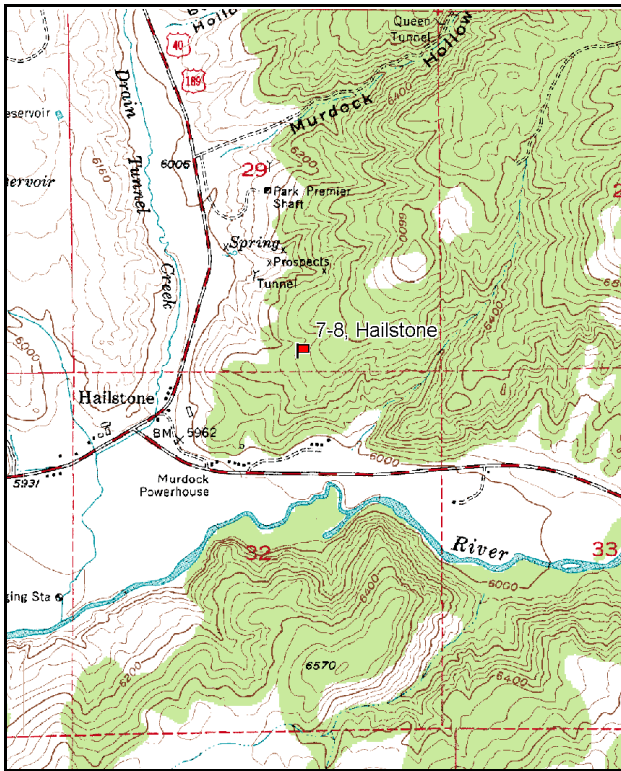
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 159 degrees magnetic.

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

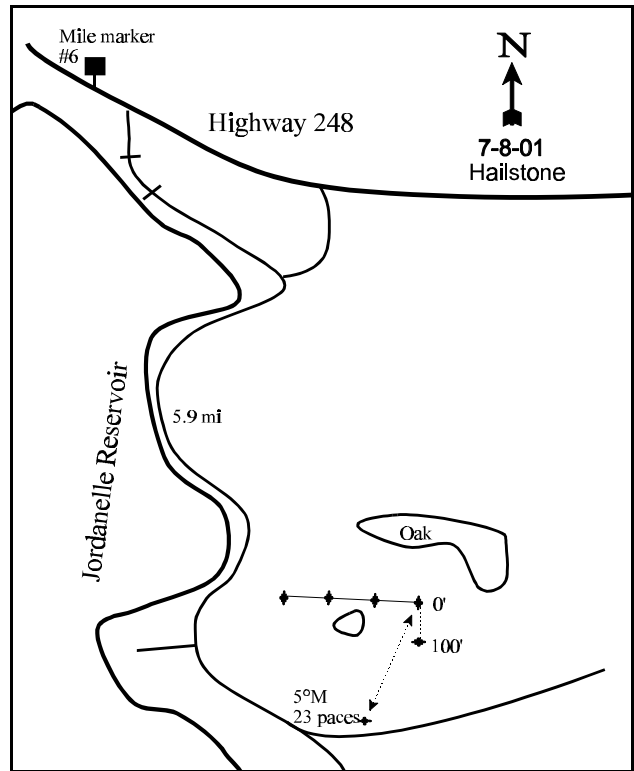
LOCATION DESCRIPTION

Just past mile marker #6 on highway 248, turn right (south) and follow the road around the east side of Jordanelle Reservoir for 5.9 miles to a fork in the road and a witness post. The fork is 0.3 miles east of the monument. From the witness post walk 23 paces at 5 degrees magnetic to the 0-foot baseline stake. Line 1 of the baseline runs 159 degrees magnetic. The rest of the baseline runs off the 0-foot baseline stake at a bearing of 248 degrees magnetic. If the gates are locked at the beginning, either obtain a key from the regional biologist, find another way around the fence or go up the road and follow the power line road which comes out above the site. It is advisable to notify a state park ranger of intentions to drive to site.



Map Name: Heber

Township 2S, Range 5E, Section 29



Diagrammatic Sketch

UTM 4495365 N 465957 E

DISCUSSION

Trend Study No. 7-8

The Hailstone trend study was originally established northeast of the old Hailstone Junction of highways 40 and 32. With the creation of Jordanelle reservoir, the trend study is now located about one-half of a mile from the east shore of the reservoir. This site was established in 1984. The study area consists of mixed mountain big sagebrush-grass with scattered clumps of Gambel oakbrush. It received relatively little deer or elk use in 1984 and 1990, but the area has become much more important after Jordanelle Reservoir was constructed. With Jordanelle completed in the early 1990's, north to south movements across the Provo River become impossible, or at least very difficult, and the winter range on the north and east side of the reservoir became more vital than was the case in 1984. The site is placed on a southwest facing ridge with a moderate slope of 15% to 18%. Elevation is about 6,200 feet. Quadrat frequency of deer pellet groups was moderate at 25% in 1996 and slightly higher at 29% in 2001. A pellet group transect read on the site in 2001 estimated 55 deer days use/acre (136 ddu/ha). A couple of elk pellet groups were also encountered. Most of the deer pellet groups appear to be recent, indicating use during the summer.

Soil type is very similar to that described for Study Number 7-7 with a slightly higher surface rock cover. Soil is classified as mountain Stoney loam. Permeability is moderate, available water capacity is low and root penetration is somewhat limited. These soils have a moderately low erosion hazard. Effective rooting depth is estimated at almost 12 inches with a slightly acidic soil reaction (6.5 pH). The soil texture is a clay loam with an organic matter content of 4.6%. There is abundant vegetation and litter cover leaving little unprotected bare soil. There is little erosion occurring and the erosion condition class was determined to be stable in 2001. Where limited erosion has occurred in the past, it now appears stable. Erosion is minimal except where roads, power line construction, and quarrying activity have occurred. These areas are subject to some active gully formation.

This study is within a mountain big sagebrush-grass opening that is characterized by a moderately dense stand of large mountain big sagebrush, with lesser amounts of mountain snowberry, antelope bitterbrush, and Gambel oak interspersed throughout. Sagebrush totally dominates the browse component on the site by providing about 90% of the browse cover. At first glance, the big sagebrush population appears highly decadent, in fact, many of the large older plants do have appreciable percentages of dead crown. Utilization, however, is uniformly light, indicating other causes for the high percent decadence. Crown die-back is most likely the result of winter injury, drought, and intraspecies competition. The population is comprised primarily of large mature plants that in the past were mostly decadent. About half of the plants sampled in 1984 and 1990 were decadent. Density was estimated at nearly 8,000 plants/acre in 1984, declining to 6,799 in 1990. A larger sample was taken in 1996, which is more representative of the area. Density was estimated at 4,560 plants/acre in 1996 and percent decadence declined to 18%. The population remained at a stable density in 2001, but percent decadence nearly doubled to 33%. In addition, 36% (547 plants/acre) of the decadent plants sampled were classified as dying. Reproduction has been good in most years but young plants accounted for only 3% of the population in 2001, down from 11% in 1996. The big sagebrush population will continue to dominant this community and will continue to suppress other shrub and herbaceous species.

Understory vegetation is sparse and consists largely of cheatgrass brome, Kentucky bluegrass, Sandberg bluegrass, and a wide variety of forbs. The most important and palatable perennial forbs consist of showy goldeneye, silky lupine, and redroot eriogonum.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable. Although there are a few long established gullies in the vicinity, these are not rapidly expanding. Sheet erosion is evident but is of small magnitude. Soil loss does not appear growth limiting. However, this area does have a shallow soil that has moderate to high erosion potential. Soil trend deserves careful monitoring. Vegetative trend also appears stable. The Gambel oakbrush areas are static in terms of the area they occupy. Oak may be growing in height and becoming even more exclusive of other vegetation. Oak clumps customarily have almost no understory and litter provides a nearly complete ground cover. In the mountain big sagebrush areas, there have been very slight but perhaps temporary improvements in understory diversity and production. Overall trend for these areas is judged stable because no significant signs of change in the dominant sagebrush population can be detected.

1990 TREND ASSESSMENT

Mountain big sagebrush has less growth and seed production, although vigor is normal compared to the wet year when the study was established. The shrubs are moderately to heavily hedged. Sagebrush density shows a slight decrease (15%). A lower percentage (46%) of decadent plants was classified in 1990, which is still high. Sagebrush cover averages almost 30%. Seedlings are abundant this year. Frequencies of the other browse species remain low but stable. Oakbrush has not increased. Oak shows moderate hedging on the available stems, more use than typically observed on oak on this type of site. The grass sum of nested frequency is extremely low and the herbaceous component is lacking. Ground cover percentages are also unchanged. There is adequate litter and aerial vegetative cover with no significant erosion.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable, but still poor condition (3)

1996 TREND ASSESSMENT

Trend for soils is stable with an excellent ratio of protective cover (vegetation and litter) to bare ground. The only negative aspect is that most of the vegetative cover is made up of sagebrush which is not as effective at preventing erosion as herbaceous cover. The key browse species is obviously sagebrush, which contributes 93% of the browse cover. The age structure is drifting again to a mostly mature population. Percent decadence has decreased from 57% in 1984, to 46% in 1990, and down to 18% in 1996. The population appears stable now, with the thinning effect of long-term drought (1987-90) and intraspecific competition. The herbaceous understory trend for perennial species is slightly improved, but still in very poor condition (composition and abundance).

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up slightly but poor (4)

2001 TREND ASSESSMENT

Trend for soil continues to be stable with abundant vegetation and litter cover to prevent most erosion. Unfortunately most of the vegetation cover comes from sagebrush which is not as effective as herbaceous cover at preventing erosion. Trend for the key browse species, mountain big sagebrush, is stable. The sagebrush population has remained stable, but percent decadence has increased from 18% to 33%. In

addition, 36% of the decadent sagebrush sampled were classified as dying (>50% crown death) which is equivalent to 547 plants/acre. Young recruitment is currently not adequate to maintain the current population. The population may thin slightly in the future, but this would be a positive change considering the density of the sagebrush stand. Trend for the herbaceous understory is up but still limited by sagebrush. Sum of nested frequency for perennial grasses increased slightly, while sum of nested frequency for perennial forbs more than doubled. Perennial grasses are still limited but nested frequency of Kentucky bluegrass increased significantly. Another positive change is the significant decline in the nested frequency of cheatgrass. Cover of cheatgrass also declined from 15% to only 2%. The dramatic increase in the sum of nested frequency for perennial forbs comes primarily from the significant increase in the nested frequency of silky lupine. Average cover of lupine also increased from less than 1% in 1996 to 6% in 2001. Wild onion, a milkvetch, and longleaf phlox also increased significantly in nested frequency. Sum of nested frequency and cover of annual forbs remained similar to 1996.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up, but still very limited (5)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 8

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	-	1	5	6	-	1	3	3	.09	.18
G	Bromus japonicus (a)	-	-	2	7	-	-	1	3	.00	.01
G	Bromus tectorum (a)	-	-	_b 342	_a 175	-	-	96	68	14.50	1.48
G	Carex spp.	-	-	-	5	-	-	-	2	.03	.38
G	Poa pratensis	_a 4	_a 10	_b 55	_c 83	1	4	15	26	2.68	3.49
G	Poa secunda	-	-	4	-	-	-	1	-	.00	-
G	Sitanion hystrix	_a -	_a 2	_b 33	_b 48	-	1	14	21	1.06	2.17
G	Stipa lettermani	-	2	3	3	-	1	1	1	.15	.03
Total for Annual Grasses		0	0	344	182	0	0	97	71	14.50	1.49
Total for Perennial Grasses		4	15	100	145	1	7	34	53	4.01	6.27
Total for Grasses		4	15	444	327	1	7	131	124	18.52	7.77
F	Achillea millefolium	-	-	1	-	-	-	1	-	.03	-
F	Alyssum alyssoides (a)	-	-	4	2	-	-	2	1	.01	.00
F	Allium spp.	_a -	_a -	_b 21	_c 59	-	-	11	25	.05	.27
F	Artemisia ludoviciana	6	-	1	2	2	-	1	1	.00	.03
F	Aster chilensis	-	-	7	8	-	-	2	3	.30	.33
F	Astragalus convallarius	5	3	4	9	2	1	2	5	.01	.36
F	Astragalus spp.	_a -	_a -	_a -	_b 12	-	-	-	5	-	.67
F	Camelina microcarpa (a)	-	-	3	2	-	-	1	1	.00	.00
F	Calochortus nuttallii	-	-	-	9	-	-	-	4	-	.02

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Chenopodium fremontii</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Cirsium undulatum</i>	10	4	8	12	6	2	5	4	.21	.53
F	<i>Collomia linearis</i> (a)	-	-	52	62	-	-	27	30	.16	.15
F	<i>Comandra pallida</i>	4	-	2	13	2	-	1	4	.04	.12
F	<i>Collinsia parviflora</i> (a)	-	-	_a 5	_b 71	-	-	3	27	.01	.45
F	<i>Cordylanthus ramosus</i> (a)	-	-	43	23	-	-	19	12	.95	.76
F	<i>Epilobium brachycarpum</i> (a)	-	-	_b 112	_a 20	-	-	51	12	.94	.11
F	<i>Erigeron</i> spp.	-	-	1	-	-	-	1	-	.00	-
F	<i>Eriogonum racemosum</i>	14	14	11	14	7	8	6	8	.11	.12
F	<i>Galium aparine</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Hedysarum boreale</i>	_b 6	_a -	_a 1	_a -	5	-	1	-	.00	-
F	<i>Holosteum umbellatum</i> (a)	-	-	_a -	_b 12	-	-	-	5	-	.05
F	<i>Lithospermum ruderales</i>	-	3	-	-	-	1	-	-	-	-
F	<i>Lomatium</i> spp.	-	-	4	7	-	-	2	4	.01	.04
F	<i>Lupinus argenteus</i>	_b 75	_a 15	_a 14	_b 113	35	7	7	46	.69	6.10
F	<i>Microsteris gracilis</i> (a)	-	-	_a 3	_b 13	-	-	1	8	.00	.04
F	<i>Phlox longifolia</i>	_a -	_a 4	_b 22	_c 37	-	2	10	16	.22	.18
F	<i>Polygonum douglasii</i> (a)	-	-	86	100	-	-	36	42	.18	.26
F	<i>Ranunculus testiculatus</i> (a)	_a -	_a -	_a -	_b 81	-	-	-	30	-	.74
F	<i>Tragopogon dubius</i>	-	-	3	1	-	-	1	1	.00	.00
F	<i>Trifolium</i> spp.	-	-	-	7	-	-	-	3	-	.04
F	<i>Verbascum thapsus</i>	6	3	2	-	3	1	1	-	.03	-
F	<i>Vicia americana</i>	-	4	-	-	-	1	-	-	-	-
F	<i>Viguiera multiflora</i>	_a 19	_b 51	_{ab} 27	_a 14	11	23	15	6	.28	.08
Total for Annual Forbs		0	0	308	390	0	0	140	170	2.28	2.59
Total for Perennial Forbs		145	101	129	317	73	46	67	135	2.01	8.93
Total for Forbs		145	101	437	707	73	46	207	305	4.30	11.53

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	0	3	-	.41
B	Artemisia tridentata vaseyana	99	93	29.54	34.81
B	Chrysothamnus viscidiflorus viscidiflorus	2	3	.03	.15
B	Mahonia repens	11	17	.87	.83
B	Opuntia spp.	1	1	.03	.15
B	Purshia tridentata	4	5	.68	1.06
B	Quercus gambelii	3	7	.06	.68
B	Symphoricarpos oreophilus	9	10	.51	.63
Total for Browse		129	139	31.73	38.73

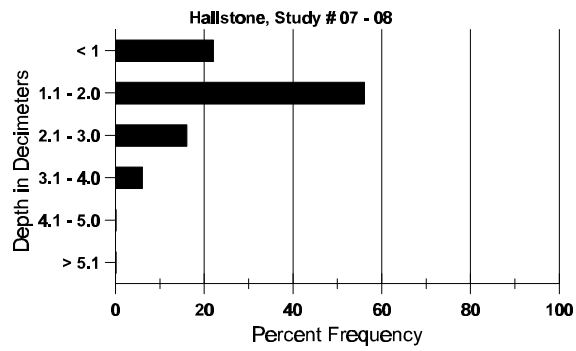
BASIC COVER --
Herd unit 07 , Study no: 8

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	376	337	1.50	5.00	47.30	55.46
Rock	209	166	11.00	5.50	3.26	3.40
Pavement	210	260	8.75	15.50	5.63	11.04
Litter	397	378	70.25	66.75	56.90	51.26
Cryptogams	9	8	0	0	.12	.12
Bare Ground	174	164	8.50	7.25	6.07	7.04

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 08, Hailstone

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.6	53.0 (13.8)	6.5	40.2	29.1	30.7	4.6	41.6	377.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 07 , Study no: 8

Type	Quadrat Frequency	
	'96	'01
Rabbit	5	2
Elk	1	-
Deer	25	29

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
01	01
-	-
17	1 (3)
713	55 (136)

BROWSE CHARACTERISTICS --

Herd unit 07 , Study no: 8

A G R E	Y 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				
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	1	-	-	-	-	1	-	-	-	20		1	
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133	19	14	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	14	0
	01	-	-	1	-	1	-	-	-	-	2	-	-	-	40	26	43	2
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	1	-	-	-	-	-	1	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-50%							
'90		00%			00%			100%										
'96		00%			00%			00%										
'01		67%			33%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	0%			
												'90	66		100%			
												'96	0		0%			
												'01	60		0%			

A Y G R E	Form Class (No. of Plants)	1				2				3				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	84	10	-	-	-	-	-	-	-	-	-	-	10	-	-	-	666		10
	90	47	-	-	-	-	-	16	-	-	-	-	63	-	-	-	4200		63
	96	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	60		3
	01	10	-	-	-	-	-	-	-	-	-	-	10	-	-	-	200		10
Y	84	23	-	-	-	-	-	-	-	-	-	23	-	-	-	1533		23	
	90	15	2	1	2	-	-	2	-	-	-	22	-	-	-	1466		22	
	96	25	-	-	-	-	-	-	-	-	-	25	-	-	-	500		25	
	01	4	3	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	84	22	7	-	-	-	-	-	-	-	-	29	-	-	-	1933	23 25	29	
	90	11	17	5	-	-	-	-	-	-	-	32	-	1	-	2200	28 35	33	
	96	131	28	-	2	-	-	-	-	-	-	161	-	-	-	3220	24 48	161	
	01	134	2	3	9	-	-	-	-	-	-	148	-	-	-	2960	26 38	148	
D	84	47	21	-	-	-	-	-	-	-	-	67	-	-	1	4533		68	
	90	12	20	12	2	1	-	-	-	-	-	30	-	1	16	3133		47	
	96	26	12	3	1	-	-	-	-	-	-	26	-	-	16	840		42	
	01	69	2	1	4	-	-	-	-	-	-	49	-	-	27	1520		76	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	820		41	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500		25	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'84		23%				00%				.83%				-15%					
'90		39%				18%				18%				-33%					
'96		18%				01%				07%				+ 1%					
'01		03%				02%				12%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	7999	Dec:	57%				
												'90	6799		46%				
												'96	4560		18%				
												'01	4620		33%				
<i>Cercocarpus montanus</i>																			
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28 16		0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'84		00%				00%				00%									
'90		00%				00%				00%									
'96		00%				00%				00%									
'01		00%				00%				00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-				
												'90	0		-				
												'96	0		-				
												'01	0		-				

A G R E	Y 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				
Chrysothamnus viscidiflorus viscidiflorus																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	1	-	-	1	-	-	2	-	-	-	133			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133	9	4	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	11	1
	01	1	-	-	2	-	-	-	-	-	3	-	-	-	60	11	12	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-33%							
'90		00%			00%			00%			-70%							
'96		00%			00%			00%			+33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	-			
												'90	133		-			
												'96	40		-			
												'01	60		-			
Mahonia repens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
	01	7	-	-	4	-	-	-	-	-	11	-	-	-	220			11
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	44	-	-	-	-	-	-	-	-	44	-	-	-	880	28	31	44
	01	136	-	-	78	-	-	56	-	-	270	-	-	-	5400	3	5	270
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%			+77%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	1280		-			
												'01	5620		-			

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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	9	-	-	-	-	-	-	-	-	9	-	-	-	600	4	5	9
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133	6	13	2
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	5	24	3
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	5	6	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+25%							
'90		00%			00%			00%			-92%							
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	600	Dec:	0%			
												'90	799		8%			
												'96	60		0%			
												'01	60		0%			

A Y G R E	Form Class (No. of Plants)	1				2				3				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4	5	6	7	8	9	1	2	3		4			
Purshia tridentata																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	1	-	-	2	-	-	2	-	1	-	200			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	2	1	-	-	-	-	-	-	4	-	-	-	266	14	18	4
	90	-	1	2	-	1	-	-	-	-	4	-	-	-	266	7	23	4
	96	-	-	2	1	-	-	-	-	-	3	-	-	-	60	22	41	3
	01	-	-	2	-	-	-	-	-	-	2	-	-	-	40	24	45	2
D	84	-	3	4	-	-	-	-	-	-	7	-	-	-	466			7
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	133			2
	96	-	-	-	-	-	1	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	3	-	-	1	3	-	-	1	80			4
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'84		42%				42%				00%				-25%				
'90		22%				44%				11%				-87%				
'96		00%				75%				00%				+33%				
'01		00%				100%				17%								
Total Plants/Acre (excluding Dead & Seedlings)												'84	798	Dec:	58%			
												'90	599		22%			
												'96	80		25%			
												'01	120		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				
Quercus gambelii																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	3	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3	
	01	6	-	-	3	-	-	3	-	-	12	-	-	-	240		12	
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66	43 25	1	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	57 19	1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	48 47	1	
	01	8	-	-	-	-	-	-	-	-	8	-	-	-	160	27 16	8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		17%			00%			00%			-33%							
'90		100%			00%			00%			-70%							
'96		00%			00%			00%			+80%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec:	-			
												'90	266		-			
												'96	80		-			
												'01	400		-			

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	84	36	-	-	-	-	-	-	-	36			36
	90	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	66			1
	90	1	-	-	2	-	-	-	-	200			3
	96	1	-	-	1	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	0			0
M	84	2	-	-	-	-	-	-	-	133	14	16	2
	90	-	-	-	1	-	-	-	-	66	5	4	1
	96	4	-	-	8	-	-	-	-	240	16	20	12
	01	3	-	-	4	-	-	1	-	160	20	31	8
D	84	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	1	-	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	0			0
	01	5	-	-	-	-	-	-	4	100			5
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'84		00%		00%		00%		+40%					
'90		00%		00%		20%		-16%					
'96		00%		00%		00%		- 7%					
'01		00%		00%		31%							
Total Plants/Acre (excluding Dead & Seedlings)										'84	199	Dec:	0%
										'90	332		20%
										'96	280		0%
										'01	260		38%

Trend Study 7-9-01

Study site name: Above Woodland.

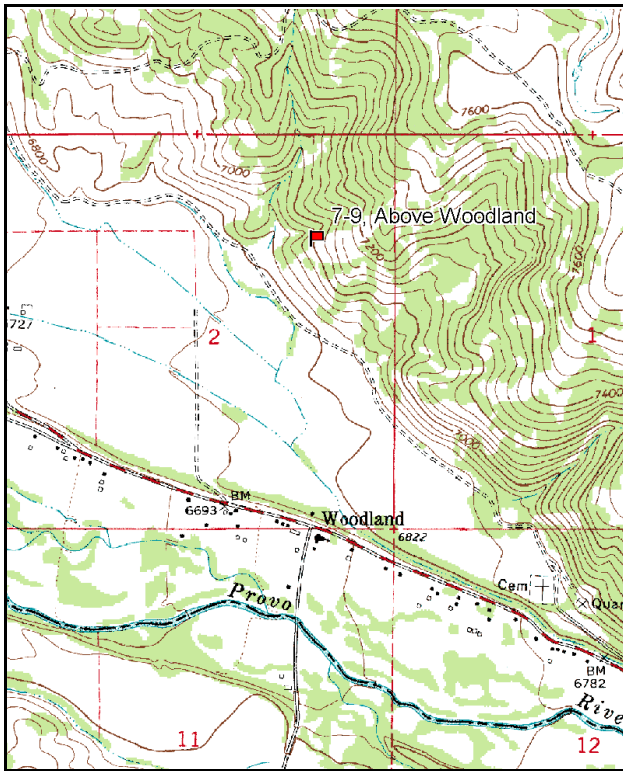
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 76 degrees magnetic.

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

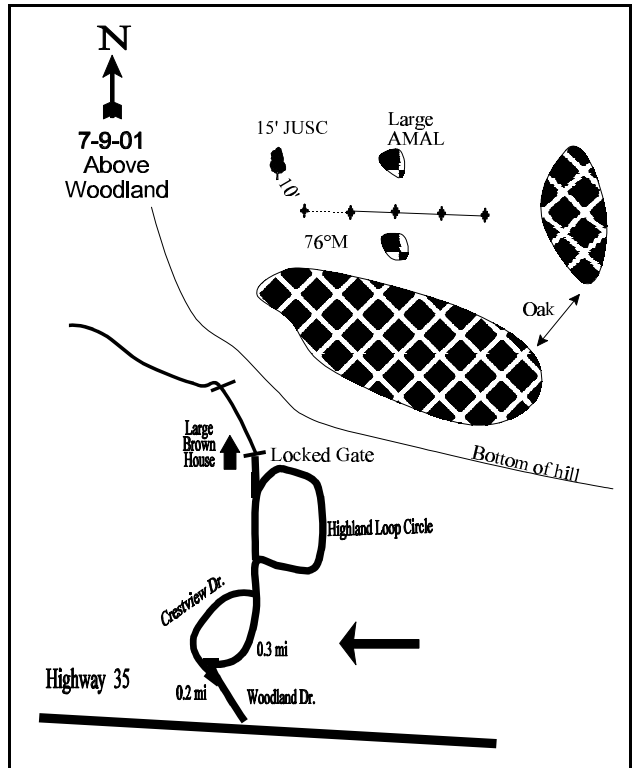
LOCATION DESCRIPTION

From the intersection of Highway 35 and Woodland Drive, west of Woodland, turn onto Woodland Drive and proceed 0.2 miles. Turn onto Crestview Drive and proceed 0.3 miles to Highland Loop Circle. Turn left and follow the circle 0.1 miles to a dirt road. Travel along the road past a large brown house to a fork after 0.15 miles to a gate. From here cross the fence and walk up the slope. Walk around the west end of a large oak clone and continue up the slope. Look for a large, lone high lined Rocky Mountain Juniper. The 0-foot baseline is ten feet from this tree. The baseline runs between a couple of large serviceberry.



Map Name: Woodland

Township 3S, Range 6E, Section 2



Diagrammatic Sketch

UTM 4493241 N 480844 E

DISCUSSION

Trend Study No. 7-9

The Above Woodland trend study was originally established in 1984 sampling a closely intermixed mountain big sagebrush/grass and Gambel oakbrush winter range located north of Woodland. Due to low big game use of the site and low numbers of mountain big sagebrush sampled, the site was moved about a quarter of a mile to the southwest. The new area supports a more dense stand of sagebrush in association with other preferred browse species including serviceberry and bitterbrush. This new site has a southwest aspect with a 25% to 30% slope at about 7,000 feet in elevation. The Provo River winter range in the Woodland area appears to be principally a "normal" deer winter range, although elk and moose pellet groups can also be found. This area is at a high enough elevation that deep snow may preclude use during severe winters. A pellet group transect read on site in 2001 estimate 16 deer and 31 elk days use/acre (40 ddu/ha and 78 edu/ha). All of the elk pellet groups appear to be from winter use while most deer pellets were from spring use.

Soil is moderately deep, but very stony. Surface rocks vary in size from pavement to large rock. Percent surface rock and pavement cover is high at 40%. Soil parent material appears to be sandstone and shale which gives the soil a reddish color. Due to the high rock content of the soil profile, effective rooting depth was estimated at only about 7 inches. The soil is obviously deeper considering the presence of deep rooted shrubs. Soil texture is a clay loam with a slightly acid soil reaction (6.2 pH). There is abundant protective ground cover which leaves little exposed bare ground. There is little soil movement occurring and the soil erosion condition class was determined as stable in 2001.

The browse composition consists primarily of mountain big sagebrush with lesser amounts of serviceberry and antelope bitterbrush. Mountain big sagebrush provides 57% of the total browse cover with a population of 2,260 plants/acre. The population is mostly mature with light use and generally good vigor. Serviceberry numbers 840 plants/acre. Utilization is moderate to heavy but vigor is good and percent decadence is low at 10%. Only a few bitterbrush plants occur on the site. They show moderate use but are vigorous. Other browse encountered include low numbers of dwarf and stickyleaf low rabbitbrush, broom snakeweed, snowberry, gray horsebrush, and high numbers of creeping barberry.

The herbaceous understory is moderately abundant but limited somewhat by competition with shrubs and poor site potential caused by the high rock content of the soil. Perennial grasses are diverse but only three species, bluebunch wheatgrass, Kentucky bluegrass, and Sandberg bluegrass are abundant. Annual grasses, Japanese brome and cheatgrass also occur but they are not very abundant. Forbs are also diverse with 24 species identified. The only moderately abundant perennial forbs consist of Louisiana sage and silvery lupine which provide 76% of the forb cover. Most other forbs occur infrequently. Little use was found on grasses or forbs.

2001 APPARENT TREND ASSESSMENT

Soil conditions appear stable with little erosion occurring due to the abundant protective ground cover. Browse populations appear stable with mostly light use and good vigor of the mountain big sagebrush. Serviceberry is more heavily used but it also displays good vigor. The herbaceous understory is diverse but only a few species are very abundant. Grasses and forbs are probably limited by competition with shrubs and a poor site potential. Soil on the site is very rocky on the surface and throughout the profile.

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 9

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
G	Agropyron spicatum	198	56	9.50
G	Agropyron trachycaulum	17	6	.54
G	Bromus carinatus	1	1	.03
G	Bromus japonicus (a)	135	52	1.26
G	Bromus tectorum (a)	48	24	.39
G	Koeleria cristata	8	4	.56
G	Poa fendleriana	28	12	.23
G	Poa pratensis	87	30	1.56
G	Poa secunda	135	41	1.94
G	Sitanion hystrix	23	8	.43
Total for Annual Grasses		183	76	1.65
Total for Perennial Grasses		497	158	14.80
Total for Grasses		680	234	16.46
F	Agoseris glauca	7	3	.01
F	Alyssum alyssoides (a)	55	28	.19
F	Allium spp.	36	18	.11
F	Arabis spp.	4	3	.06
F	Artemisia ludoviciana	40	14	1.64
F	Calochortus nuttallii	6	3	.01
F	Cirsium undulatum	8	4	.10
F	Collomia linearis (a)	44	19	.12
F	Collinsia parviflora (a)	24	8	.04
F	Cymopterus spp.	3	1	.00
F	Descurainia pinnata (a)	8	2	.01
F	Epilobium brachycarpum (a)	3	1	.01
F	Eriogonum racemosum	4	2	.06
F	Eriogonum umbellatum	4	1	.01
F	Galium aparine (a)	3	2	.03
F	Holosteum umbellatum (a)	7	3	.01
F	Lupinus argenteus	10	4	.97
F	Microsteris gracilis (a)	2	1	.00
F	Phlox longifolia	14	6	.03
F	Polygonum douglasii (a)	50	22	.18
F	Senecio integerrimus	2	1	.03

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
F	Senecio multilobatus	1	1	.03
F	Tragopogon dubius	25	12	.23
F	Viguiera multiflora	3	3	.09
Total for Annual Forbs		196	86	0.61
Total for Perennial Forbs		167	76	3.42
Total for Forbs		363	162	4.04

BROWSE TRENDS --
Herd unit 07 , Study no: 9

T y p e	Species	Strip Frequency	Average Cover %
		'01	'01
B	Amelanchier alnifolia	34	6.10
B	Artemisia tridentata vaseyana	62	15.92
B	Chrysothamnus depressus	10	.45
B	Chrysothamnus viscidiflorus viscidiflorus	5	.15
B	Gutierrezia sarothrae	20	.98
B	Mahonia repens	37	1.29
B	Opuntia spp.	9	.03
B	Purshia tridentata	1	1.78
B	Symphoricarpos oreophilus	24	1.37
B	Tetradymia canescens	1	-
Total for Browse		203	28.10

BASIC COVER --
Herd unit 07 , Study no: 9

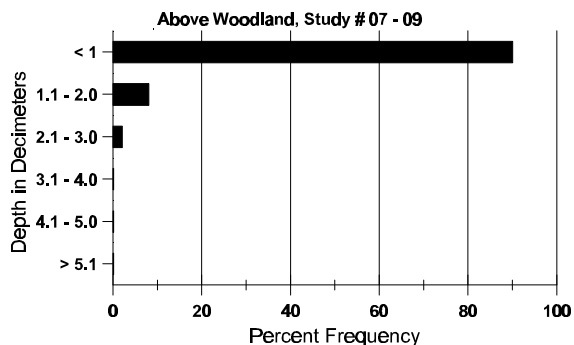
Cover Type	Nested Frequency	Average Cover %
	'01	'01
Vegetation	404	48.56
Rock	308	23.71
Pavement	315	15.28
Litter	430	36.37
Cryptogams	6	.39
Bare Ground	159	5.36

SOIL ANALYSIS DATA --

Herd Unit 07, Study no: 09, Above Woodland

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
6.6	53.0 (6.4)	6.2	36.2	35.4	28.4	3.8	27.6	214.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 07 , Study no: 9

Type	Quadrat Frequency	Pellet Transect	
		Pellet Groups per Acre	Days Use per Acre (ha)
	'01	01	01
Rabbit	12	148	N/A
Elk	15	409	31 (78)
Deer	7	208	16 (40)

BROWSE CHARACTERISTICS --

Herd unit 07 , Study no: 9

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 alnifolia																	
S	01	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1
Y	01	5	1	-	1	-	-	-	-	-	7	-	-	-	140		7
M	01	3	15	10	1	2	-	-	-	-	29	-	2	-	620	30 38	31
D	01	1	2	1	-	-	-	-	-	-	3	-	-	1	80		4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'01		48%			26%			07%									
Total Plants/Acre (excluding Dead & Seedlings)												'01	840	Dec:	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				
<i>Artemisia tridentata vaseyana</i>																		
Y	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	01	79	6	-	-	-	-	-	-	-	85	-	-	-	1700	22	34	85
D	01	23	1	-	-	-	-	-	-	-	15	-	-	9	480		24	
X	01	-	-	-	-	-	-	-	-	-	-	-	-	-	680		34	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'01		06%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'01	2260	Dec:	21%			
<i>Chrysothamnus depressus</i>																		
M	01	13	-	-	-	-	-	-	-	-	13	-	-	-	260	7	14	13
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'01	260	Dec:	-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140	13	15	7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'01	140	Dec:	-			
<i>Gutierrezia sarothrae</i>																		
Y	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	01	31	-	-	-	-	-	-	-	-	31	-	-	-	620	8	14	31
D	01	1	-	-	-	-	-	-	-	-	-	-	-	20			1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'01		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'01	700	Dec:	3%			
<i>Mahonia repens</i>																		
Y	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	01	531	-	-	-	-	-	-	-	-	531	-	-	-	10620	4	5	531
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'01	10760	Dec:	-			

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	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	01	16	-	-	-	-	-	-	-	-	16	-	-	-	320	3 8	16
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)														'01	340	Dec:	-
Purshia tridentata																	
M	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20	26 122	1
% Plants Showing '01		<u>Moderate Use</u> 100%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)														'01	20	Dec:	-
Symphoricarpos oreophilus																	
Y	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
M	01	19	-	-	1	-	-	-	-	-	20	-	-	-	400	18 29	20
D	01	4	-	-	-	-	-	-	-	-	3	-	-	1	80		4
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 04%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)														'01	500	Dec:	16%
Tetradymia canescens																	
M	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	- -	1
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)														'01	20	Dec:	-

Trend Study 7-10-01

Study site name: Elder Hollow.

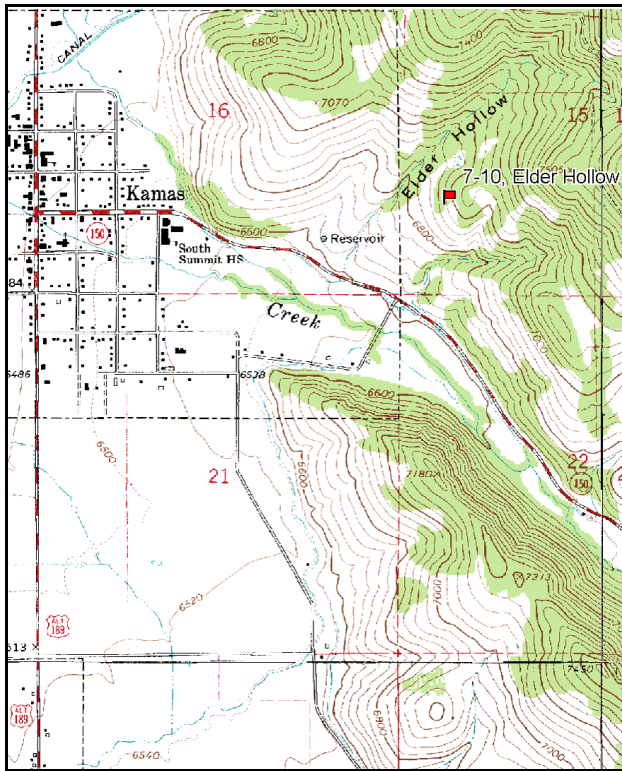
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 169 degrees magnetic.

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

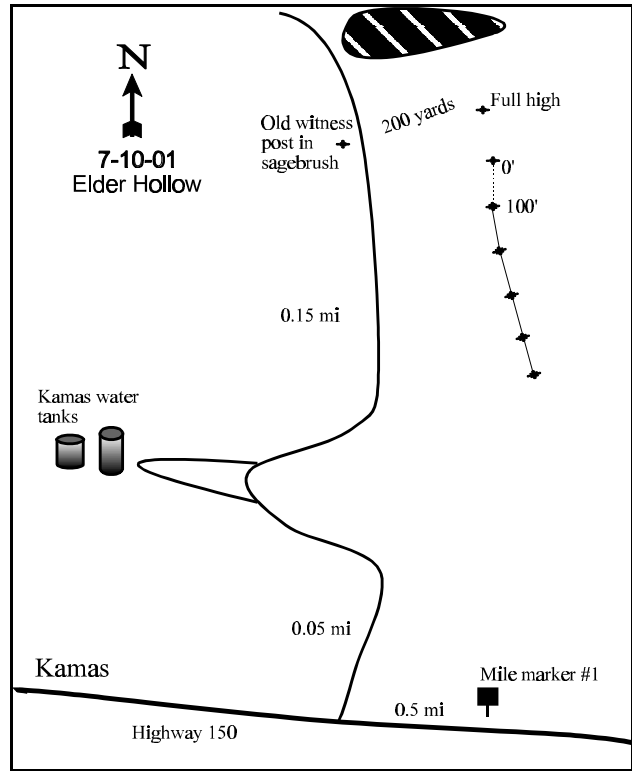
LOCATION DESCRIPTION

Westbound on Highway 150 (Mirror Lake Highway) from mile marker 1, proceed 0.05 miles to a locked gate on the right. Contact the Wildlife Biologist in the area to obtain a key. The site can also be reached by walking. Proceed through the gate, turn left, travel 0.05 miles, turn right, travel 0.05 miles, bear right, and travel 0.15 miles to green steel stake on the left. The post is in dense sagebrush 3 feet from road. From the post, walk 200 yards at 66 degrees magnetic to a witness post. The 0-foot stake is just a couple of paces south of the witness post. The baseline doglegs down through the same vegetation type. Line 1 runs 169 degrees magnetic. Line 2 runs 151 degrees magnetic. Line 3 runs 149 degrees magnetic. Lines 4 and 5 run 146 degrees magnetic.



Map Name: Kamas

Township 2S, Range 6E, Section 15



Diagrammatic Sketch

UTM 4499007 N 478156 E

DISCUSSION

Trend Study No. 7-10

The Elder Hollow trend study replaces the old Kamas Water Tank trend study established in 1984. The original Kamas Water Tank site sampled critical deer winter range located immediately east of Kamas. When this site was revisited in 1996, the land was for sale. This is a privately owned site that for many years has been intensively grazed by sheep, cattle, and horses. Knowing that this area is important as critical winter range, the study site was moved up the ridge about 200 yards so that the site could be accessible in the future. Furthermore, there was little sign that the old site was used by wildlife, whereas the new site has abundant indications of use. The range type is mountain big sagebrush/grass that also contains an interspersed and diverse population of other shrub species. Elevation of the new site is approximately 7,000 feet. It has a slope of 35-40% and an aspect to the southwest. Deer use was reportedly heavy on the old site, although few pellet groups were present in 1996. Form class analysis of the key browse species indicated only light to moderate use. Wildlife use on the new site is abundant. Pellet group quadrat frequency was 45% for deer and 27% for elk in 1996. During the 2001 reading, pellet group quadrat frequency was 39% for deer and only 3% for elk. A pellet group transect read on the site in 2001 estimated 103 deer, 8 elk, and 6 cow days use/acre (253 ddu/ha, 20 edu/ha, and 14 cud/ha). Most pellet groups appear to be from late winter and early spring use. Cows were on the site within the past few weeks.

Soil is moderately deep with an effective rooting depth of 14 inches. Texture is a sandy clay loam\loam with a neutral soil reaction (7.0 pH). Rock is common on the surface and throughout the soil profile. Protective ground cover of vegetation and litter is abundant but interspaces between shrubs show signs of localized erosion. Terracing along the slope and soil pedestalling on the uphill side of shrubs is common. The erosion condition class was determined as slight in 2001.

The site supports several preferred browse species. These include mountain big sagebrush, serviceberry, bitterbrush, and snowberry. The key species for this site is mountain big sagebrush which made up 72% of the browse cover in 1996 and 61% in 2001. Density of sagebrush was estimated at 2,540 plants/acre in 1996. Utilization was light to moderate, vigor good, and percent decadence moderate at 20%. Approximately 26% of the population consisted of dead plants which appear to have died within the past 10 years or so. Density declined slightly in 2001 to 2,140 plants/acre. Utilization continues to be moderate to heavy. Plants displaying poor vigor increased slightly and percent decadence rose from 20% to 38%. Annual leader growth was poor in 2001 averaging only 1.4 inches. Young recruitment has declined most likely due to the dry spring conditions of the past two years. Spring precipitation (April to June) in 2000 was only 55% of normal at Kamas (Utah climate summaries 2001). Precipitation from April to June was closer to normal in 2001 at 79% of normal, due to above average April precipitation. However, May precipitation was only 28% of normal and June 19% of normal. Dry spring conditions make seedling establishment very difficult.

Serviceberry is moderately abundant with a density of 840 plants/acre estimated in 2001. Mature plants are about 2 feet in height with a crown diameter of nearly 3 feet. Utilization has been moderate to heavy and vigor good. Annual leader growth of serviceberry averaged only 2.3 inches in 2001. The few scattered bitterbrush on the site are heavily browsed but in good vigor. Mature bitterbrush have a low growing, spreading growth form. Average height of mature bitterbrush was only 9 inches in 2001 with a crown diameter of 4 feet. Snowberry has a density of about 1,200 plants/acre. They display mostly light use, good vigor, and low decadence. A few increaser shrubs are found on the site but most occur in limited numbers. Broom snakeweed is abundant but small in stature and providing only 4% to 5% of the browse cover.

Understory growth is limited because of the slope and aspect of the site combined with competition from browse species, especially mountain big sagebrush. A variety of perennial grasses occur on the site but none are abundant. The only common species include Kentucky bluegrass and Sandberg bluegrass. Cheatgrass, an annual, is also moderately abundant. It accounted for 38% of the grass cover in 1996 and 51% in 2001. Forbs are also diverse but most occur only rarely. Common perennials include wavyleaf thistle, redroot eriogonum, silvery lupine, and low penstemon. Annual forbs are also common and produce similar cover as perennial forbs. Annual forbs like pale alyssum, storksbill, and bur buttercup dominate bare areas in the shrub interspaces.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable with percent bare ground low at only about 6% and a good ratio of bare ground to protective cover (vegetation and litter cover). The key browse species for the site is mountain big sagebrush which provides more than 72% of the browse cover. The population appears stable at this time. The herbaceous understory is dominated by Kentucky bluegrass (an increaser) and cheatgrass (winter annual). These two species contribute 52% of the herbaceous understory cover. There are few desirable forbs on the site. The herbaceous understory is considered stable, but in poor condition because of the composition of increasers and winter annuals.

2001 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in cover for bare ground and a decline in litter cover. Herbaceous cover also declined primarily due to a drop in cover of Kentucky bluegrass. Some erosion is occurring but it is localized and the soil erosion condition class was determined as slight. Trend for browse is stable. Mountain big sagebrush density has declined slightly (16%). Utilization continues to be moderate to heavy with good vigor on all but 29% of the decadent shrubs. Recruitment is currently poor. Serviceberry has increased in density, displays moderate to heavy use, good vigor, with no decadent plants sampled. Snowberry produces 23% of the total browse cover. It has remained stable in density, is only lightly hedged, and in good vigor. Trend for the herbaceous understory is stable. Perennial grasses and forbs are not abundant and combine to produce only 20% cover. Sum of nested frequency for perennial grasses has declined slightly while frequency of perennial forbs has increased slightly. The biggest change for perennial grasses is the significant decline in the nested frequency of Kentucky bluegrass. This is somewhat counterbalanced by a significant increase in crested wheatgrass and Sandberg bluegrass. Kentucky bluegrass is still the most abundant perennial grass. Cheatgrass, an annual, provides half of the total grass cover. It has declined significantly since 1996. Perennial forbs increased slightly in sum of nested frequency. Annual forbs increased substantially and currently produce as much cover as perennial forbs. The largest change comes from the significant increase in bur buttercup.

TREND ASSESSMENT

soil - down slightly (2)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 10

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron cristatum	16	*25	7	8	.28	.47
G	Agropyron spicatum	6	11	2	5	.03	.13
G	Bromus carinatus	10	2	6	1	.08	.01
G	Bromus tectorum (a)	303	*277	80	84	3.80	3.95
G	Carex spp.	17	17	6	6	.36	.28
G	Oryzopsis hymenoides	-	3	-	1	.00	.01
G	Poa fendleriana	4	1	3	1	.06	.00
G	Poa pratensis	125	*65	41	24	4.13	.64
G	Poa secunda	50	*74	20	29	.90	1.96
G	Sitanion hystrix	13	25	6	9	.25	.14
G	Stipa comata	-	8	-	3	-	.06
Total for Annual Grasses		303	277	80	84	3.80	3.95
Total for Perennial Grasses		241	231	91	87	6.12	3.72
Total for Grasses		544	508	171	171	9.93	7.68
F	Agoseris glauca	2	13	1	5	.00	.05
F	Alyssum alyssoides (a)	272	316	79	87	1.76	2.36
F	Arabis spp.	-	1	-	1	-	.00
F	Artemisia ludoviciana	14	26	5	9	.22	.58
F	Arabis perennans	6	-	3	-	.01	-
F	Astragalus convallarius	1	*8	1	4	.00	.21
F	Astragalus spp.	-	-	-	-	-	.00
F	Astragalus utahensis	1	-	1	-	.00	-
F	Camelina microcarpa (a)	-	6	-	4	-	.02
F	Calochortus nuttallii	6	10	3	5	.01	.02
F	Chaenactis douglasii	5	-	2	-	.03	-
F	Cirsium undulatum	35	32	16	13	.56	.91
F	Collomia linearis (a)	-	*14	-	6	-	.05
F	Comandra pallida	7	9	3	3	.06	.09
F	Collinsia parviflora (a)	8	*138	4	53	.04	.53
F	Cynoglossum officinale	-	4	-	1	-	.03
F	Draba spp. (a)	24	5	6	3	.03	.04
F	Epilobium brachycarpum (a)	10	10	5	6	.02	.03
F	Erodium cicutarium (a)	1	*38	1	15	.00	.89
F	Eriogonum racemosum	29	21	17	15	.21	.54

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	<i>Eriogonum umbellatum</i>	-	1	-	1	-	.03
F	<i>Heterotheca villosa</i>	1	5	1	2	.03	.40
F	<i>Holosteum umbellatum</i> (a)	1	*20	1	8	.00	.09
F	<i>Lactuca serriola</i>	-	1	-	1	-	.00
F	<i>Lithospermum ruderales</i>	-	-	-	-	.15	-
F	<i>Lomatium</i> spp.	-	1	-	1	-	.00
F	<i>Lupinus argenteus</i>	13	*45	6	20	.75	2.53
F	<i>Microsteris gracilis</i> (a)	-	*29	-	13	-	.06
F	<i>Oenothera pallida</i>	3	7	1	3	.00	.06
F	<i>Penstemon humilis</i>	42	29	18	12	.87	.48
F	<i>Penstemon</i> spp.	2	4	1	1	.00	.03
F	<i>Phlox longifolia</i>	-	3	-	2	-	.01
F	<i>Polygonum douglasii</i> (a)	8	-	3	-	.01	-
F	<i>Ranunculus testiculatus</i> (a)	60	*211	20	58	.20	2.04
F	<i>Taraxacum officinale</i>	-	5	-	2	-	.01
F	<i>Tragopogon dubius</i>	14	7	6	3	.08	.06
F	<i>Viguiera multiflora</i>	20	*6	8	3	.16	.06
F	<i>Zigadenus paniculatus</i>	3	7	1	3	.01	.10
Total for Annual Forbs		384	787	119	253	2.08	6.15
Total for Perennial Forbs		204	245	94	110	3.21	6.26
Total for Forbs		588	1032	213	363	5.30	12.41

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 10

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Amelanchier alnifolia</i>	20	31	1.53	1.84
B	<i>Artemisia tridentata vaseyana</i>	74	73	21.76	18.50
B	<i>Chrysothamnus depressus</i>	3	3	-	-
B	<i>Chrysothamnus nauseosus albicaulis</i>	0	2	-	.03
B	<i>Chrysothamnus nauseosus consimilis</i>	1	1	-	.03
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	5	10	.53	.19
B	<i>Eriogonum heracleoides</i>	1	1	-	.00
B	<i>Gutierrezia sarothrae</i>	38	42	1.24	1.41
B	<i>Mahonia repens</i>	4	2	-	-
B	<i>Opuntia spp.</i>	17	13	.54	.16
B	<i>Prunus virginiana</i>	1	0	-	-
B	<i>Purshia tridentata</i>	4	3	.56	.53
B	<i>Symphoricarpos oreophilus</i>	38	46	3.80	6.99
B	<i>Tetradymia canescens</i>	14	14	.21	.46
Total for Browse		220	241	30.20	30.17

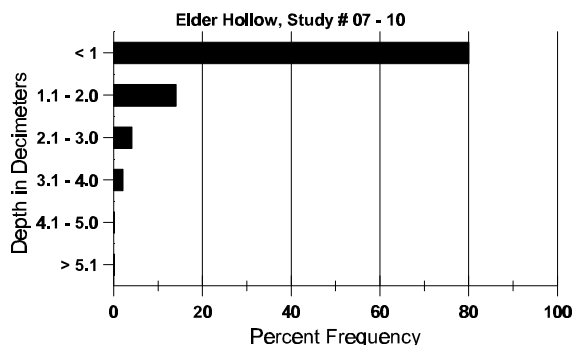
BASIC COVER --
Herd unit 07 , Study no: 10

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	461	445	41.93	46.54
Rock	330	295	22.34	19.41
Pavement	255	281	4.72	4.82
Litter	487	459	43.82	38.67
Cryptogams	54	27	.26	.32
Bare Ground	221	260	6.30	13.25

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 10, Elder Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.1	38.4 (13.2)	7.0	48.2	27.1	24.7	3.7	16.6	198.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 10

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	1	4	104	N/A
Elk	27	3	104	8 (20)
Deer	45	39	1331	102 (253)
Cattle	-	-	70	6 (14)

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 10

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 alnifolia																		
Y	96	-	-	1	-	-	1	-	-	-	2	-	-	-	40		2	
	01	2	-	-	-	-	-	1	-	-	3	-	-	-	60		3	
M	96	-	5	9	3	4	3	-	-	-	24	-	-	-	480	22	29	24
	01	2	5	11	3	14	3	1	-	-	38	-	1	-	780	23	30	39
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'96		35%			54%			00%				+38%						
'01		45%			33%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	520	Dec:	-			
												'01	840		-			

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>																		
Y	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	17	52	25	-	-	-	-	-	-	94	-	-	-	1880	20	44	
	01	25	32	3	2	1	1	-	-	-	64	-	-	-	1280	22	39	
D	96	4	11	9	-	-	1	-	-	-	21	-	-	4	500		25	
	01	6	21	13	-	-	1	-	-	-	29	-	1	11	820		41	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	880		44	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	560		28	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		50%			28%			03%			-16%							
'01		50%			17%			11%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	2540	Dec:	20%			
												'01	2140		38%			
<i>Chrysothamnus depressus</i>																		
M	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	7	17	
	01	3	2	-	-	-	-	-	-	-	5	-	-	-	100	5	16	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+ 0%							
'01		40%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	100	Dec:	-			
												'01	100		-			
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	50	53	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	40		-			
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
												'01	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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	11	19	
	01	7	3	3	4	-	-	-	-	-	17	-	-	-	340	8	75	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+53%							
'01		18%			18%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	160	Dec:	-			
												'01	340		-			
<i>Eriogonum heracleoides</i>																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	8	15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
												'01	20		-			
<i>Gutierrezia sarothrae</i>																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	96	35	-	-	-	-	-	-	-	-	35	-	-	-	700		35	
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	96	170	-	-	-	-	-	-	-	-	170	-	-	-	3400	8	12	
	01	149	-	-	-	-	-	-	-	-	149	-	-	-	2980	7	8	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-24%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	4100	Dec:	-			
												'01	3100		-			
<i>Mahonia repens</i>																		
M	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	4	4	
	01	5	-	-	4	-	-	-	-	-	9	-	-	-	180	2	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+44%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	100	Dec:	-			
												'01	180		-			

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	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	96	24	-	-	2	-	-	-	-	-	25	-	1	-	520	4	12	26
	01	12	-	-	2	-	-	-	-	-	14	-	-	-	280	4	8	14
D	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			07%			-39%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	560	Dec:	4%			
												'01	340		0%			
Prunus virginiana																		
M	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
												'01	0		-			
Purshia tridentata																		
M	96	-	-	4	-	-	-	-	-	-	4	-	-	-	80	10	51	4
	01	-	1	2	-	-	-	-	-	-	3	-	-	-	60	9	50	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			100%			00%			-25%							
'01		33%			67%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	80	Dec:	-			
												'01	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				
Symphoricarpos oreophilus																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	96	10	1	-	-	-	-	-	-	-	11	-	-	-	220		11	
	01	6	-	-	1	-	-	-	-	-	7	-	-	-	140		7	
M	96	27	5	-	19	-	-	-	-	-	51	-	-	-	1020	21	30	51
	01	31	4	1	10	-	-	6	-	-	51	1	-	-	1040	22	33	52
D	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		10%			00%			02%			- 5%							
'01		07%			02%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1260	Dec:	2%			
												'01	1200		2%			
Tetradymia canescens																		
Y	96	5	-	-	1	-	-	-	-	-	6	-	-	-	120		6	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	16	-	-	-	-	-	-	-	-	16	-	-	-	320	8	18	16
	01	15	3	-	1	-	-	1	-	-	20	-	-	-	400	9	14	20
D	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			04%			- 8%							
'01		14%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	480	Dec:	8%			
												'01	440		5%			

SUMMARY

HERD UNIT 7 - KAMAS

Nine trend studies occur in Wildlife Management 7. These studies were established in 1984 and reread in 1990, 1996 and 2001. In 1996, the Kamas Water Tanks trend study was moved and renamed Elder Hollow (7-10). In 2001, Stevens Hollow (7-1) was discontinued and the trend study, Above Woodland (7-9), was moved to a nearby more suitable location. Due to the change, the Above Woodland trend study is treated like a new site with only baseline data available. All trend studies sample big game winter ranges, however 5 trend studies are above 7,000 feet making them available only during normal winters.

Averages soil trends for the 7 trend studies read in 2001 is 2.4 or slightly down. Three trend studies displayed stable soil trends but Pinyon Canyon (7-2), Above Samak (7-4), Provo River Canyon (7-7), and Elder Hollow had slightly down soil trends. The main factor in these declining trends was an increase in percent cover of bare ground and a general decline in litter cover. Percent cover of bare ground declined an average of 56% between 1996 and 2001(10% to 22%). Average litter cover declined from 47% in 1996 to 39% in 2001. Herbaceous cover also declined on some sites. The main cause of these trends is drought. Precipitation data from Kamas indicate below normal annual precipitation in 1999, 2000, and 2001. Spring precipitation (April-June) has been especially poor for the past 2 years. Spring precipitation is critical for herbaceous plants and shrub recruitment. In 2000, spring precipitation, April through June, was only 55% of normal. April and June precipitation was exceptionally poor at only 44% and 17% of normal respectively. In 2001, spring precipitation was 79% of normal but May and June were very dry. April precipitation was above normal but May precipitation was only 28% of normal and June 19% of normal (Utah climate summaries 2001).

Trend studies were originally established in 1984 during the middle of an extended wetter than normal period. Conditions were dry during the 1990 reading and wet for the 1996 reading of these trend studies. Annual precipitation was above normal from 1982 to 1986. Drier than normal to normal conditions prevailed from 1987 to 1992. Precipitation in 1995, 1996, and 1998 were above normal.

Average browse trends are 2.9 or nearly stable. All sites had a stable browse trend except for Provo River Canyon which had a slightly down browse trend. This site has a very dense sagebrush population which is showing the effects of drought conditions combined with intense interspecific competition. The average herbaceous trend is 3.7 or slightly up. Many sites showed an increase in perennial grass and forb sum of nested frequency.

A summary table of trends follows.

TREND SUMMARY

Location	Category	1984	1990	1996	2001
7-1 Steven's Hollow	soil	est	3	4	susp
	browse	est	1	1	susp
	herbaceous understory	est	3	3	susp
7-2 Pinyon Canyon	soil	est	3	4	2
	browse	est	2	4	3
	herbaceous understory	est	4	4	3
7-3 Foothill Drive	soil	est	3	4	3
	browse	est	5	3	3
	herbaceous understory	est	3	3	3
7-4 Above Samak	soil	est	3	4	2
	browse	est	2	3	3
	herbaceous understory	est	3	4	3
7-6 Cedar Hollow	soil	est	3	3	3
	browse	est	3	3	3
	herbaceous understory	est	3	3	4
7-7 Provo River Canyon	soil	est	3	3	2
	browse	est	2	4	2
	herbaceous understory	est	3	2	5
7-8 Hailstone	soil	est	3	3	3
	browse	est	3	3	3
	herbaceous understory	est	3	4	5
7-9 Above Woodland	soil				est
	browse				est
	herbaceous understory				est
7-10 Elder Hollow	soil			est	2
	browse			est	3
	herbaceous understory			est	3

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established, susp = suspended, NR = not read

SPECIAL STUDIES - 2001

Special studies are established statewide where Division of Wildlife Resources biologists and other public land managers need additional information to make resource management recommendations. They include regular range trend studies, as well as monitoring vegetation composition and the associated changes that occur on high priority, habitat improvement projects.

Special studies were monitored in 4 of the state's 5 regions during the summer of 2001. These studies are listed below:

Northern Region

- < Deseret Land and Livestock - Main Gate (4R-1)
- < Deseret Land and Livestock - Burn (4R-2)

Northeastern Region

- < Buckhorn Canyon (9R-2)
- < Rabbit Gulch (17R-4)

Southern Region

- < Tushar Mountain Goat transects (22R-1 and 22R-2)
- < Sage Hen Hollow (28R-7)

Southeastern Region

- < Hay Canyon Burn (10R-31)
- < Cathedral Butte (14R-1)
- < Jerry Hines CRP (14R-2)
- < Gordon Creek Burn (16R-10)
- < Emma Park Harrow - Grazed (17R-7)
- < Emma Park Harrow - Ungrazed (17R-8)
- < Emma Park Meadow (17R-9)

Maps, data tables, and a narrative are included for each study.

Special Studies - Northern Region

Trend Study 4R-1-01

Study site name: Deseret Main Gate.

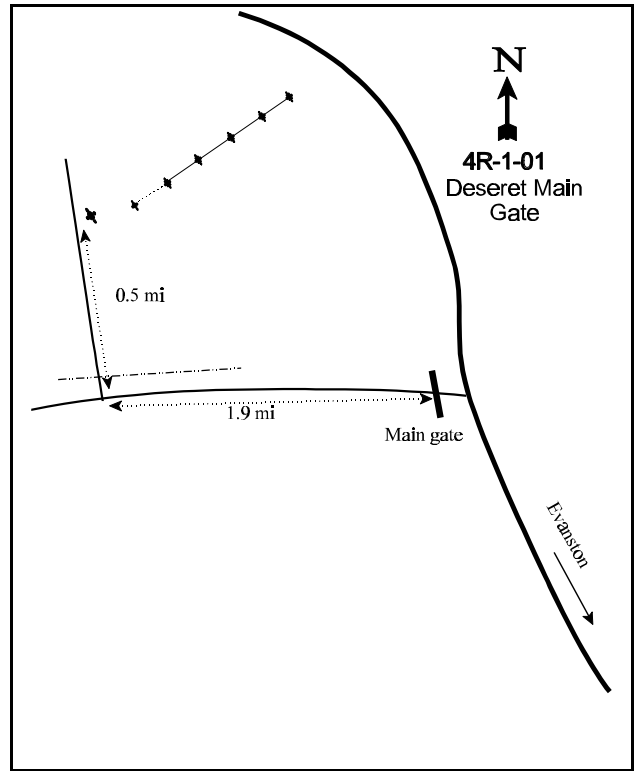
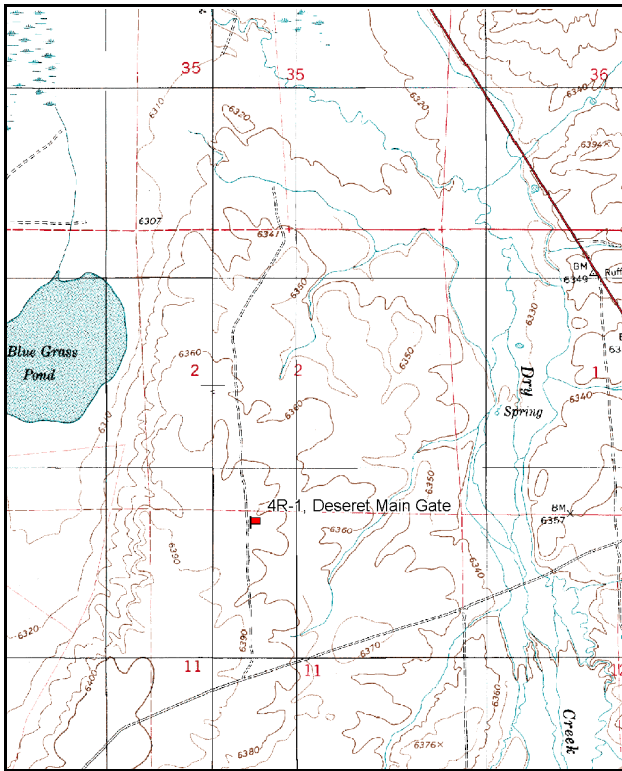
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 12 degrees magnetic.

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

LOCATION DESCRIPTION

From the Deseret Land & Livestock main gate on highway 16 between Evanston and Woodruff, proceed west towards the Deseret ranch house 1.9 miles. Turn right and go 0.5 miles north to a witness post on the east side of the road. The 0-foot stake is 9 paces at 48 degrees magnetic.



Map Name: Neponset Reservoir NE

Diagrammatic Sketch

Township 8N, Range 6E, Section 11

UTM 4588675 N 489762 E

DISCUSSION

Trend Study No. 4R-1

The Deseret Land and Livestock - Main Gate study is located near the ranch's east entrance off of Highway 16. The study was initially established in 1997, and reread in 2001. The study site is basically on flat terrain at an elevation of 6,400 feet. This area is used by elk, mule deer, pronghorn antelope, cattle, and sage grouse. A pellet group transect read along the vegetation baseline in 2001 estimated 19 elk days use/acre (48 edu/ha), 9 deer/pronghorn days use/acre (23/ha), and 53 cow days use/acre (131 cdu/ha). Two sage grouse pellet groups were sampled in the transect as well.

Soils have a loam texture and slightly acidic soil reaction (6.3 pH). Estimated effective rooting depth is over 14 inches. There is little rock or pavement on the soil surface or within the profile. Vegetation cover comes primarily from crested wheatgrass and Wyoming big sagebrush. Bare ground is fairly abundant at over 30% in 1997 and 2001, with most of this occurring in the interspaces between crested wheatgrass and/or sagebrush plants. Cryptogamic crusts are abundant and contribute to about 10% average cover. Erosion is minimal due to the gentle slope. Moderate pedestaling around sagebrush stems and crested wheatgrass clumps provide some evidence of past erosion. In 2001, an erosion condition class assessment showed soils to be stable.

The key browse species is Wyoming big sagebrush, which had an estimated density of 5,280 plants/acre in 1997. Density slightly increased to 5,780 plants/acre in 2001. Use on sagebrush was moderate to heavy in 1997, with use decreasing to a mostly light to moderate level in 2001. The proportion of the population classified as decadent is higher at 43% in 2001, an increase from 27% in 1997. Decadent plants classified as dying also increased from 520 plants/acre in 1997 to 660 plants/acre in 2001. Vigor is normal in the majority of the population with poor vigor being displayed on about 10% of the population in both sampling years. Recruitment from young plants is low. In 1997 and 2001, the average number of young sagebrush plants was 3 times less than the number of dead in the population. Annual leader growth was very low in 2001, averaging less than 1 inch.

Crested wheatgrass is the dominate understory species, contributing over 18% average cover in 2001. Some utilization was noted on crested wheatgrass in 2001. Only two other grasses were sampled on the site, Sandberg bluegrass and Indian ricegrass. Both species occur infrequently. Forbs are sparse, providing less than 1% average cover in both 1997 and 2001.

2001 TREND ASSESSMENT

Trend for soil is stable. Although bare ground is moderately high at 32%, cover from crested wheatgrass, litter, and cryptogams is well distributed and adequate to hold soils in place. Due to the nearly level terrain, erosion is minimal. Trend for browse is stable. The Wyoming big sagebrush population increased in percent decadency, but use decreased to a more moderate level and the proportion of plants displaying poor vigor remains about the same. The number of decadent plants classified as dying (660 plants/acre) is currently higher than the number of young in the population. This factor should be monitored closely for a possible decline in density in the future. Trend for the herbaceous understory is stable. Crested wheatgrass remains dominant with a slight increase in nested frequency. All other species are infrequent and unimportant on the site.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 4R, Study no: 1

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'01	'97	'01	'97	'01
G	Agropyron cristatum	373	403	99	98	11.72	18.31
G	Oryzopsis hymenoides	-	3	-	1	-	.03
G	Poa secunda	6	*27	2	13	.03	.26
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		379	433	101	112	11.75	18.60
Total for Grasses		379	433	101	112	11.75	18.60
F	Alyssum alyssoides (a)	-	5	-	2	-	.03
F	Astragalus convallarius	-	11	-	3	-	.07
F	Descurainia pinnata (a)	-	1	-	1	-	.00
F	Phlox hoodii	10	22	5	9	.05	.14
F	Phlox longifolia	10	*-	6	-	.10	-
F	Trifolium spp.	-	2	-	1	-	.00
Total for Annual Forbs		0	6	0	3	0	0.03
Total for Perennial Forbs		20	35	11	13	0.15	0.22
Total for Forbs		20	41	11	16	0.15	0.26

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 4R, Study no: 1

T y p e	Species	Strip Frequency		Average Cover %	
		'97	'01	'97	'01
B	Artemisia tridentata wyomingensis	90	95	11.57	11.61
B	Atriplex gardneri falcata	3	9	.06	.31
B	Ceratoides lanata	0	2	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	60	46	1.27	.57
Total for Browse		153	152	12.91	12.50

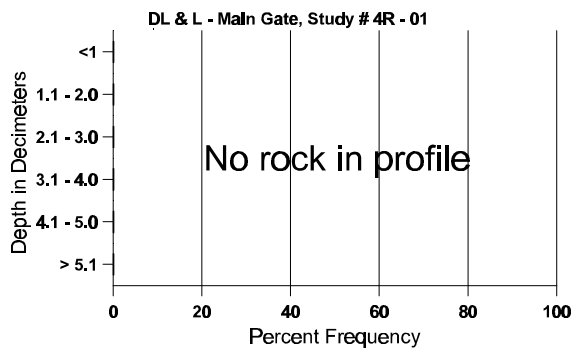
BASIC COVER --
Herd unit 4R, Study no: 1

Cover Type	Nested Frequency		Average Cover %	
	'97	'01	'97	'01
Vegetation	386	410	21.86	28.14
Rock	109	27	.64	.08
Pavement	326	229	5.08	1.01
Litter	492	477	22.24	47.11
Cryptogams	279	240	9.64	10.44
Bare Ground	398	355	33.04	32.00

SOIL ANALYSIS DATA --
Herd Unit 4R, Study no: 01, Deseret Main Gate

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.6	69.6 (13.9)	6.3	48.0	28.1	23.9	1.5	22.1	185.6	0.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 4R, Study no: 1

Type	Quadrat Frequency		Pellet Transect			
	'97	'01	Pellet Groups per Acre		Days Use per Acre (ha)	
			'97	'01	'97	'01
Rabbit	1	2	9	35	N/A	N/A
Grouse	1	-	35	17	N/A	N/A
Elk	24	5	487	252	38 (93)	19 (48)
Deer	22	8	557	122	43 (106)	9 (23)
Cattle	9	15	452	635	38 (93)	53 (131)

BROWSE CHARACTERISTICS --

Herd unit 4R, Study no: 1

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	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	97	5	4	2	-	-	-	-	-	-	11	-	-	-	220		11	
	01	24	-	-	-	-	-	-	-	-	24	-	-	-	480		24	
M	97	-	7	18	19	86	53	-	-	-	183	-	-	-	3660	14	22	183
	01	91	38	13	-	-	-	-	-	-	142	-	-	-	2840	12	20	142
D	97	-	3	9	2	28	28	-	-	-	44	-	-	26	1400		70	
	01	55	47	15	6	-	-	-	-	-	90	-	-	33	2460		123	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	980		49	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1140		57	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		48%			42%			10%			+ 9%							
'01		29%			10%			11%										
Total Plants/Acre (excluding Dead & Seedlings)											'97	5280	Dec:	27%				
											'01	5780		43%				
<i>Atriplex gardneri falcata</i>																		
Y	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	16	-	-	-	-	-	-	-	-	16	-	-	-	320		16	
M	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220	4	5	11
	01	33	-	-	-	-	-	-	-	-	33	-	-	-	660	3	4	33
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			+73%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'97	260	Dec:	-				
											'01	980		-				
<i>Ceratoides lanata</i>																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'97	0	Dec:	-				
											'01	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			
Chrysothamnus viscidiflorus viscidiflorus																	
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	9	-	-	-	-	-	-	-	-	-	-	-	180		9	
M	97	124	-	-	12	-	-	-	-	-	-	-	-	2720	6	8	136
	01	70	-	-	-	-	-	-	-	-	-	-	-	1400	4	6	70
D	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	12	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'97		00%			00%			00%			-33%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'97	2720	Dec:	0%		
												'01	1820		13%		

Trend Study 4R-2-01

Study site name: Deseret Burn.

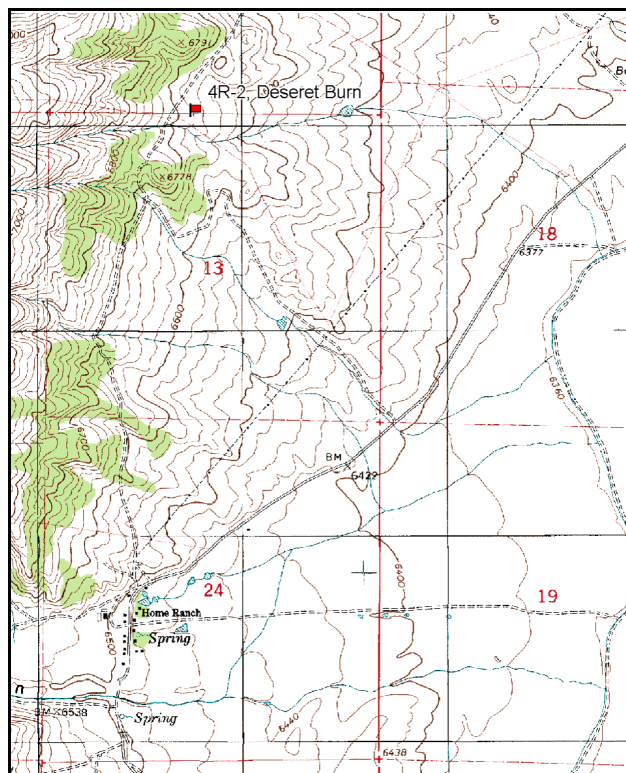
Vegetation type: Burned and Seeded.

Compass bearing: frequency baseline 320 degrees magnetic.

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

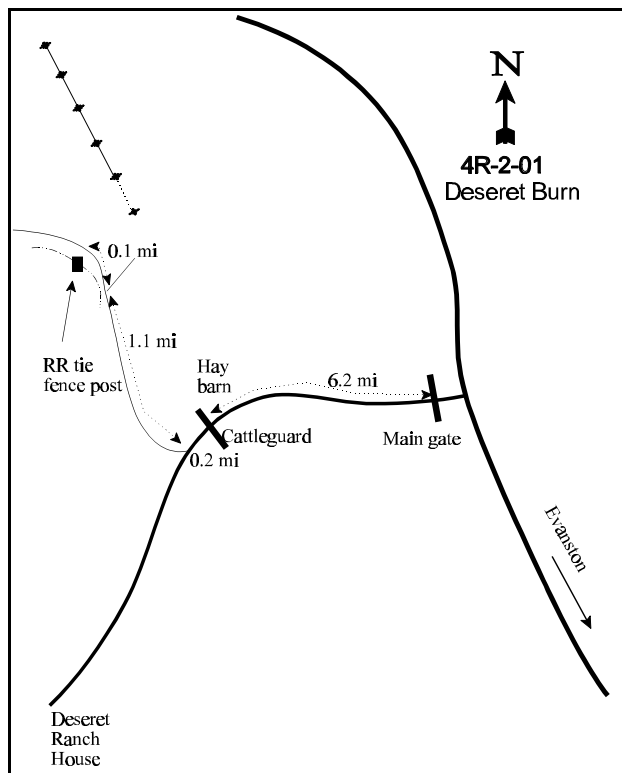
LOCATION DESCRIPTION

From the Deseret Land & Livestock main gate on highway 16 between Evanston and Woodruff, proceed west towards the Deseret ranch house 6.2 miles to a cattleguard. Continue 0.2 miles and turn right onto a two track. Follow the two track for 1.2 miles staying left. The 0-foot stake is 16 paces at 54 degrees magnetic from a rail road tie in the fence line. The baseline runs at 320 degrees magnetic.



Map Name: Neponset Reservoir NW

Township 8N, Range 6E, Section 13



Diagrammatic Sketch

UTM 45870412N 481752 E

DISCUSSION

Trend Study No. 4R-2

The Deseret Land and Livestock - Burn study is located approximately 1½ miles north of the ranch house at an elevation of 6,700 feet. Slope is variable up to 12%, and aspect is to the east. The study area burned in 1996, and was aerially seeded and chained afterwards. Shrubs were seeded either by a dribbler or planted from root stock. The study was established to monitor vegetation recovery following treatment. There was very little wildlife use on this site when it was established in 1997. Elk, deer, and cattle sign were present when the study was read in 2001. A pellet group transect read along the vegetation baseline in 2001 estimated 36 elk days use/acre (88 edu/ha), 4 deer days use/acre (10 ddu/ha), and 33 cow days use/acre (82 cdu/ha).

Soils are sandy clay loam in texture with a neutral soil reaction (6.7 pH). Effective rooting depth was estimated at just over 12 inches. The majority of the rock in the profile occurs 4 to 8 inches below the surface. Vegetation and litter cover were both very low in 1997, the first growing season following the seeding. Conversely, bare ground was high at over 50%. In 2001, the vegetative community has greatly increased resulting in much better protective ground cover. Vegetation and litter cover both increased, while bare ground decreased to 23%. An erosion condition class assessment done in 2001 determined soils to be stable.

Very little browse is currently present on the site even though there was a concerted effort to establish them by seeding and planting bare-root stock, browse still remains limited. Wyoming big sagebrush, fourwing saltbush, and low rabbitbrush were sampled in 2001. Wyoming big sagebrush density is estimated at 60 plants/acre. Fourwing saltbush was estimated at 360 plants/acre in 1997, but only 100 plants/acre in 2001. Apparently, some of the young plants sampled in 1997 did not establish and persist. Recruitment from young plants is low at only 20 plants/acre in 2001. Low rabbitbrush density was estimated at 1,600 plants/acre in 2001. This species appears to have a stable population with mostly mature and decadent plants, although there are few young in the population.

The herbaceous understory is dominated by grasses. The most abundant perennial species include Sandberg bluegrass, crested wheatgrass, intermediate wheatgrass, and western wheatgrass. Desirable, but less abundant species include needle-and-thread, a *Carex*, and bluebunch wheatgrass. Sum of nested frequency for all perennial grasses increased by 27% in 2001. Cheatgrass was the most abundant individual species after significantly increasing in nested frequency in 2001. Further increases in cheatgrass will hopefully be curtailed by the diversity and competition of perennial grasses on the site. Forbs are not particularly abundant on the site, especially in 2001. Seeded perennial forbs such as alfalfa and small burnet are rare. With the exception of pale alyssum, annual forbs are infrequent as well.

2001 TREND ASSESSMENT

Trend for soil is up. Protective cover from vegetation and litter have increased, and bare ground has decreased. As a result, the ratio of bare ground to protective cover (vegetation, litter, and cryptogams) improved in 2001. Trend for browse is slightly down. Fourwing saltbush density decreased and use increased. Most of the young plants sampled in 1997 apparently did not persist. Wyoming big sagebrush has an estimated density of 60 plants/acre, but recruitment is low. Trend for the herbaceous understory is stable. The loss in frequency of perennial forbs was balanced by the increase in frequency of perennial grasses. A negative aspect was the increase in cheatgrass.

TREND ASSESSMENT

soil - up (5)

browse - slightly down (2)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 4R, Study no: 2

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'01	'97	'01	'97	'01
G	Agropyron cristatum	153	148	56	54	3.52	5.30
G	Agropyron intermedium	93	*160	40	54	1.70	4.90
G	Agropyron smithii	47	*95	14	31	1.10	2.47
G	Agropyron spicatum	30	*1	9	1	.51	.00
G	Bromus japonicus (a)	-	2	-	1	-	.00
G	Bromus tectorum (a)	56	*295	20	79	.65	6.25
G	Carex spp.	22	25	7	6	.72	.51
G	Elymus cinereus	-	1	-	1	-	.03
G	Oryzopsis hymenoides	3	-	2	-	.15	-
G	Poa fendleriana	6	-	2	-	.18	-
G	Poa secunda	144	175	52	59	2.12	4.11
G	Sitanion hystrix	-	1	-	1	.00	.00
G	Stipa comata	7	*34	2	15	.06	.31
Total for Annual Grasses		56	297	20	80	0.64	6.25
Total for Perennial Grasses		505	640	184	222	10.09	17.67
Total for Grasses		561	937	204	302	10.74	23.93
F	Agoseris glauca	-	1	-	1	-	.00
F	Alyssum alyssoides (a)	-	*292	-	76	-	1.38
F	Allium spp.	32	*-	17	-	.11	-
F	Arabis spp.	3	-	1	-	.00	-
F	Astragalus spp.	2	3	1	3	.03	.01
F	Balsamorhiza sagittata	2	1	1	1	.06	.33
F	Chenopodium spp. (a)	-	-	-	-	.41	-
F	Crepis acuminata	-	2	-	1	-	.03
F	Cymopterus spp.	-	1	-	1	-	.00
F	Erigeron spp.	14	-	4	-	.24	-
F	Gayophytum ramosissimum (a)	76	*-	30	-	1.69	-
F	Gilia spp. (a)	18	27	8	9	.26	.07
F	Lappula occidentalis (a)	14	*72	9	27	.26	.18
F	Lactuca serriola	-	-	-	-	.06	-

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'01	'97	'01	'97	'01
F	Linum lewisii	13	*-	6	-	.09	-
F	Medicago sativa	12	17	4	7	.24	.63
F	Phlox longifolia	54	*35	22	12	.21	.08
F	Sanguisorba minor	65	*4	30	2	1.84	.01
F	Sphaeralcea coccinea	2	3	1	1	.03	.15
F	Tragopogon dubius	-	4	-	2	-	.03
F	Unknown forb-perennial	3	4	1	2	.03	.31
Total for Annual Forbs		108	391	47	112	2.63	1.64
Total for Perennial Forbs		202	75	88	33	2.97	1.61
Total for Forbs		310	466	135	145	5.60	3.25

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 4R, Study no: 2

T y p e	Species	Strip Frequency		Average Cover %	
		'97	'01	'97	'01
B	Artemisia tridentata wyomingensis	0	3	-	.03
B	Atriplex canescens	14	5	.04	.00
B	Chrysothamnus viscidiflorus viscidiflorus	33	35	.83	1.58
B	Eriogonum microthecum	0	1	-	-
B	Opuntia spp.	2	3	-	.00
Total for Browse		49	47	0.87	1.62

BASIC COVER --

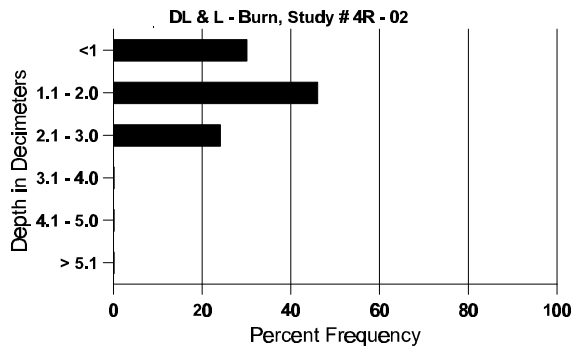
Herd unit 4R, Study no: 2

Cover Type	Nested Frequency		Average Cover %	
	'97	'01	'97	'01
Vegetation	342	465	16.43	38.72
Rock	255	98	3.81	1.23
Pavement	375	262	10.35	2.20
Litter	462	481	5.63	55.69
Cryptogams	27	18	.48	.30
Bare Ground	473	291	51.37	23.37

SOIL ANALYSIS DATA --
 Herd Unit 4R, Study no: 02, Deseret Burn

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.4	74.8 (12.4)	6.7	49.6	19.5	30.9	2.7	27.7	249.6	0.8

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 4R, Study no: 2

Type	Quadrat Frequency	
	'97	'01
Rabbit	-	5
Elk	-	14
Deer	-	5
Cattle	-	13

Pellet Transect			
Pellet Groups per Acre		Days Use per Acre (ha)	
'97	'01	'97	'01
-	-	-	-
9	461	1 (2)	36 (88)
-	52	-	4 (10)
-	400	-	33 (82)

BROWSE CHARACTERISTICS --

Herd unit 4R, 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				
Artemisia tridentata wyomingensis																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	8	9	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	180		9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'01	60		-			
Atriplex canescens																		
S	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180	23	23	
	01	2	2	-	-	-	-	-	-	-	4	-	-	-	80	19	18	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			-72%							
'01		60%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	360	Dec:	-			
												'01	100		-			
Chrysothamnus viscidiflorus viscidiflorus																		
Y	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	97	72	-	-	-	-	-	-	-	-	72	-	-	-	1440	12	17	
	01	58	-	-	-	-	-	-	-	-	58	-	-	-	1160	10	18	
D	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	01	20	-	-	-	-	-	-	-	-	18	-	-	2	400		20	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			01%			+ 8%							
'01		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	1480	Dec:	1%			
												'01	1600		25%			

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				
Eriogonum microthecum																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'01	20		-			
Opuntia spp.																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	3	8	2
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	3	6	4
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			+60%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	40	Dec:	-			
												'01	100		-			
Tetradymia canescens																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	25	22	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'01	0		-			

Special Studies - Northeastern Region

Trend Study 9R-2-01

Study site name: Buckhorn Canyon.

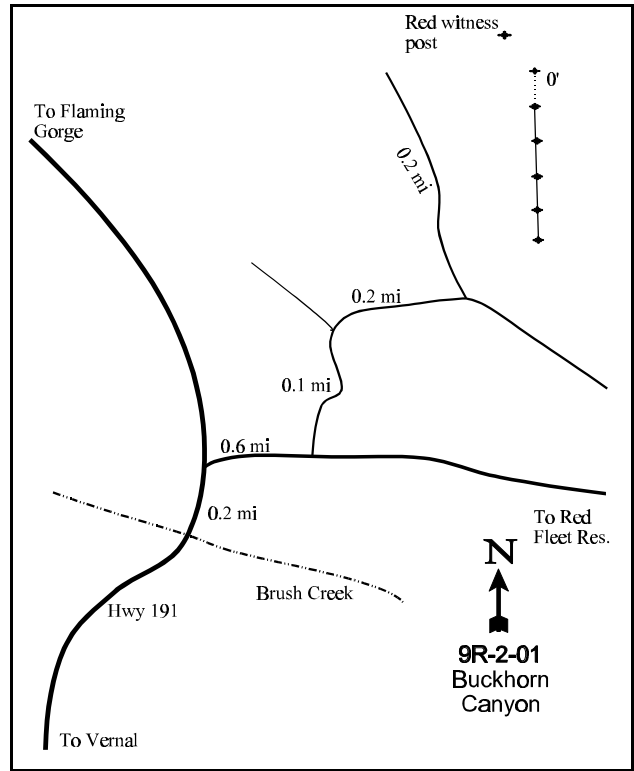
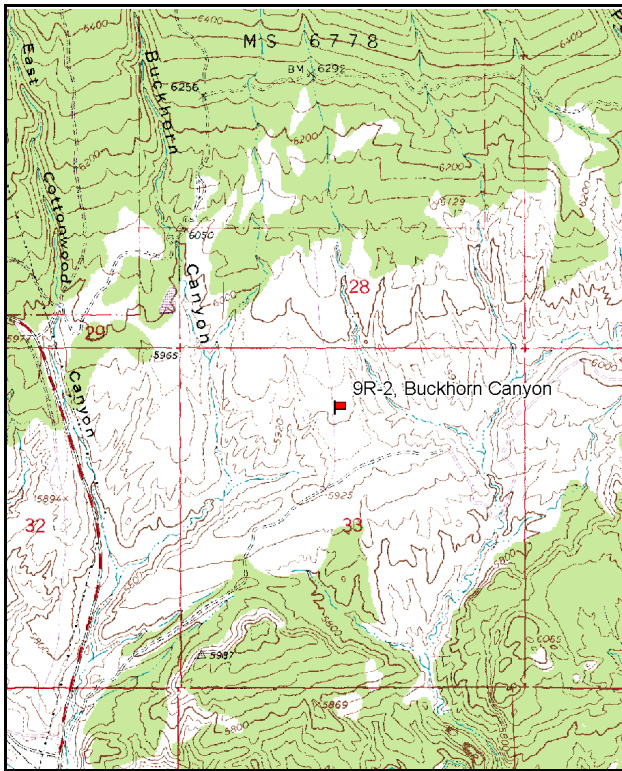
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 158 degrees magnetic.

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

LOCATION DESCRIPTION

From Vernal proceed north on Highway 191. After Highway 191 crosses brush creek continue 0.2 miles and turn right onto the road that leads to Red Fleet Reservoir. On this road proceed 0.6 miles. Turn left onto a dirt road. Go 0.1 miles to a fork. Turn right and go 0.2 miles to another fork. Turn left and go 0.2 miles. The witness post is a red full high fence post about 50 feet to the east. The 0-foot stake is 45 to the south at 148 degrees magnetic.



Map Name: Donkey Flat

Diagrammatic Sketch

Township 3N, Range 22E, Section 33

UTM 4495924 N 630960 E

DISCUSSION

Trend Study No. 9R-2

The Buckhorn Canyon study is located approximately 11 miles north of Vernal off Highway 191. The study was established in 2001 to monitor winter use by big game, primarily mule deer. The study site lies on a gentle, south facing slope at an elevation of 5,850 feet. Deer use on the site is heavy, with use by elk and livestock being much lighter. A pellet group transect read along the vegetation baseline in 2001 estimated 175 deer days use/acre (431 ddu/ha), 28 elk days use/acre (69 edu/ha), and 28 cow days use/acre (68 cdu/ha). A lot of the pellet groups sampled had been displaced by runoff and overland flow.

Soils have a clay loam texture and a slightly alkaline soil reaction (7.7 pH). Effective rooting was estimated at just over 13 inches. Rock and pavement occur in very low amounts. There is a layer of stoniness found between 8 and 12 inches below the surface. Phosphorus and potassium are both low at 4.1 ppm and 57.6 ppm respectively. Values lower than 10 ppm for phosphorus, and 70 ppm for potassium can be limiting to plant growth and development. Low amounts of herbaceous vegetation and litter cover with high amounts of bare ground allow significant erosion to occur. An erosion condition class assessment categorized soils as having moderate erosion in 2001. This classification was due mostly to heavy pedestaling around sagebrush stems and surface litter translocation resulting from recent thunderstorms.

The site is dominated by Wyoming big sagebrush. Sagebrush density was estimated at 4,900 plants/acre in 2001. Nearly the entire population is composed of mature or decadent plants. Percent decadence in the population is high at 49%, where 45% (1,090 plants/acre) of the decadent plants were classified as dying. Recruitment is low at only 2% (80 plants/acre). The number of young plants is not adequate to replace the decadent, dying plants in the population should there be a die-off in the immediate future. Mature plants have very few seedheads and annual leader growth averaged less than 2 inches in 2001. Poor vigor is fairly high with 22% of the population classified with poor vigor. Use is moderate to heavy.

The herbaceous understory is poor. Grasses and forbs combine to produce less than one-fourth of the cover on the site. Thickspike wheatgrass was the most abundant herbaceous species as it was present in 53% of the quadrats. Other perennial grasses sampled on the site include Sandberg bluegrass, bottlebrush squirreltail, needle-and-thread, and Indian ricegrass. Needle-and-thread had a patchy distribution on the site, while Sandberg bluegrass was found growing primarily underneath the safety of sagebrush crowns. Cheatgrass was also present, but it was small statured and occurs infrequently at this time. Forbs are insignificant on the site and will likely continue to be in the future. A treatment to thin and restore vigor to the sagebrush population, as well as improve understory productivity, should be considered in the future.

2001 APPARENT TREND ASSESSMENT

Soils appear to have a downward trend. Bare soil is high, pedestaling is severe, and displacement of surface litter is high. Herbaceous vegetation cover, which is best at holding soils in place, is low. The Wyoming big sagebrush population is in poor condition with a high percent decadency and poor vigor, compounded by moderate to heavy use. Density will likely decline in the future with a high proportion of decadent plants classified as dying (45%) and very low recruitment from young plants. The understory is sparse for a sagebrush community and will probably not improve without some type of mechanical treatment to thin the sagebrush population.

HERBACEOUS TRENDS --
Herd unit 9R, Study no: 2

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
G	Agropyron dasystachyum	187	53	2.12
G	Bromus tectorum (a)	25	13	.09
G	Oryzopsis hymenoides	2	1	.03
G	Poa secunda	106	43	1.23
G	Sitanion hystrix	57	27	.96
G	Stipa comata	50	17	1.07
Total for Annual Grasses		25	13	0.09
Total for Perennial Grasses		402	141	5.42
Total for Grasses		427	154	5.51
F	Astragalus convallarius	5	3	.19
F	Calochortus nuttallii	11	5	.02
F	Descurainia pinnata (a)	50	23	.11
F	Lappula occidentalis (a)	100	44	.21
F	Machaeranthera canescens	2	1	.01
F	Phlox longifolia	124	53	.56
F	Ranunculus testiculatus (a)	9	4	.02
F	Sphaeralcea coccinea	67	31	.25
F	Townsendia spp.	20	6	.03
Total for Annual Forbs		159	71	0.35
Total for Perennial Forbs		229	99	1.07
Total for Forbs		388	170	1.43

BROWSE TRENDS --
Herd unit 9R, Study no: 2

T y p e	Species	Strip Frequency	Average Cover %
		'01	'01
B	Artemisia tridentata wyomingensis	73	21.31
B	Juniperus osteosperma	0	1.00
B	Opuntia spp.	14	.45
Total for Browse		87	22.76

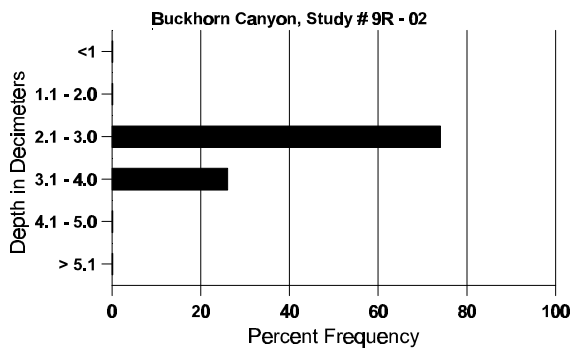
BASIC COVER --
Herd unit 9R, Study no: 2

Cover Type	Nested Frequency	Average Cover %
	'01	'01
Vegetation	387	27.13
Rock	10	.04
Pavement	191	.46
Litter	441	31.23
Cryptogams	176	4.40
Bare Ground	438	50.20

SOIL ANALYSIS DATA --
Herd Unit 9R, Study no: 02, Buckhorn Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.2	63.0 (13.1)	7.7	35.6	33.8	30.6	1.4	4.1	57.6	0.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 9R, Study no: 2

Type	Quadrat Frequency	Pellet Transect	
		Pellet Groups per Acre	Days Use per Acre (ha)
	'01	'01	'01
Rabbit	25	183	N/A
Elk	10	365	28 (69)
Deer	62	2271	175 (431)
Cattle	10	331	28 (68)

BROWSE CHARACTERISTICS --

Herd unit 9R, 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				
Artemisia tridentata wyomingensis																		
Y	01	3	-	-	1	-	-	-	-	-	4	-	-	-	80			4
M	01	50	53	17	-	-	-	-	-	-	120	-	-	-	2400	19	28	120
D	01	61	45	12	1	2	-	-	-	-	67	-	-	54	2420			121
X	01	-	-	-	-	-	-	-	-	-	-	-	-	-	980			49
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'01		41%			12%			22%										
Total Plants/Acre (excluding Dead & Seedlings)												'01	4900	Dec:	49%			
Opuntia spp.																		
Y	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	01	14	-	-	-	-	-	-	-	-	14	-	-	-	280	3	11	14
D	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'01	420	Dec:	24%			

Trend Study 17R-4-01

Study site name: Rabbit Gulch.

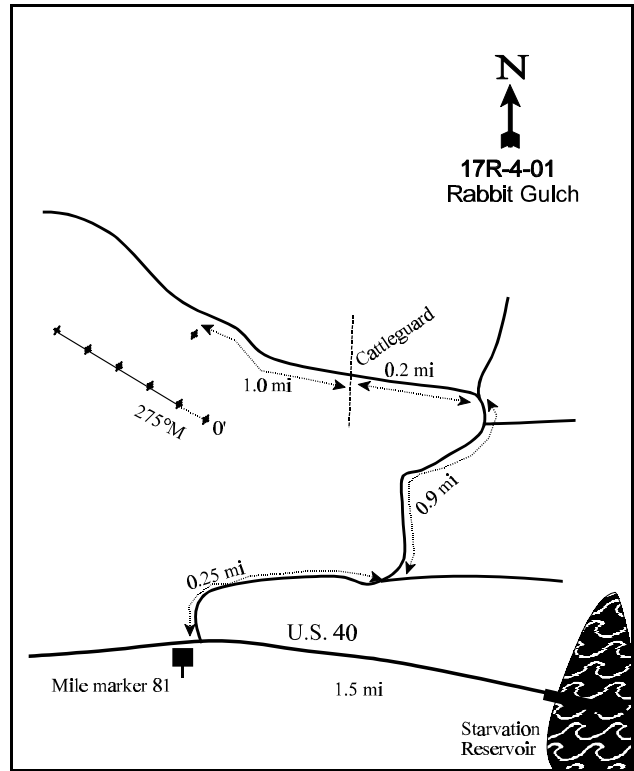
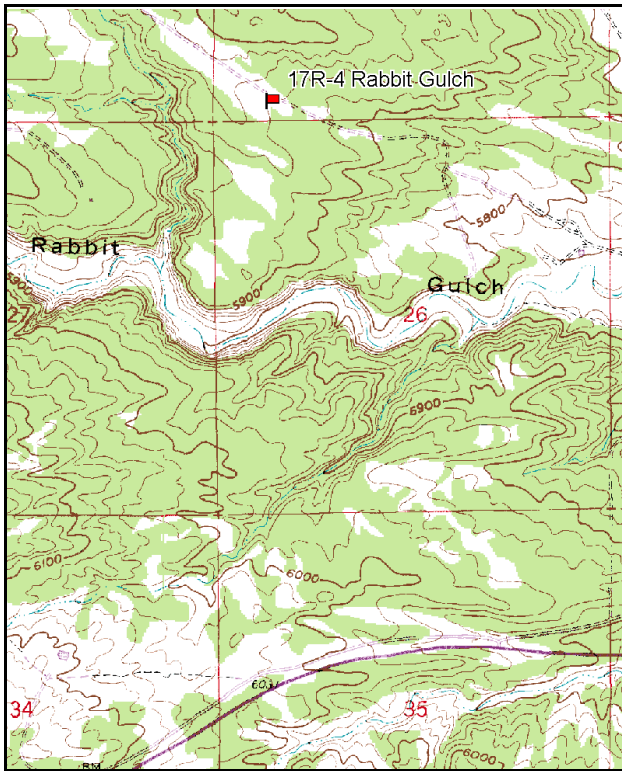
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 275 degrees magnetic.

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

LOCATION DESCRIPTION

From the Starvation Bridge on U.S. 40 travel west 1.5 miles to a turnoff on the north side of the road. Follow this road 0.25 miles to a fork. Continue left 0.9 miles and staying left. Continue 0.2 miles to a cattleguard and fence. After the cattleguard proceed 1.0 mile to a witness post on the left side of the road. From the witness post walk 51 paces at 180 degrees magnetic to the 0-foot stake. The 0-foot stake is marked by browse tag #94.



Map Name: Rabbit Gulch

Diagrammatic Sketch

Township 3S, Range 6W, Section 23

UTM 4449677 N 539432 E

DISCUSSION

Trend Study No. 17R-4

The Rabbit Gulch study was established in 1997 to monitor critical deer winter range on the south side of the Uintah Mountains. The study is on a gentle (3%), east facing slope at an elevation of 5,700 feet. Starvation Reservoir lies about 2 miles to the east. Deer use has been heavy on this site in both 1997 and 2001. Elk use was light in 1997 and light to moderate in 2001. Quadrat frequency for deer pellet groups was 72% and 85% in 1997 and 2001 respectively. A pellet group transect read parallel to the vegetation baseline in 2001 estimated 171 deer days use/acre (423 ddu/ha), 26 elk days use/acre (65 edu/ha), and 2 cow days use/acre (5 cdu/ha).

Soils have a sandy loam texture with a moderately alkaline soil reaction (8.0 pH). Estimated effective rooting depth was over 16 inches with little to no rock being sampled on the surface or within the profile. Phosphorus is low at 5.1 ppm, where values less than 10 ppm can be limiting to normal plant growth and development. Nearly half of the soil surface is represented by bare ground, while vegetation and litter cover have only moderate values. Cryptogams were much less abundant in 2001, which lowered the amount of the protective ground cover on the site. An erosion condition class assessment done in 2001 categorized soil to be stable to slightly eroding. Excessive pedestaling around shrub stems provides the most evidence of erosion.

The key browse on the site consists of Wyoming big sagebrush and black sagebrush. In 1997, all sagebrush was classified as Wyoming big sagebrush. In 2001, sagebrush was split into both Wyoming big sagebrush and black sagebrush. Identification was based mostly on growth form and coloration. In reality, most of the sagebrush on the site is likely a hybrid between the two species. Total sagebrush density was estimated at 3,060 plants/acre in 1997. In 2001, Wyoming big sagebrush had an estimated density of 1,360 plants/acre, while black sagebrush had an estimated density of 1,720 plants/acre. Due to the abundance of pellet groups during both samples, it was not surprising that sagebrush showed moderate to heavy use. In 2001, percent decadency was high for Wyoming big sagebrush (41%), but much lower for black sagebrush at 15%. Poor vigor is also high in the Wyoming big sagebrush population at 42% in 1997 and 31% in 2001. A positive aspect for Wyoming big sagebrush was that the average number of young plants were abundant enough to replace the decadent and dead in the population. Average leader growth for Wyoming big sagebrush was less than 2 inches in 2001.

Other less abundant browse on the site include fourwing saltbush, shadscale, winterfat, and stickyleaf low rabbitbrush. Pinyon and juniper trees have invaded the flat. They have an estimated density of 29 trees/acre and 68 trees/acre respectively. Most trees are small as stem diameter averages less than 3 inches for both pinyon and juniper.

The herbaceous component is comprised primarily of perennial grasses. Crested wheatgrass was seeded onto the site sometime in the past and is the most abundant species, providing nearly half of the total vegetative cover. Crested wheatgrass had not been utilized when the study was monitored in 2001. Other moderately abundant perennial grasses are needle-and-thread and blue grama. Forbs are rare and insignificant, especially perennial species.

2001 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover increased. Bare ground remains high, but similar to 1997 estimates. Trend for browse is slightly down. Sagebrush was split into both Wyoming big sagebrush and black sagebrush, although most of the sagebrush is likely a hybrid between the two species. Wyoming big sagebrush still shows moderate to heavy use, elevated poor vigor, and increased percent decadency. Black sagebrush also displays moderate to heavy use, but percent decadency and poor vigor are lower than that of Wyoming big sagebrush. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses slightly increased. Crested wheatgrass, blue grama, and needle-and-thread remain the dominant species. Forbs are still rarely encountered.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 17R, Study no: 4

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'01	'97	'01	'97	'01
G	Agropyron cristatum	347	312	95	87	8.44	15.27
G	Agropyron dasystachyum	22	*1	8	1	.16	.00
G	Bouteloua gracilis	71	*141	27	39	.85	6.03
G	Bromus tectorum (a)	-	-	-	-	.00	-
G	Elymus junceus	3	*22	2	8	.03	.43
G	Oryzopsis hymenoides	13	15	5	4	.17	.25
G	Stipa comata	76	75	33	38	1.03	3.54
G	Vulpia octoflora (a)	127	*44	37	20	.61	.15
Total for Annual Grasses		127	44	37	20	0.62	0.15
Total for Perennial Grasses		532	566	170	177	10.71	25.53
Total for Grasses		659	610	207	197	11.33	25.68
F	Alopecurus alpinus	4	-	1	-	.00	-
F	Chenopodium fremontii (a)	2	2	2	2	.01	.01
F	Collomia linearis (a)	3	-	1	-	.00	-
F	Collinsia parviflora (a)	-	6	-	2	-	.01
F	Cryptantha spp.	3	-	1	-	.00	-
F	Descurainia pinnata (a)	-	6	-	4	-	.42
F	Eriogonum cernuum (a)	5	6	3	4	.01	.04
F	Hymenoxys richardsonii	-	4	-	2	-	.06
F	Lappula occidentalis (a)	-	*33	-	15	-	.51
F	Machaeranthera spp	1	-	1	-	.00	-

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'01	'97	'01	'97	'01
F	Phlox longifolia	-	6	-	2	-	.01
F	Sphaeralcea coccinea	4	6	2	2	.01	.01
F	Townsendia incana	6	-	3	-	.01	-
Total for Annual Forbs		10	53	6	27	0.03	1.00
Total for Perennial Forbs		18	16	8	6	0.03	0.07
Total for Forbs		28	69	14	33	0.07	1.07

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 17R, Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'97	'01	'97	'01
B	Artemisia nova	0	31	-	1.05
B	Artemisia tridentata wyomingensis	70	42	4.35	3.37
B	Atriplex confertifolia	0	1	-	.03
B	Ceratoides lanata	1	2	-	-
B	Chrysothamnus nauseosus consimilis	0	2	-	.60
B	Chrysothamnus viscidiflorus viscidiflorus	15	12	.61	.84
B	Eriogonum microthecum	0	1	-	-
B	Gutierrezia sarothrae	25	24	.16	.98
B	Juniperus osteosperma	1	1	1.03	.76
B	Opuntia spp.	24	22	.27	.36
B	Sclerocactus	1	2	.03	.06
Total for Browse		137	140	6.47	8.07

CANOPY COVER --

Herd unit 17R, Study no: 4

Species	Percent Cover	
	'97	'01
Juniperus osteosperma	-	.20
Pinus edulis	-	-

Point-Quarter Tree Data

Trees per Acre		Average diameter (in)	
'97	'01	'97	'01
27	68	5.5	2.8
9	29	3.2	2.9

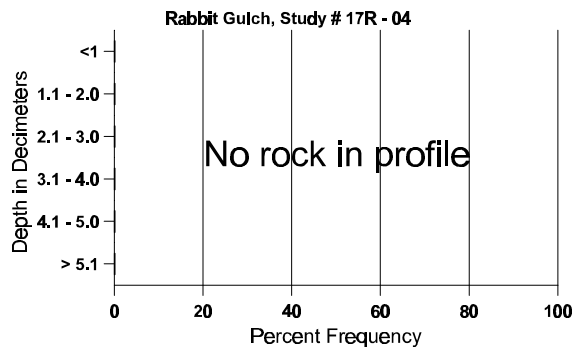
BASIC COVER --
Herd unit 17R, Study no: 4

Cover Type	Nested Frequency		Average Cover %	
	'97	'01	'97	'01
Vegetation	409	400	14.82	33.59
Rock	5	-	.01	0
Pavement	49	-	.08	0
Litter	496	457	23.74	27.52
Cryptogams	193	40	5.82	.94
Bare Ground	427	420	47.28	48.83

SOIL ANALYSIS DATA --
Herd Unit 17R, Study no: 04, Rabbit Gulch

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.3	74.8 (14.0)	8.0	78.6	10.8	10.6	0.6	5.1	96.0	0.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 17R, Study no: 4

Type	Quadrat Frequency		Pellet Transect			
	'97	'01	Pellet Groups per Acre		Days Use per Acre (ha)	
			'97	'01	'97	'01
Rabbit	16	31	26	61	N/A	N/A
Elk	3	22	200	339	15 (38)	26 (65)
Deer	72	85	1566	2227	121 (298)	171 (423)
Cattle	3	1	139	26	12 (29)	2 (5)

BROWSE CHARACTERISTICS --

Herd unit 17R, 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				
Artemisia nova																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	10	35	23	-	1	-	-	-	-	69	-	-	-	1380	6	10	
D	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	5	8	-	-	-	-	-	-	3	-	-	10	260		13	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'01		48%			36%			12%										
Total Plants/Acre (excluding Dead & Seedlings)											'97	0	Dec:	0%				
											'01	1720		15%				
Artemisia tridentata wyomingensis																		
S	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	97	21	22	-	-	-	-	-	-	-	37	-	6	-	860		43	
	01	6	1	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	97	-	68	25	-	-	-	-	-	-	46	-	45	2	1860	19	31	
	01	9	10	13	-	-	1	-	-	-	33	-	-	-	660	16	26	
D	97	1	7	9	-	-	-	-	-	-	5	-	3	9	340		17	
	01	4	4	17	-	1	2	-	-	-	7	-	-	21	560		28	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		63%			22%			42%			-56%							
'01		24%			49%			31%										
Total Plants/Acre (excluding Dead & Seedlings)											'97	3060	Dec:	11%				
											'01	1360		41%				
Atriplex canescens																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	43	62	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'97	0	Dec:	-				
											'01	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>Atriplex confertifolia</i>																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	31	0
D	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	0%			
												'01	20		100%			
<i>Ceratoides lanata</i>																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	7	7	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	10	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		100%			00%			00%			+50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	20	Dec:	-			
												'01	40		-			
<i>Chrysothamnus nauseosus consimilis</i>																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	10	1
D	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'01		00%			00%			50%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	0%			
												'01	40		50%			

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>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
	01	3	-	-	-	-	-	-	-	-	1	-	2	60		3		
M	97	14	3	-	-	-	-	-	-	-	16	-	1	340	15	24	17	
	01	15	-	-	-	-	-	-	-	-	11	-	4	300	11	20	15	
D	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	2	-	-	-	-	-	-	-	-	-	-	1	40		2		
X	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	-	-	-	-	-	-	-	-	-	-	-	-	20		1		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		11%			00%			04%			-29%							
'01		00%			00%			40%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	560	Dec:	0%			
												'01	400		10%			
<i>Eriogonum microthecum</i>																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	01	2	-	-	-	-	-	-	-	-	2	-	-	40	-	-	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'01	40		-			
<i>Gutierrezia sarothrae</i>																		
S	97	4	-	-	-	-	-	-	-	-	4	-	-	80		4		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	97	6	-	-	-	-	-	-	-	-	6	-	-	120		6		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	97	43	-	-	-	-	-	-	-	-	43	-	-	860	7	8	43	
	01	60	-	-	-	-	-	-	-	-	56	-	4	1200	6	8	60	
D	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	4	-	-	-	-	-	-	-	-	4	-	-	80		4		
X	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	-	-	-	-	-	-	-	-	-	-	-	-	280		14		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			+23%							
'01		00%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	980	Dec:	0%			
												'01	1280		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				
Juniperus osteosperma																		
Y	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	01	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	20	Dec:	-			
												'01	20		-			
Opuntia spp.																		
S	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	97	24	-	-	-	-	-	-	-	-	24	-	-	-	480	5	24	
	01	25	-	-	-	-	-	-	-	-	24	1	-	-	500	3	25	
D	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			04%			+10%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	560	Dec:	4%			
												'01	620		6%			
Sclerocactus																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			+50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	20	Dec:	-			
												'01	40		-			

Special Studies - Southern Region

Trend Study 22R-1 & 22R-2

Study site name: Tushar Mountain Goat #1 & 2

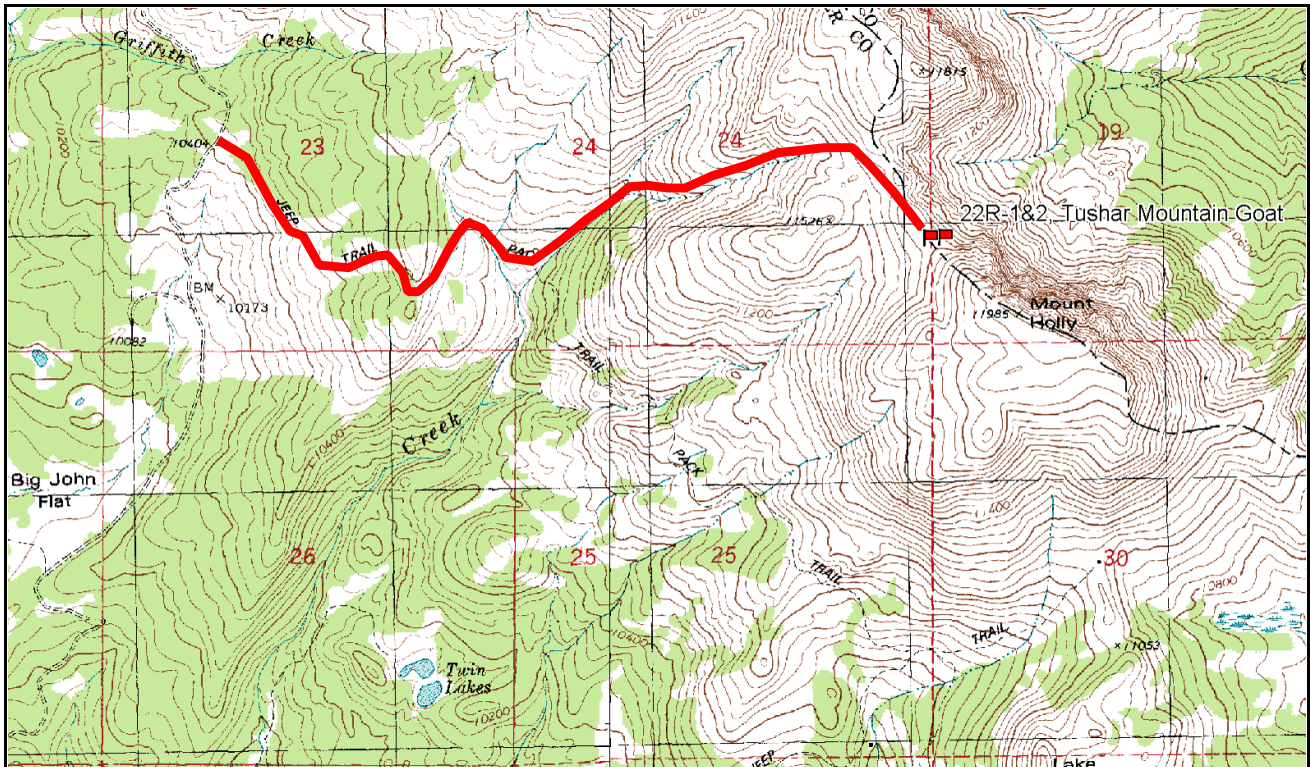
Vegetation type: Alpine Tundra

Compass bearing: frequency baseline 0 degrees magnetic.

100 foot baseline. Quadrats read along baseline. See text for study methods.

LOCATION DESCRIPTION

From Beaver drive 16.3 miles up Beaver Canyon to the turnoff to Big John Flat. Turn left onto this road and continue 3.5 miles to Big John Flat. Continue 1.0 mile to a trail head and park here. The walk from the trail head to the study sites is 2.2 miles with an elevation gain of 1,166 feet. Site #1 is located on the east side of the saddle on a steeper slope. Site #2 is located in the middle of the saddle, west of study #1.



Map Name: Delano Peak

Study # 1 UTM 4245914 N 381134 E

Township 28S, Range 4W, Section 19 & 24

Study # 2 UTM 4245913 N 381079 E

DISCUSSION

Trend Study No. 22R-1 & 2

The Tushar Mountain Goat studies are located in an alpine community approximately one-third of a mile below Mount Holly at an elevation of 11,500 feet. The studies were established in 1997 due to concern over mountain goat utilization of the Tushar paintbrush (*Castilleja parvula* var. *parvula*). The Tushar paintbrush is on the Utah endangered, threatened and sensitive species list and categorized as a federal status 3C species. This listing is defined as “taxa that have proven to be more abundant or widespread than was previously believed, and/or those that are not subject to any identifiable threat” (Atwood et al. 1991). The Tushar paintbrush is an endemic to south-central and west-central Utah in Beaver, Piute, and Garfield counties. It is found growing on alpine ridgetops and talus slopes above timberline on sandy, gravelly soils derived from igneous parent material (Welsh et al. 1993).

Transect 22R-1 was placed in a saddle below Mt. Holly and a second transect (22R-2) was placed downhill several hundred feet from the first. Seven mountain goats were on the study area in 2001 when it was monitored. Transect 22R-1 is somewhat steep and rocky, dropping off to the east near the end of transect. Transect 22R-2 slopes toward the west at 3-5% and is less rocky. The vegetation in this alpine community is comprised primarily of low growing grasses and forbs. There were no browse species sampled on either of the transects. Grasses and forbs were grouped, while cover and nested frequency data was collected using 20, 1/4 m² quadrats read along a 100-foot baseline. Tushar paintbrush density was determined by counting the number of plants rooted within a 100 ft radius circular plot. Utilization was estimated on each plant sampled. Mountain goat pellet groups were also counted within the circular plot.

Table 1 summarizes the data collected on transect 22R-1. This study is characterized by moderate vegetation cover and high rock and pavement cover. The density of the Tushar paintbrush was estimated at 73 plants/acre in 1997, increasing to 88 plants/acre in 2001. None of plants sampled in 1997 appeared to have been utilized. In 2001, 54% of the paintbrush plants that were sampled showed light use, with an additional 29% showing moderate use. No plants were heavily used in either year. Mountain goat pellet groups increased from 25 in 1997 to 56 in 2001.

Table 2 summarizes the data collected on transect 22R-2. This transect is characterized by very high vegetative cover with much lower amounts of rock, pavement, and bare ground. The density of the Tushar paintbrush was estimated at 20 plants/acre in 1997, decreasing to 8 plants/acre in 2001. As with 22R-1, none of the plants sampled in 1997 appeared to have been utilized. In 2001, 67% (4 of the 6 plants sampled) showed light use and a single plant showed moderate use. No plants were classified as being heavily used in either year. Seven mountain goat pellet groups were sampled in 1997, increasing to 35 in 2001.

It appears that study 22R-1 is more representative of preferred habitat for the Tushar paintbrush, while study 22R-2 would be best categorized as marginal. An examination of the habitat characteristics of these two transects is important. Study 22R-1 lies in a saddle on the ridgetop and has lower vegetation cover (38.1% in 2001) and a higher amount of rock, pavement, and bare ground (73.9% cover combined). Paintbrush would have less competition on this transect compared to the lower transect (22R-2) which lies down and off the ridgetop and is composed of a thick, uniform mat of low growing perennial grasses and forbs (about 75% cover). Rock, pavement, and bare ground are much less abundant on transect 22R-2 (20.7% cover combined), thus competition between the paintbrush and other low growing species is much greater. Higher competition results in fewer safe sites being available for the paintbrush to become established. Although mountain goat pellet groups increased between 1997 and 2001, use by these animals does not appear to be excessive. Of the plants that were classified as having been utilized, all of these looked to have been nipped off at the top of the plant and none were grubbed to the ground (heavy use) on either transect.

It is our assessment that mountain goat use of the Tushar paintbrush, at least on these two transects within the immediate area, are not a threat to the paintbrush population. Furthermore, the amount of ground cover appears to have the most influence on paintbrush density. Thus, areas that are more open and rocky will likely contain more plants compared to areas where vegetation is thick and uniformly distributed. The paintbrush population does not appear to be very competitive and/or abundant where the vegetative cover is relatively high. The two readings to this point have determined that the mountain goats are having little or no effect on the paintbrush population at this time.

Table 1- Data summary for study #22R-1

	1997	2001
% Cover		
Vegetation	34.3	38.1
Litter	3.8	0.8
Rock - Pavement	74.3	68.9
Cryptogamic crusts	3.8	-
Bare ground	8.5	5.1
Perennial Grasses	7.0	17.7
Perennial Forbs	16.9	21.7
Nested Frequency (100 is maximum value)		
Vegetation	85	93
Litter	84	50
Rock	88	80
Pavement	93	94
Cryptogamic crusts	36	-
Bare ground	74	29
Perennial Grasses	61	76
Perennial Forbs	79	77
Tushar paintbrush (<i>Castilleja parvula</i> var. <i>parvula</i>)		
Density (plants/acre)	73	88
% plants showing:		
No use	100	17
Light use	0	54
Moderate use	0	29
Heavy use	0	0
Pellet Groups		
# of goat pellet groups	25	56

Table 2- Data summary for study #22R-2

	1997	2001
% Cover		
Vegetation	39.6	76.2
Litter	13.1	8.8
Rock - Pavement	46.3	20.3
Cryptogamic crusts	5.2	0.03
Bare ground	6.1	0.4
Perennial Grasses	23.1	48.2
Perennial Forbs	18.2	26.5
Nested Frequency (100 is maximum value)		
Vegetation	98	100
Litter	92	90
Rock	74	38
Pavement	89	86
Cryptogamic crusts	64	4
Bare ground	61	9
Perennial Grasses	97	100
Perennial Forbs	82	92
Tushar paintbrush (<i>Castilleja parvula</i> var. <i>parvula</i>)		
Density (plants/acre)	20	8
% plants showing:		
No use	100	17
Light use	0	67
Moderate use	0	17
Heavy use	0	0
Pellet Groups		
# of goat pellet groups	7	35

Trend Study 28R-7-01

Study site name: Sage Hen Hollow.

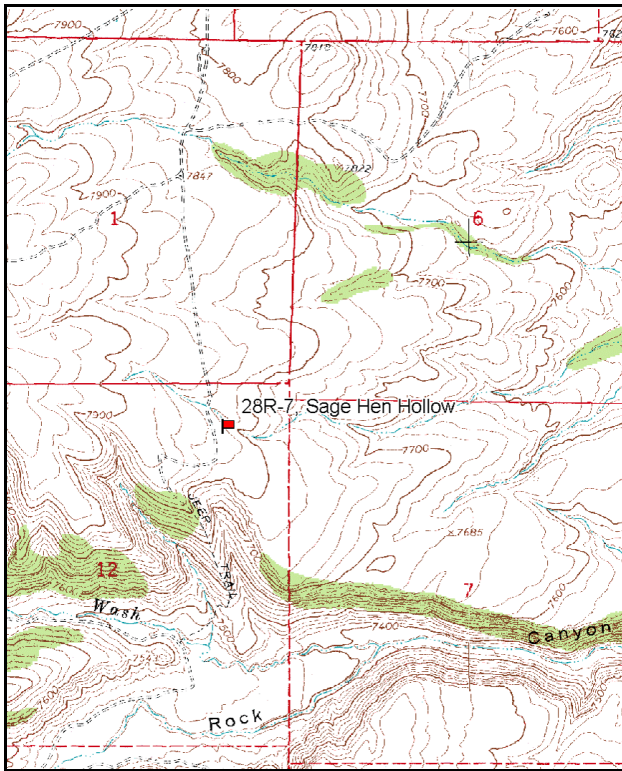
Vegetation type: Black Sagebrush.

Compass bearing: frequency baseline 106 degrees magnetic.

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

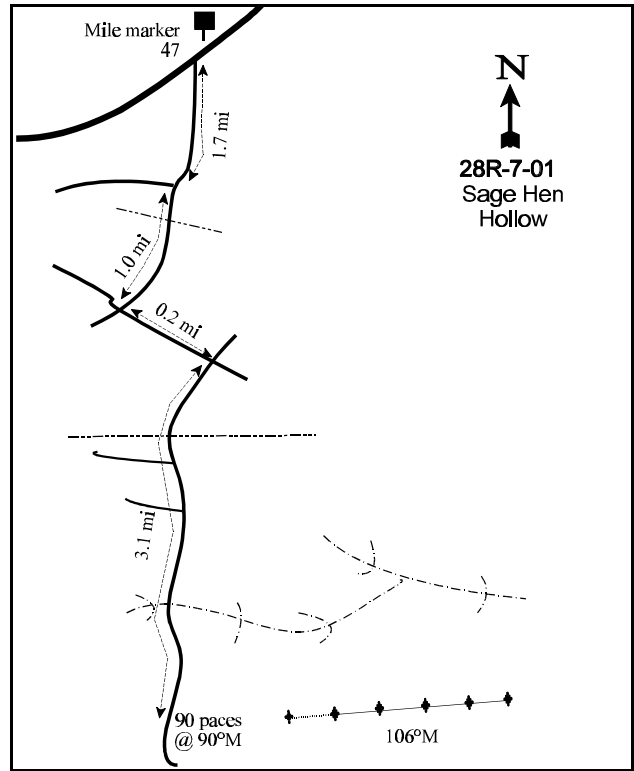
LOCATION DESCRIPTION

From Panguitch travel south towards Panguitch Lake on Highway 143. Turn left 0.1 miles past mile marker 47. Travel 1.7 miles staying left and go another 1.0 mile. Turn left and go 0.2 miles. Turn right and travel 3.1 miles on a rocky two track road, staying left at intersections. The 0-foot stake is 20 paces east of the road at 90 degrees magnetic. The baseline runs at 106 degrees magnetic.



Map Name: Hatch

Township 36S, Range 6W, Section 12



Diagrammatic Sketch

UTM 4173415 N 370346 E

DISCUSSION

Trend Study No. 28R-7

The Sage Hen Hollow study is located about 8 miles south of Panguitch. The study was established in 2000 due to concern that elk were overusing the site. The study lies on a small ridge that runs east-west at an elevation of 7,600 feet. Slope on the site varies from 4-15%. Aspect is to the northeast. The study is dominated by black sagebrush with lesser amounts of mountain big sagebrush and bitterbrush. A pellet group transect read in 2000 estimated light use by all animals. The transect estimated 11 deer days use/acre (27 ddu/ha), 5 elk days use/acre (12 edu/ha), and less than 1 cow day use/acre (2 cdu/ha). Pellet group transect data taken in 2001 estimated 24 deer days use/acre (60 ddu/ha), 11 elk days use/acre (27 edu/ha), and less than 1 cow day use/acre (2 cdu/ha). Grouse pellets were also sampled in both 2000 and 2001.

Soils are loamy in texture and shallow due to the abundance of rock within the profile. Effective rooting depth was estimated at just over 9 inches. Soils are slightly acidic in reactivity (6.4 pH). Organic matter is good at over 3%. Vegetation and litter cover are abundant, although most of the vegetation cover comes from shrubs. Shrubs provide less protection against erosion compared to herbaceous vegetation. Erosion appeared to be minimal in both 2000 and 2001.

The browse component consists of a variety of species. Black sagebrush is the dominant species, with mountain big sagebrush and bitterbrush providing lesser amounts of palatable forage. Black sagebrush had an estimated density of nearly 16,000 plants/acre in 2001. Percent decadence is moderate at 38% and 34% in 2000 and 2001 respectively. The proportion of the population displaying poor vigor ranges from 12-17%. Utilization on black sage was light during both readings. Annual leader growth for black sagebrush averaged less than 1 inch in 2001.

In 2001, mountain big sagebrush had an estimated density of 1,180 plants/acre. Percent decadence is very high in 2001 at 63%, an increase from 44% in 2000. However, the proportion of the population displaying poor vigor decreased from 49% in 2000 to 17% in 2001. Use is light and recruitment is low with only 20 young plants/acre being estimated in 2001. Annual leader growth for mountain big sagebrush averaged about 1½ inches in 2001. Bitterbrush had an estimated density of 320 plants/acre in 2000, increasing to 440 plants/acre in 2001. The increase is due to the emergence of young plants in the population (80 plants/acre). Use on bitterbrush has been mostly light, while vigor has been normal for the most part. Bitterbrush rarely has the level of light use seen on this site, especially on big game winter ranges. Annual leader growth for bitterbrush averaged less than 2 inches in 2001. High decadency and poor vigor in the mountain big sagebrush population is mostly from high competition with an overly abundant black sagebrush population. Furthermore, this site is already marginal for mountain big sagebrush and bitterbrush due to the shallow, rocky soils where black sagebrush excels.

Pinyon and juniper trees are slowly encroaching onto the site. Point-quarter data taken in 2000 estimated 109 pinyon trees/acre and 6 juniper trees/acre.

The herbaceous understory is sparse for a site at this elevation. In 2001, grasses provided only 7% average cover while forbs contributed to less than 1% cover. Mutton bluegrass is the most abundant herbaceous species. Bottlebrush squirreltail, needle-and-thread, and blue grama were also sampled. Due to the abundance of black sagebrush and the typically low site potential of most black sagebrush sites, herbaceous species will likely be limited.

2001 TREND ASSESSMENT

Trend for soil is stable. Erosion appears minimal with adequate vegetation and litter cover. Abundant rock and pavement help decrease erosion as they armor the soil surface. Trend for browse is stable. Use on black sagebrush and the more preferred but less abundant species, mountain big sage and bitterbrush, is mostly light. This site is marginal for mountain big sagebrush and bitterbrush due to the shallow, rocky soils and high competition with black sagebrush. The herbaceous understory is sparse, but it has a stable trend.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 28R, Study no: 7

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'00	'01	'00	'01	'00	'01
G	<i>Bouteloua gracilis</i>	33	41	11	15	.75	.87
G	<i>Carex</i> spp.	-	2	-	1	-	.01
G	<i>Oryzopsis hymenoides</i>	1	-	1	-	.00	-
G	<i>Poa fendleriana</i>	185	181	65	66	4.25	4.13
G	<i>Poa secunda</i>	39	-	16	-	.15	-
G	<i>Sitanion hystrix</i>	6	*63	4	27	.12	1.11
G	<i>Stipa comata</i>	17	34	9	12	.47	1.49
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		281	321	106	121	5.77	7.62
Total for Grasses		281	321	106	121	5.77	7.62
F	<i>Antennaria rosea</i>	3	6	1	2	.15	.30
F	<i>Aster</i> spp.	1	-	1	-	.00	-
F	<i>Astragalus</i> spp.	4	-	2	-	.03	-
F	<i>Chaenactis douglasii</i>	1	-	1	-	.00	-
F	<i>Cryptantha</i> spp.	-	1	-	1	-	.00
F	<i>Draba</i> spp. (a)	-	12	-	4	-	.02
F	<i>Eriogonum alatum</i>	1	6	1	2	.03	.01
F	<i>Erigeron eatonii</i>	6	4	2	2	.01	.01
F	<i>Erigeron pumilus</i>	12	7	7	5	.03	.02
F	<i>Eriogonum racemosum</i>	14	8	9	4	.09	.02
F	<i>Gayophytum ramosissimum</i> (a)	-	*14	-	6	-	.03
F	<i>Linum lewisii</i>	20	*2	9	1	.07	.01
F	<i>Lotus utahensis</i>	1	-	1	-	.03	-
F	<i>Lupinus argenteus</i>	3	2	1	2	.01	.01

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'00	'01	'00	'01	'00	'01
F	Lygodesmia spinosa	9	2	6	2	.09	.03
F	Phlox longifolia	1	*33	1	17	.00	.08
F	Polygonum douglasii (a)	-	1	-	1	-	.00
F	Senecio multilobatus	13	10	7	6	.06	.05
Total for Annual Forbs		0	27	0	11	0	0.05
Total for Perennial Forbs		89	81	49	44	0.63	0.56
Total for Forbs		89	108	49	55	0.63	0.62

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 28R, Study no: 7

Type	Species	Strip Frequency		Average Cover %	
		'00	'01	'00	'01
B	Abies concolor	0	0	.38	-
B	Artemisia nova	97	99	22.71	30.79
B	Artemisia tridentata vaseyana	26	29	3.79	4.63
B	Chrysothamnus depressus	1	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	14	15	.15	.06
B	Coryphantha vivipara	1	0	-	-
B	Gutierrezia sarothrae	1	4	.16	.00
B	Juniperus osteosperma	0	0	.38	1.25
B	Mahonia repens	3	4	.00	.01
B	Opuntia spp.	1	2	.00	-
B	Pinus edulis	6	8	1.25	1.77
B	Purshia tridentata	15	20	2.96	.68
Total for Browse		165	181	31.82	39.21

CANOPY COVER --

Herd unit 28R, Study no: 7

Species	Percent Cover	
	'00	'01
Juniperus osteosperma	-	-
Pinus edulis	-	1

Point-Quarter Tree Data

Trees per Acre	Average diameter (in)
'00	'00
6	2.7
109	0.9

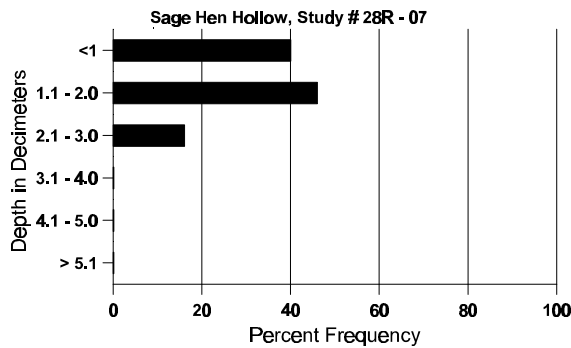
BASIC COVER --
Herd unit 28R, Study no: 7

Cover Type	Nested Frequency		Average Cover %	
	'00	'01	'00	'01
Vegetation	295	340	39.36	47.79
Rock	318	286	14.98	14.64
Pavement	365	367	20.31	15.91
Litter	447	451	38.28	33.82
Cryptogams	16	-	.37	0
Bare Ground	349	338	27.82	9.68

SOIL ANALYSIS DATA --
Herd Unit 28R, Study no: 07, Sage Hen Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.2	54.8 (9.7)	6.4	43.9	32.8	23.3	3.1	26.0	380.8	0.8

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 28R, Study no: 7

Type	Quadrat Frequency		Pellet Transect			
	'00	'01	Pellet Groups per Acre		Days Use per Acre (ha)	
			'00	'01	'00	'01
Rabbit	4	2	26	17	N/A	N/A
Elk	10	8	61	139	5 (12)	11 (27)
Deer	10	19	17	313	11 (28)	24 (60)
Cattle	-	-	9	9	1 (2)	1 (2)
Sage grouse	-	-	9	9	N/A	N/A

BROWSE CHARACTERISTICS --

Herd unit 28R, Study no: 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				
<i>Artemisia nova</i>																		
S	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	00	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	00	265	21	-	65	23	-	4	-	-	370	-	8	-	7560	11	19	378
	01	523	-	-	-	-	-	-	-	-	523	-	-	-	10460	10	19	523
D	00	114	16	-	64	15	-	22	-	-	138	-	3	90	4620			231
	01	267	-	-	1	-	-	-	-	-	170	-	-	98	5360			268
X	00	-	-	-	-	-	-	-	-	-	-	-	-	-	720			36
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1440			72
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'00		12%			00%			17%			+23%							
'01		00%			00%			12%										
Total Plants/Acre (excluding Dead & Seedlings)												'00	12220	Dec:	38%			
												'01	15960		34%			
<i>Artemisia tridentata vaseyana</i>																		
Y	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	00	16	3	-	5	1	-	-	-	-	18	-	7	-	500	17	24	25
	01	19	1	-	-	-	-	1	-	-	21	-	-	-	420	18	22	21
D	00	11	7	-	2	-	-	-	-	-	5	-	5	10	400			20
	01	34	1	-	2	-	-	-	-	-	27	-	-	10	740			37
X	00	-	-	-	-	-	-	-	-	-	-	-	-	-	380			19
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'00		24%			00%			49%			+24%							
'01		03%			00%			17%										
Total Plants/Acre (excluding Dead & Seedlings)												'00	900	Dec:	44%			
												'01	1180		63%			
<i>Chrysothamnus depressus</i>																		
M	00	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'00		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'00	20	Dec:	-			
												'01	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>																	
Y	00	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	00	8	-	-	3	1	-	1	-	-	13	-	-	-	260	4	8
	01	14	-	-	-	-	-	1	-	-	15	-	-	-	300	7	11
D	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'00		06%			00%			00%			+ 0%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'00	320	Dec:	6%		
												'01	320		0%		
<i>Coryphantha vivipara</i>																	
M	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20	1	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'00		00%			00%			00%									
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'00	20	Dec:	-		
												'01	0		-		
<i>Gutierrezia sarothrae</i>																	
M	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	5
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140	6	6
D	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'00		00%			00%			00%			+88%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'00	20	Dec:	0%		
												'01	160		13%		
<i>Mahonia repens</i>																	
Y	00	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	00	3	-	-	3	-	-	-	-	-	6	-	-	-	120	3	5
	01	6	-	-	-	-	-	1	-	-	7	-	-	-	140	3	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'00		00%			00%			00%			+ 0%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'00	140	Dec:	-		
												'01	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				
Opuntia spp.																		
M	'00	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	13	1
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	11	1
D	'00	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	'01	1	-	-	-	-	-	-	-	-	-	-	1	20			1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'00		00%			00%			00%			+50%							
'01		00%			00%			50%										
Total Plants/Acre (excluding Dead & Seedlings)												'00	20	Dec:	0%			
												'01	40		50%			
Pinus edulis																		
S	'00	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	'01	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
Y	'00	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	'01	5	-	-	1	-	-	-	-	-	6	-	-	-	120			6
M	'00	-	-	-	-	-	-	-	2	-	2	-	-	-	40	-	-	2
	'01	1	-	-	-	-	-	1	-	-	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'00		00%			00%			00%			+25%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'00	120	Dec:	-			
												'01	160		-			
Purshia tridentata																		
Y	'00	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	'01	2	-	-	2	-	-	-	-	-	4	-	-	-	80			4
M	'00	3	2	-	5	3	-	2	-	-	14	-	1	-	300	31	54	15
	'01	10	4	-	3	1	-	-	-	-	18	-	-	-	360	29	52	18
D	'00	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'00		31%			00%			06%			+27%							
'01		23%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'00	320	Dec:	6%			
												'01	440		0%			

Special Studies - Southeastern Region

Trend Study 10R-31-01

Study site name: Hay Canyon Burn.

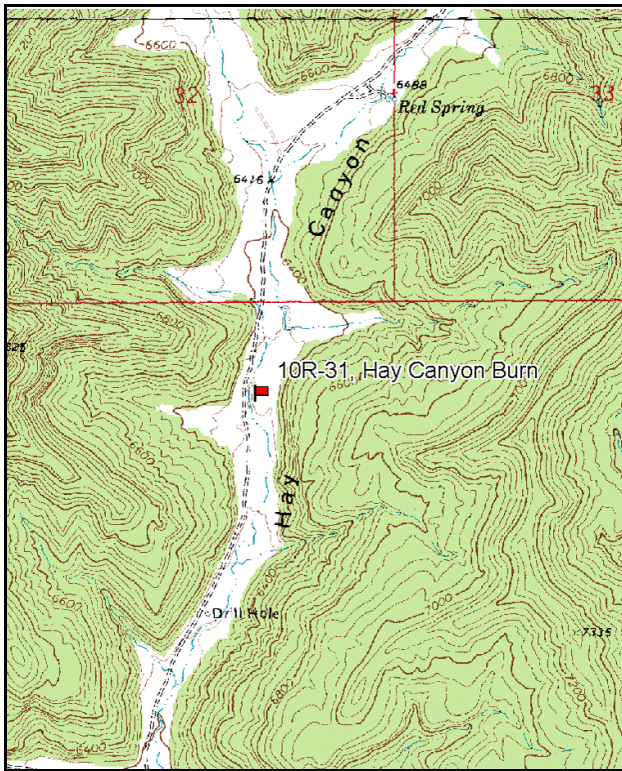
Vegetation type: Burned and Seeded.

Compass bearing: frequency baseline 12 degrees magnetic.

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

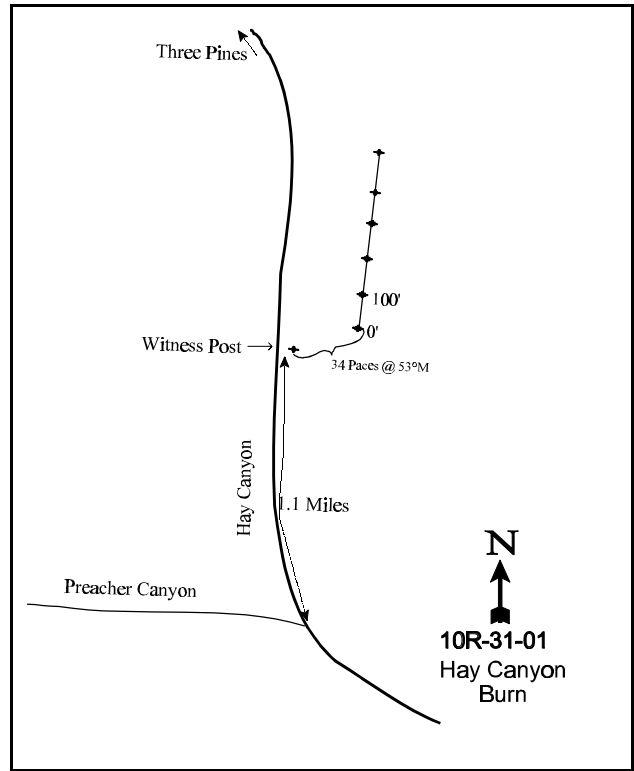
LOCATION DESCRIPTION

From the junction of Preacher Canyon Road and Hay Canyon Road follow Hay Canyon Road towards Three Pines for 1.1 miles to a witness post on the right side of the road. From the witness post the 0' stake is located 34 paces at 53 degrees magnetic and is marked with browse tag # 405.



Map Name: Preacher Canyon

Township 17S, Range 23E, Section Unsurveyed



Diagrammatic Sketch

UTM 4357934 N 637849 E

DISCUSSION

Trend Study No. 10R-31

The Hay Canyon Burn study is located about 10½ miles south of the Three Pines Junction on the Book Cliff Divide. The study area was prescribed burned by the BLM in 1998. The site was established the following year to monitor the recovery of the vegetative community. The study lies in a floodplain that was dominated by basin big sagebrush prior to the fire. A pellet group transect read along the vegetative baseline in 1999 estimated 1 cow day use/acre (3 cdu/ha). No deer or elk pellets were sampled on the study in 1999. In 2001, pellet group transect data estimated 1 deer day use/acre (3 ddu/ha), 11 elk days use/acre (28 edu/ha), and 32 cow days use/acre (79 cdu/ha).

Soils are sandy loam in texture and deep, with an estimated effective rooting depth of over 21 inches. Soil reaction is moderately alkaline (7.9 pH). The soil is low in phosphorus at 7.5 ppm, where values less than 10 ppm can be limiting to normal plant growth and development. Rock is distributed uniformly throughout the profile with the majority occurring between 10 and 20 inches below the surface. In 1999, the first year following the fire, vegetation and litter were low. In 2001, cover for both vegetation and litter increased as percent cover for bare ground decreased. Erosion appears to be minimal at the present time ('01).

Very little browse is present on the site. Nearly all of the basin big sagebrush was eliminated following the prescribed burn. In 2001, basin big sagebrush had an estimated density of 100 plants/acre, with 80% of the population made up of young plants. Use was light and vigor normal in 2001. Other browse encountered on the site include fringed sagebrush, white-stemmed rubber rabbitbrush, and pricklypear cactus. Fringed sagebrush, which was not sampled in 1999, had an estimated density of 4,700 plants/acre in 2001. It also increased in strip frequency from 0 to 55% between 1999 and 2001. Fringed sagebrush can be important winter feed for deer and usually increases with heavy grazing (Stubbendieck et al. 1989).

The understory is dominated by annual species, primarily cheatgrass brome and pepperweed. In 2001, cheatgrass significantly increased in nested frequency, while its cover nearly tripled. Pepperweed, which was not sampled in 1999, had a quadrat frequency of 53% and contributed over 8% average cover in 2001. Sum of nested frequency for all annual grasses and forbs increased by 52% in 2001. Perennial species are infrequent. The most abundant perennial species is bluebunch wheatgrass which significantly increased in nested frequency in 2001. Other perennial grasses that were sampled include slender wheatgrass, Great Basin wildrye, Indian ricegrass, and bottlebrush squirreltail. Nearly all of the perennial grasses that were seen on the site had been moderately to heavily utilized by livestock in 2001. The most abundant perennial forb was an erigeron.

2001 TREND ASSESSMENT

Trend for soil is slightly up. Vegetation and litter cover increased and bare ground decreased. Trend for browse is slightly up. Basin big sagebrush increased in density due to the increase in young plants. However, density still remains low. White-stemmed rubber rabbitbrush, a species palatable to wildlife, also has a low but increasing population. Fringed sagebrush, a species that can provide important winter forage for deer, has dramatically increased since site establishment. The herbaceous understory has a downward trend. Although perennial grasses and forbs increased in nested frequency, they still remain in very low numbers. Annual species more than doubled in sum of nested frequency, as cheatgrass and pepperweed currently dominate the site. It would have been beneficial to the vegetative community, especially the herbaceous understory, to have rested this site from grazing for a longer period of time. Perennial grasses will have a difficult time increasing on the site due to their initial low abundance, heavy competition from annuals, and recurrent heavy use.

TREND ASSESSMENT

soil - slightly up (4)

browse - slightly up (4)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Herd unit 10R, Study no: 31

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'99	'01	'99	'01	'99	'01
G	Agropyron spicatum	-	*61	-	18	-	1.37
G	Agropyron trachycaulum	32	*4	10	1	2.08	.03
G	Bromus tectorum (a)	266	*399	86	100	8.81	26.89
G	Elymus cinereus	1	4	1	1	.18	.15
G	Oryzopsis hymenoides	-	2	-	2	.03	.07
G	Sitanion hystrix	13	*-	5	-	.10	-
Total for Annual Grasses		266	399	86	100	8.81	26.89
Total for Perennial Grasses		46	71	16	22	2.39	1.62
Total for Grasses		312	470	102	122	11.20	28.52
F	Arabis spp.	2	-	2	-	.18	-
F	Astragalus convallarius	-	4	-	1	-	.03
F	Chenopodium album (a)	5	*113	2	46	.06	2.50
F	Descurainia pinnata (a)	4	*18	2	7	.03	.30
F	Erigeron spp.	-	*81	-	26	-	1.20
F	Helianthus annuus (a)	8	-	4	-	.22	-
F	Lappula occidentalis (a)	13	*5	7	2	.52	.03
F	Lepidium spp. (a)	-	*100	-	53	-	8.10
F	Nicotiana attenuata (a)	8	-	4	-	.21	-
F	Schoenocrambe linifolia	3	-	1	-	.03	-
F	Sphaeralcea coccinea	-	3	-	1	-	.00
F	Tragopogon dubius	2	1	1	1	.18	.00
F	Unknown forb-perennial	3	-	2	-	.01	-
Total for Annual Forbs		38	236	19	108	1.05	10.94
Total for Perennial Forbs		10	89	6	29	0.40	1.23
Total for Forbs		48	325	25	137	1.46	12.18

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 10R, Study no: 31

Type	Species	Strip Frequency		Average Cover %	
		'99	'01	'99	'01
B	Artemisia frigida	0	55	-	3.53
B	Artemisia tridentata tridentata	1	4	-	.30
B	Chrysothamnus nauseosus hololeucus	0	2	.00	-
B	Opuntia spp.	1	3	-	-
Total for Browse		2	64	0.00	3.83

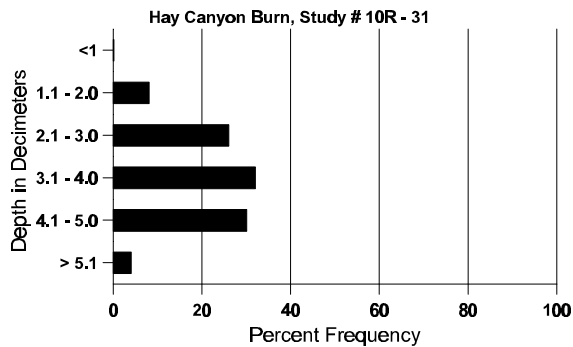
BASIC COVER --
Herd unit 10R, Study no: 31

Cover Type	Nested Frequency		Average Cover %	
	'99	'01	'99	'01
Vegetation	317	424	12.38	40.84
Rock	12	9	.59	.56
Pavement	8	13	.06	.02
Litter	481	486	39.49	62.20
Cryptogams	215	26	10.60	.10
Bare Ground	336	265	18.28	15.06

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 31, Hay Canyon Burn

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
21.7	64.4 (18.0)	7.9	62.9	19.8	17.3	2.5	7.5	105.6	0.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 10R, Study no: 31

Type	Quadrat Frequency		Pellet Transect			
			Pellet Groups per Acre		Days Use per Acre (ha)	
	'99	'01	'99	'01	'99	'01
Rabbit	4	4	592	-	N/A	-
Elk	-	11	-	148	-	11 (28)
Deer	-	12	17	383	1 (3)	32 (79)
Cattle	-	-	-	9	-	1 (2)

BROWSE CHARACTERISTICS --

Herd unit 10R, Study no: 31

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	99	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	01	2	-	-	-	-	-	-	-	2	-	-	40	-	2
Y	99	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	01	8	-	-	-	-	-	-	-	8	-	-	160	-	8
M	99	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	01	226	-	-	-	-	-	-	-	226	-	-	4520	9 15	226
D	99	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	01	1	-	-	-	-	-	-	-	1	-	-	20	-	1
X	99	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'99		00%		00%		00%									
'01		00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'99	0	Dec:	0%		
										'01	4700		0%		
<i>Artemisia tridentata tridentata</i>															
Y	99	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	01	4	-	-	-	-	-	-	-	4	-	-	80	-	4
M	99	3	-	-	-	-	-	-	-	3	-	-	60	-	3
	01	1	-	-	-	-	-	-	-	1	-	-	20	19 13	1
X	99	-	-	-	-	-	-	-	-	-	-	-	7780	-	389
	01	-	-	-	-	-	-	-	-	-	-	-	0	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'99		00%		00%		00%		+40%							
'01		00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'99	60	Dec:	-		
										'01	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				
Chrysothamnus nauseosus hololeucus																		
M	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	01	2	-	-	-	-	-	-	-	-	-	-	2	40	26	30	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'99		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'99	0	Dec:	-			
												'01	40		-			
Opuntia spp.																		
Y	99	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	1	-	-	-	-	-	-	-	-	-	-	1	20			1	
M	99	1	-	-	-	-	-	-	-	-	-	-	1	20	-	-	1	
	01	8	-	-	-	-	-	-	-	-	-	-	8	160	4	17	8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'99		00%			00%			00%			+89%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'99	20	Dec:	-			
												'01	180		-			

Trend Study 14R-1-01

Study site name: Cathedral Butte.

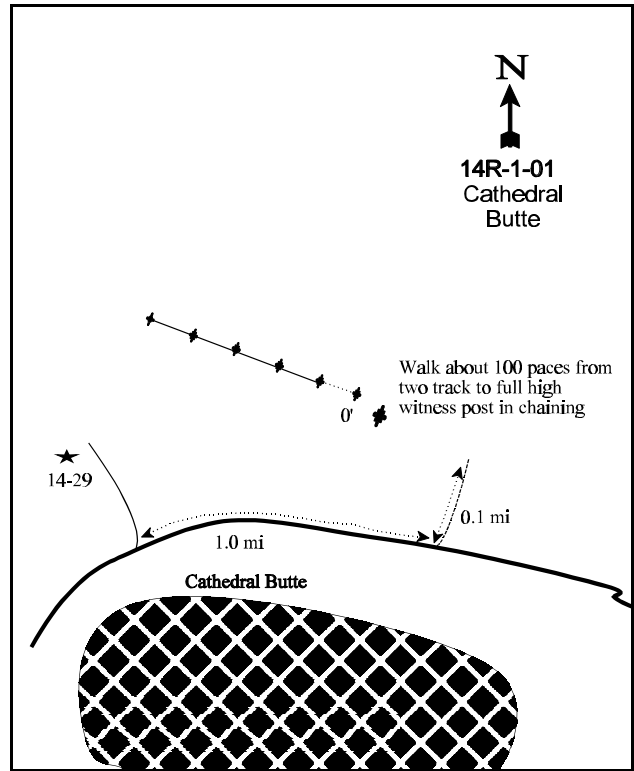
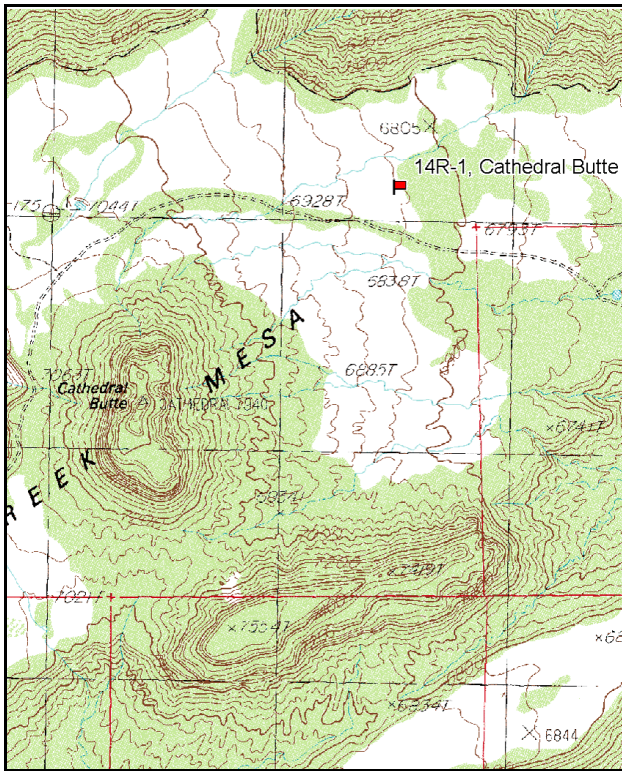
Vegetation type: Chained, Seeded PJ.

Compass bearing: frequency baseline 290 degrees magnetic.

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

LOCATION DESCRIPTION

Travel to the north side of Cathedral Butte. As the road winds around the north side of the butte there is a junction to a small side road on the northwest side of the butte. This is the turnoff to the Salt Creek Mesa trend study (14-29). From this junction travel east on the main road 1.0 mile to another faint two track road heading north. Turn here and go 0.1 mile to a small opening in the trees. From here walk approximately 100 paces to the west into the chaining. There is a full high witness post a few feet from the 0-foot baseline stake. The baseline runs 290 degrees magnetic.



Map Name: Cathedral Butte

Diagrammatic Sketch

Township 32S, Range 20E, Section Unsurveyed

UTM 4202110 N 615488 E

DISCUSSION

Trend Study No. 14R-1

The Cathedral Butte study was established in 2001 to gather pretreatment data for a prescribed burn project on the north side of Elk Ridge. This area is important winter range for big game and important for livestock use. This area has received increased attention in recent years as it lies in close proximity to Beef Basin. Most of the proposed prescribe burn area consists of old pinyon-juniper chainings, including the area where the study was placed. The site lies on a gentle, northeast aspect at an elevation of 6,850 feet. A pellet group transect read parallel to the vegetation baseline in 2001 estimated 3 deer days use/acre (8 ddu/ha), 23 elk days use/acre (56 edu/ha), and 33 cow days use/acre (82 cdu/ha).

Soils are sandy clay loam in texture with a soil reaction that is slightly alkaline (7.7 pH). Effective rooting depth was estimated at just over 14 inches. A stoniness profile index shows the majority of rock to be in the upper 12 inches of the profile. Phosphorus is low at 7.3 ppm, where values less than 10 ppm can be limiting to normal plant growth and development. Although vegetation and litter cover are moderately high, percent bare ground is also fairly high. An erosion condition class assessment determined soils as slightly eroding in 2001. Most evidence of erosion is due to excessive pedestaling around some of the vegetation.

Several important browse species are present in the area, however most occur in very low numbers on the site itself. The entire browse component contributes only 4% average cover in 2001. Important winter forage species include fourwing saltbush, mountain big sagebrush, green ephedra, and bitterbrush. Fourwing saltbush has an estimated density of 300 plants/acre. Twenty-seven percent of the population consists of young plants with another 33% classified as decadent. Use on fourwing saltbush is moderate to heavy, but vigor is normal on all but 7% of the population. Mountain big sagebrush and bitterbrush have densities estimated at only 20 plants/acre. Use is moderate on mountain big sagebrush and heavy on bitterbrush. Ephedra density is estimated at 40 plants/acre with use being moderate to heavy. In 2001, annual leader growth was estimated at 4.8 inches on fourwing saltbush, 4.5 inches on bitterbrush, and 3.3 inches on mountain big sagebrush. A prescribed fire would be detrimental to the usefulness of this site to wildlife, especially big game. Fire will likely eliminate much or all of the palatable browse on the site, which is already at very low densities.

Crested wheatgrass is by far the dominant species on this site. Crested wheatgrass contributed over 39% average cover and was sampled in 97% of the quadrats in the 2001. The only other grass sampled in 2001 was blue grama. Forbs are sparse with only 5 species being sampled. Rock goldenrod and a milkvetch are the most abundant forbs.

APPARENT TREND ASSESSMENT

Soils appear to be stable with only slight erosion occurring. Vegetation and litter are moderately high with most of the bare ground occurring in the interspaces between the individual crested wheatgrass plants. Browse is already limited on the site and would be further reduced following the proposed burn. A prescribed burn will likely eliminate most or all of the palatable forage on the site, which would decrease the usefulness of this site to big game as a wintering area. Crested wheatgrass dominates the site and will likely continue to do so in the future.

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

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
G	<i>Agropyron cristatum</i>	388	97	39.51
G	<i>Bouteloua gracilis</i>	10	2	.06
Total for Annual Grasses		0	0	0
Total for Perennial Grasses		398	99	39.57
Total for Grasses		398	99	39.57
F	<i>Astragalus</i> spp.	4	3	.45
F	<i>Machaeranthera canescens</i>	3	1	.15
F	<i>Medicago sativa</i>	2	2	.07
F	<i>Petradoria pumila</i>	3	1	.41
F	<i>Phlox austromontana</i>	4	2	.06
Total for Annual Forbs		0	0	0
Total for Perennial Forbs		16	9	1.14
Total for Forbs		16	9	1.14

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

T y p e	Species	Strip Frequency	Average Cover %
		'01	'01
B	<i>Artemisia tridentata vaseyana</i>	1	-
B	<i>Atriplex canescens</i>	15	1.56
B	<i>Chrysothamnus nauseosus consimilis</i>	2	-
B	<i>Ephedra viridis</i>	2	.01
B	<i>Gutierrezia sarothrae</i>	25	1.14
B	<i>Opuntia</i> spp.	1	.01
B	<i>Pinus edulis</i>	1	1.25
B	<i>Purshia tridentata</i>	1	-
Total for Browse		48	3.99

CANOPY COVER --

Herd unit 14R , Study no: 1

Point-Quarter Tree Data

Species	Percent Cover '01	Trees per Acre '01	Average diameter (in) '01
Juniperus osteosperma	-	23	3.8
Pinus edulis	2	19	4.1

BASIC COVER --

Herd unit 14R, Study no: 1

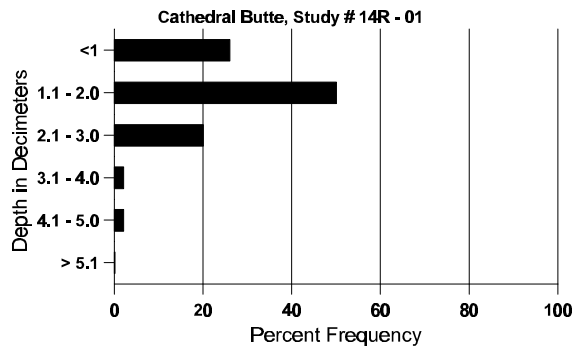
Cover Type	Nested Frequency '01	Average Cover % '01
Vegetation	399	46.50
Pavement	20	.05
Litter	413	34.80
Cryptogams	63	.69
Bare Ground	372	36.80

SOIL ANALYSIS DATA --

Herd Unit 14R, Study no: 01, Cathedral Butte

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.2	61.2 (14.8)	7.7	57.9	18.6	23.5	2.3	7.3	89.6	0.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 14R, Study no: 1

Type	Quadrat Frequency	Pellet Transect	
		Pellet Groups per Acre	Days Use per Acre (ha)
		'01	'01
Rabbit	30	157	N/A
Elk	27	296	23 (56)
Deer	12	43	3 (8)
Cattle	19	400	33 (82)

BROWSE CHARACTERISTICS --

Herd unit 14R, Study no: 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								
<i>Artemisia tridentata vaseyana</i>													
M	'01	-	-	-	-	-	-	-	0	25	42	0	
D	'01	-	1	-	-	-	-	-	1	-	-	1	
% Plants Showing '01		<u>Moderate Use</u> 100%		<u>Heavy Use</u> 00%		<u>Poor Vigor</u> 00%		<u>%Change</u>					
Total Plants/Acre (excluding Dead & Seedlings)						'01	20	Dec:	100%				
<i>Atriplex canescens</i>													
Y	'01	2	2	-	-	-	-	-	4	-	-	4	
M	'01	4	1	1	-	-	-	-	6	-	-	6	
D	'01	2	1	1	1	-	-	-	4	-	1	5	
X	'01	-	-	-	-	-	-	-	-	-	-	1	
% Plants Showing '01		<u>Moderate Use</u> 27%		<u>Heavy Use</u> 13%		<u>Poor Vigor</u> 07%		<u>%Change</u>					
Total Plants/Acre (excluding Dead & Seedlings)						'01	300	Dec:	33%				
<i>Chrysothamnus depressus</i>													
M	'01	-	-	-	-	-	-	-	-	-	4	9	0
% Plants Showing '01		<u>Moderate Use</u> 00%		<u>Heavy Use</u> 00%		<u>Poor Vigor</u> 00%		<u>%Change</u>					
Total Plants/Acre (excluding Dead & Seedlings)						'01	0	Dec:	-				
<i>Chrysothamnus nauseosus consimilis</i>													
M	'01	1	-	-	-	-	-	-	1	-	-	1	
D	'01	1	-	-	-	-	-	-	1	-	-	1	
% Plants Showing '01		<u>Moderate Use</u> 00%		<u>Heavy Use</u> 00%		<u>Poor Vigor</u> 00%		<u>%Change</u>					
Total Plants/Acre (excluding Dead & Seedlings)						'01	40	Dec:	50%				

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>Ephedra viridis</i>																		
Y	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	01	-	-	-	-	-	1	-	-	-	1	-	-	-	20	18	10	1
% Plants Showing '01		<u>Moderate Use</u> 50%			<u>Heavy Use</u> 50%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	40	Dec:	-	
<i>Gutierrezia sarothrae</i>																		
Y	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	01	75	-	-	-	-	-	-	-	-	75	-	-	-	1500	8	13	75
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	1560	Dec:	-	
<i>Mahonia fremontii</i>																		
M	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	33	0
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	0	Dec:	-	
<i>Opuntia spp.</i>																		
M	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	1	4	1
X	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	20	Dec:	-	
<i>Pinus edulis</i>																		
M	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	20	Dec:	-	
<i>Purshia tridentata</i>																		
D	01	-	-	-	-	1	-	-	-	-	1	-	-	-	20			1
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 100%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	20	Dec:	100%	

Trend Study 14R-2-01

Study site name: Hines CRP.

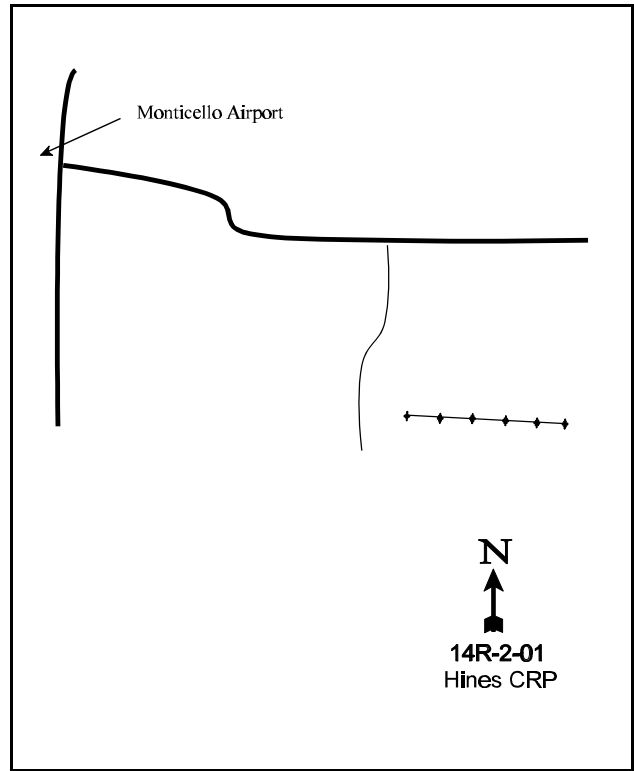
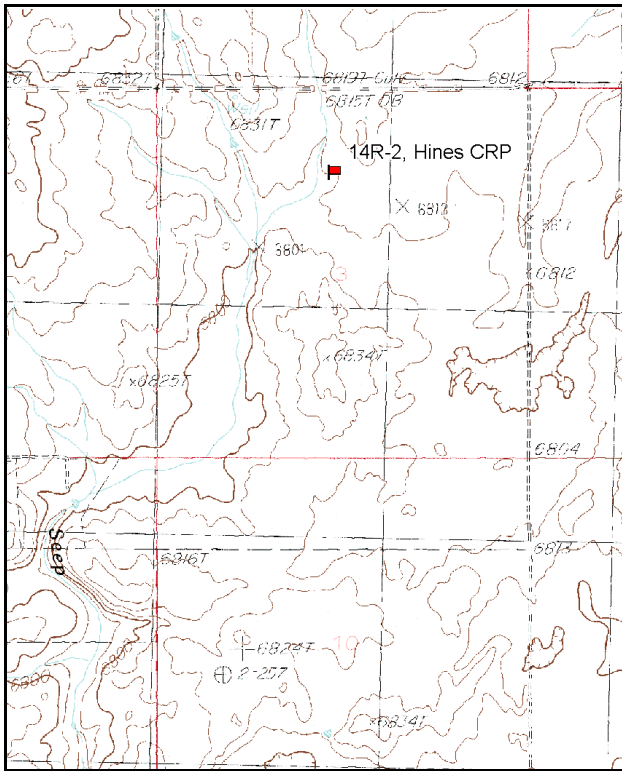
Vegetation type: Dryland Farm.

Compass bearing: frequency baseline 90 degrees magnetic.

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

LOCATION DESCRIPTION

Take road east of Monticello airport. Use GPS to locate site. No permanent posts were used to mark this site.



Map Name: Monticello North

Diagrammatic Sketch

Township 32S, Range 24E, Section 3

UTM 4200550 N 651742 E

DISCUSSION

Trend Study No. 14R-2

The Hines CRP study was established in 2001 on a parcel of private land northeast of Monticello. This particular piece of land is part of the CRP program. Wyoming big sagebrush was abundant in this area in the past, but much of the area has been converted to dryland farming. In recent years, this area has become more important as it is part of the historic range of the Gunnison sage grouse. This study was placed to determine the success of a sagebrush seeding project that was done to try to establish sagebrush into drilled farmland.

The vegetative community is dominated by herbaceous species. Seeded grasses include crested wheatgrass, intermediate wheatgrass, bluebunch wheatgrass, Russian wildrye, smooth brome, and Indian ricegrass. These perennial species make up 26% of the total vegetation cover on the site. Cheatgrass was also sampled in 71% of the quadrats and provides over 4% average cover. Forbs provide 65% of the total vegetation cover on the site. Annual forbs are dominant, especially Russian thistle, which had a quadrat frequency of 93% and contributed over 25% cover in 2001.

Sagebrush was aerially seeded, but the seeding appears to be a failure. A few small sagebrush plants were observed while walking through the area, but no plants were sampled on the transect itself. Even with the lack of browse, a few deer and elk have made use of the site. There was a small group of deer near the site when it was monitored in September of 2001.

HERBACEOUS TRENDS --

Herd unit 14R, Study no: 2

Type	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
G	Agropyron cristatum	44	24	4.40
G	Agropyron intermedium	120	42	4.76
G	Agropyron spicatum	75	33	3.70
G	Bromus inermis	15	7	.36
G	Bromus tectorum (a)	198	71	4.65
G	Elymus junceus	5	5	.78
G	Oryzopsis hymenoides	4	1	.03
Total for Annual Grasses		198	71	4.65
Total for Perennial Grasses		263	112	14.05
Total for Grasses		461	183	18.70
F	Amaranthus spp.	6	2	.01
F	Astragalus spp.	17	13	1.76
F	Chenopodium fremontii (a)	79	31	1.23
F	Cleome serrulata (a)	3	1	.03
F	Convolvulus arvensis	42	15	.49
F	Descurainia pinnata (a)	36	14	.71
F	Lactuca serriola	26	11	.61

Type	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
F	Linum lewisii	22	8	1.21
F	Melilotus officinalis	26	9	1.58
F	Medicago sativa	22	10	.87
F	Onobrychis viciaefolia	12	4	.46
F	Salsola iberica (a)	355	93	25.53
F	Sanguisorba minor	2	1	.15
F	Sisymbrium altissimum (a)	2	2	.03
Total for Annual Forbs		475	141	27.54
Total for Perennial Forbs		175	73	7.18
Total for Forbs		650	214	34.73

BASIC COVER --

Herd unit 14R, Study no: 2

Cover Type	Nested Frequency	Average Cover %
	'01	'01
Vegetation	437	54.47
Rock	18	.05
Pavement	123	.18
Litter	407	15.46
Bare Ground	445	48.59

Soil Data Not Taken

PELLET GROUP FREQUENCY --

Herd unit 14R, Study no: 2

Type	Quadrat Frequency	Pellet Transect	
		Pellet Groups per Acre	Days Use per Acre (ha)
	'01	'01	'01
Rabbit	4	52	N/A
Deer	7	87	7 (17)
Elk	-	17	1 (3)
Sage grouse	-	17	N/A

Trend Study 16R-10-01

Study site name: Gordon Creek Burn .

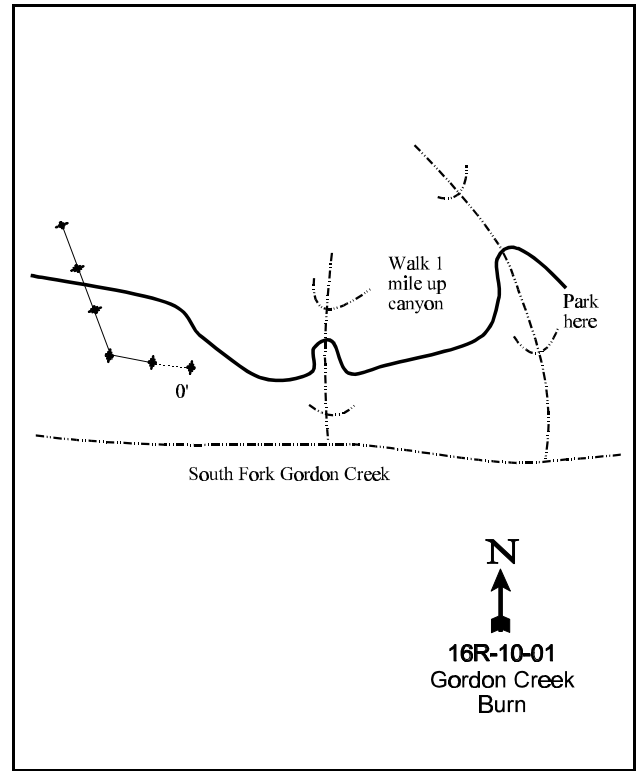
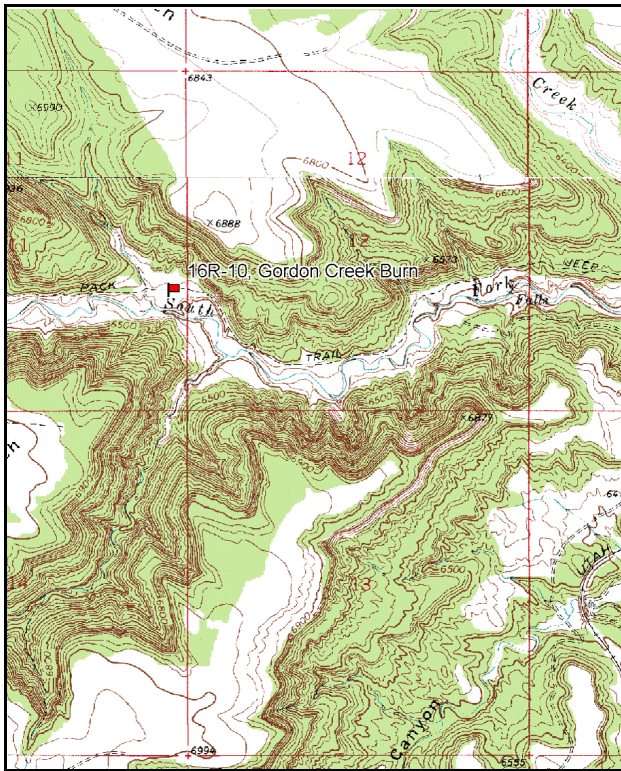
Vegetation type: Forage Kochia .

Compass bearing: frequency baseline westerly direction.

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

LOCATION DESCRIPTION

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



Map Name: Pinnacle Peak

Diagrammatic Sketch

Township 14S, Range 8E, Section 11

UTM 4385370 N 501330 E

DISCUSSION

Trend Study No. 16R-10

The Gordon Creek Burn study is located west of Price on the south fork of Gordon Creek. The site was established to monitor a 160-acre prescribed burn/seeding project that was conducted as part of a cooperative effort by the BLM, Division of Wildlife Resources, and the River Gas Corporation. The site once supported an overly mature stand of basin big sagebrush. In March of 1999, the site was burned using a helitorch, aerially seeded, and then lightly harrowed using ATV's to cover the seed. The transect was placed on an elevated flood plain above Gordon Creek to monitor the recovery of the vegetative community following the treatment. The site lies at an elevation of 6,300 feet on nearly level terrain.

Soils on the site are loamy in texture and very deep. Very little rock or pavement was sampled on the surface or within the profile. Soil reactivity is slightly alkaline (7.5 pH). The soils are low in phosphorus at 6.6 ppm, where values lower than 10 ppm can be limiting to normal plant growth and development. Several shallow gullies were forming on the site in 1999. In 2001, the vegetative community is better established and erosion is minimal. An erosion condition class assessment done in 2001 showed soils to be stable.

A pellet group transect was read along the vegetation baseline in both 1999 and 2001. In 1999, deer use was low at an estimated 4 deer days use/acre (10 ddu/ha), with no elk or cattle sign present. In 2001, deer and cattle use remained low at an estimated 5 deer days use/acre (12 ddu/ha), and 9 cow days use/acre (23 cdu/ha). However, elk use was heavy in 2001 at an estimated 139 elk days use/acre (344 edu/ha). This particular area appears to be attracting elk due to the abundance of prostrate kochia. This species was part of the seed mix following the prescribed burn and has become the dominant vegetation in 2001. Density was estimated at 22,995 mature plants/acre in 2001, an increase from 14,300 total plants/acre estimated in 1999. Due to the abundance of young and seedling kochia plants in 2001, only mature plants were counted in the shrub strips. Young and seedling kochia plants were sampled in the quadrats for cover only. Kochia plants were all classified as lightly utilized. However, estimating utilization on this species is extremely difficult due to their low growth form and abundant annual leader growth. With the high number of elk pellet groups sampled, it is apparent that kochia is the primary forage for elk. Kochia cover was estimated at 2% in 1999, increasing to over 28% in 2001.

Other important browse on the site include fourwing saltbush, winterfat, and basin big sagebrush. Fourwing saltbush had an estimated density of 1,880 plants/acre in 1999, decreasing to 1,520 plants/acre in 2001. All of the fourwing plants sampled in both years were seedlings or young. Winterfat and basin big sagebrush have estimated densities of around 500 plants/acre in 2001.

The herbaceous understory is diverse, but most species are not very abundant. Perennial grass species mostly include sand dropseed, western wheatgrass, Russian wildrye, intermediate wheatgrass, blue grama, Indian ricegrass, and Letterman needlegrass. All perennial grasses combine to provide only 2% average cover in 2001. Cheatgrass was sampled in both 1999 and 2001, but it is infrequent and will likely be held in check by the abundance and competition of prostrate kochia. Although forbs are more abundant than grasses, the only common species is alfalfa, which was seeded following the burn. Several annual forbs are present, but most were sampled only occasionally.

2001 TREND ASSESSMENT

Trend for soils is slightly up. Vegetation and litter cover have improved since 1999, resulting in less bare soil. Erosion is currently minimal. Trend for browse is up. Prostrate kochia has dramatically increased in density and cover which is good for soil protection as well as increases the palatable forage available to wildlife. A negative aspect to the dynamic expansion of kochia is that future increases in the understory and other desired shrubs may be suppressed. Fourwing saltbush and basin big sagebrush appear to be persisting on the site, but may not increase. Trend for the herbaceous understory is down. Perennial species decreased in sum of nested frequency, while annuals increased. Even with this increase they still only make up 17% of the herbaceous understory cover.

TREND ASSESSMENT

soil - slightly up (4)

browse - up (5)

herbaceous understory - down (1)

HERBACEOUS TRENDS --
Herd unit 16R, Study no: 10

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'99	'01	'99	'01	'99	'01
G	Agropyron cristatum	6	-	4	-	.13	-
G	Agropyron intermedium	15	8	7	3	.69	.56
G	Agropyron smithii	27	11	9	4	1.68	.82
G	Bouteloua gracilis	5	6	1	2	.15	.53
G	Bromus inermis	4	-	1	-	.03	-
G	Bromus japonicus (a)	2	-	2	-	.06	-
G	Bromus tectorum (a)	36	*76	15	26	.46	1.03
G	Elymus junceus	-	9	-	6	-	.15
G	Festuca ovina	-	3	-	2	-	.03
G	Oryzopsis hymenoides	14	*4	8	2	.23	.15
G	Sitanion hystrix	11	*-	4	-	.02	.00
G	Sporobolus cryptandrus	1	*15	1	6	.21	.15
G	Stipa lettermani	-	2	-	1	-	.00
Total for Annual Grasses		38	76	17	26	0.52	1.03
Total for Perennial Grasses		83	58	35	26	3.16	2.42
Total for Grasses		121	134	52	52	3.68	3.46
F	Chenopodium fremontii (a)	58	*17	26	7	7.25	.03
F	Descurainia pinnata (a)	-	*13	-	6	-	.05
F	Lappula occidentalis (a)	-	*29	-	13	-	.14
F	Lepidium spp. (a)	-	-	-	-	.00	-
F	Linum lewisii	43	*1	23	1	.77	.06

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'99	'01	'99	'01	'99	'01
F	Medicago sativa	178	*142	66	56	6.57	10.65
F	Physalis longifolia	91	*-	41	-	5.83	-
F	Physaria spp.	2	-	2	-	.01	-
F	Salsola iberica (a)	-	7	-	2	-	.15
F	Sanguisorba minor	25	*-	12	-	.61	-
F	Sisymbrium altissimum (a)	-	*96	-	31	-	2.62
F	Taraxacum officinale	-	-	-	-	.00	-
Total for Annual Forbs		58	162	26	59	7.25	3.00
Total for Perennial Forbs		339	143	144	57	13.81	10.71
Total for Forbs		397	305	170	116	21.07	13.72

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 16R, Study no: 10

T y p e	Species	Strip Frequency		Average Cover %	
		'99	'01	'99	'01
B	Artemisia tridentata tridentata	2	16	.02	.06
B	Atriplex canescens	33	34	.41	.07
B	Ceratoides lanata	24	17	.09	.06
B	Gutierrezia sarothrae	0	1	-	.03
B	Kochia prostrata	93	71	2.20	28.48
B	Opuntia spp.	0	3	-	-
Total for Browse		152	142	2.72	28.71

BASIC COVER --

Herd unit 16R, Study no: 10

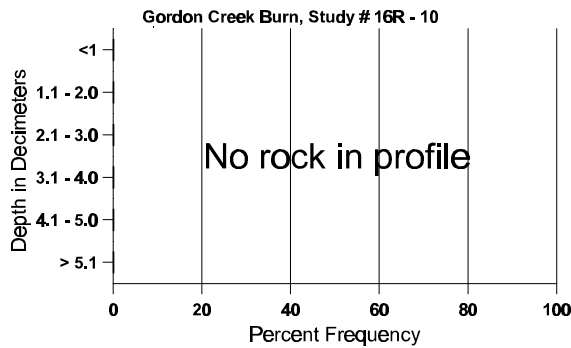
Cover Type	Nested Frequency		Average Cover %	
	'99	'01	'99	'01
Vegetation	288	427	33.91	43.19
Rock	6	5	.06	.04
Pavement	12	32	.04	.09
Litter	382	475	10.20	34.84
Bare Ground	490	385	69.72	35.97

SOIL ANALYSIS DATA --

Herd Unit 16R, Study no: 10, Gordon Creek Burn

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
N/A	53.0 (18.1)	7.5	41.3	44.2	14.5	1.9	6.6	144.0	0.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 16R, Study no: 10

Type	Quadrat Frequency	
	'99	'01
Rabbit	21	29
Elk	-	56
Deer	1	4
Cattle	-	2

Pellet Transect			
Pellet Groups per Acre		Days Use per Acre (ha)	
'99	'01	'99	'01
618	157	N/A	N/A
-	1810	-	139 (344)
52	61	4 (10)	5 (12)
-	113	-	9 (23)

BROWSE CHARACTERISTICS --

Herd unit 16R, 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 tridentata tridentata																		
S	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	23	-	-	1	-	-	-	-	-	24	-	-	-	480		24	
M	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	20	11	7	1	
X	99	-	-	-	-	-	-	-	-	-	-	-	-	3980		199		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'99		00%			00%			00%			+92%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'99	40	Dec:	-				
											'01	500		-				
Atriplex canescens																		
S	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	99	94	-	-	-	-	-	-	-	-	94	-	-	-	1880		94	
	01	56	1	-	13	-	-	6	-	-	76	-	-	-	1520		76	
M	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	19	10	0	
X	99	-	-	-	-	-	-	-	-	-	-	-	-	20		1		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'99		00%			00%			00%			-19%							
'01		01%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'99	1880	Dec:	-				
											'01	1520		-				

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>Ceratoides lanata</i>																		
S	99	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	99	22	-	-	1	-	-	-	-	-	23	-	-	-	460		23	
	01	12	-	-	4	-	-	-	-	-	16	-	-	-	320		16	
M	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220	13	5	
	01	6	1	-	1	-	-	-	-	-	8	-	-	-	160	10	8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'99		00%			00%			00%			-29%							
'01		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'99	680	Dec:	-			
												'01	480		-			
<i>Gutierrezia sarothrae</i>																		
D	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'99		00%			00%			00%										
'01		00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'99	0	Dec:	0%			
												'01	20		100%			
<i>Juniperus osteosperma</i>																		
X	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'99		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'99	0	Dec:	-			
												'01	0		-			
<i>Kochia prostrata</i>																		
S	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	99	82	-	-	-	-	-	-	-	-	82	-	-	-	1640		82	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	99	633	-	-	-	-	-	-	-	-	629	4	-	-	12660	16	16	
	01	142	-	-	-	-	-	-	-	-	142	-	-	-	22995	16	21	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'99		00%			00%			00%			-80%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'99	14300	Dec:	-			
												'01	22995		-			

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	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	2	-	-	-	-	-	-	-	-	-	-	-	40		2	
M	99	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'99		00%			00%			00%									
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'99	0	Dec:	-		
												'01	60		-		

Trend Study 17R-7-01

Study site name: Emma Park Harrow-Grazed

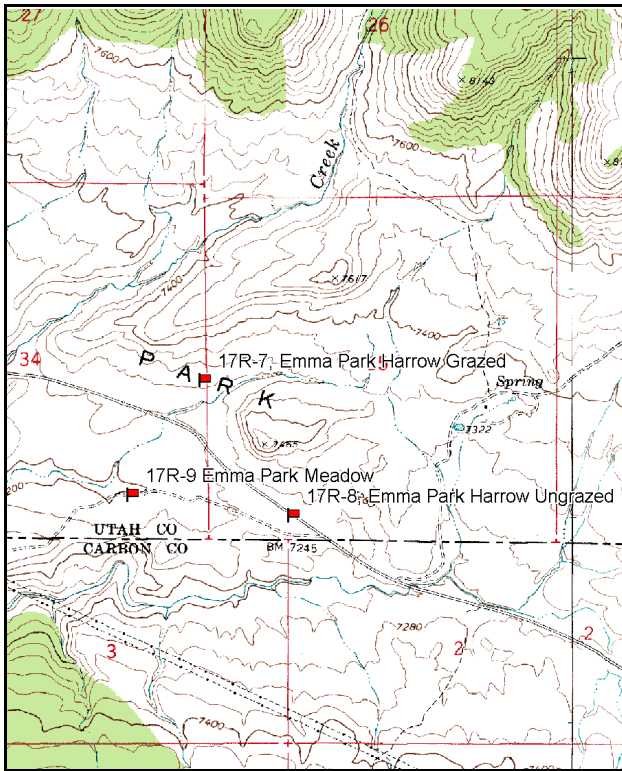
Vegetation type: Harrowed Big Sagebrush

Compass bearing: frequency baseline 246 degrees magnetic.

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

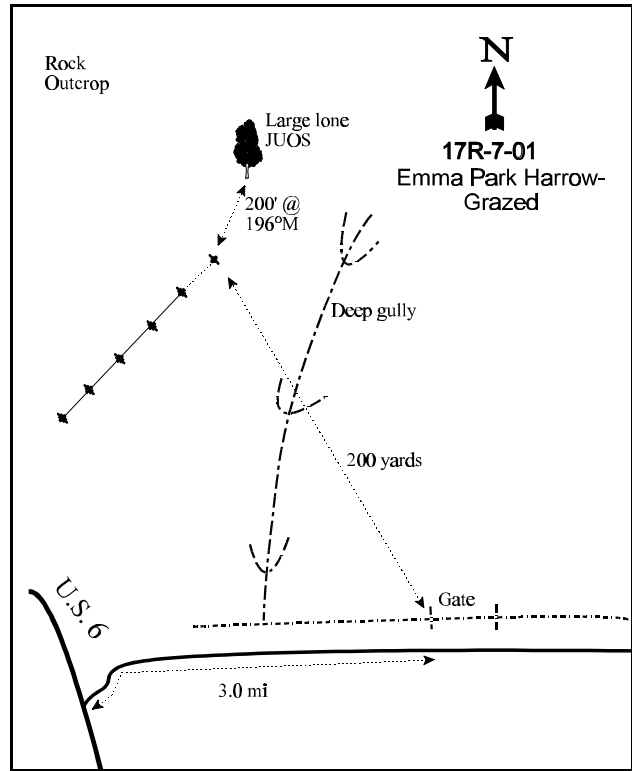
LOCATION DESCRIPTION

From the Kyune turnoff on U.S. 6 travel 3.0 miles to a gate on the north side of the road. From the gate walk approximately 200 yards towards a lone, large juniper on the other side of the deep gully. The 0-foot post is about 200 feet south of the juniper. The 0-foot stake is marked by browse tag #422.



Map Name: Kyune

Township 11S, Range 9E, Section 34



Diagrammatic Sketch

UTM 4407534 N 508979 E

DISCUSSION

Trend Study No. 17R-7

The Emma Park Harrow - Grazed study is located about 3 miles east of the junction of Highway 6 and Kyune in Spanish Fork Canyon. This study was established in 2001 to monitor a sagebrush pipe harrow treatment conducted by the Bureau of Land Management and Utah Division of Wildlife Resources. This area had been pipe harrowed one-way and seeded prior to placement of the transect. This study was paired with study 17R-8 to monitor site differences with and without livestock grazing following a pipe harrow treatment. Cattle grazing will still occur on this site, but not on study 17R-8. A pellet group transect read along the vegetation baseline in 2001 estimated 9 deer days use/acre (22 ddu/ha), and less than 1 elk day use/acre (2 edu/ha). No cattle pats were sampled.

Elevation at this study is approximately 7,200 feet. The site has a gentle slope of 3-5% with a south aspect. Soils are clay loam in texture with a soil reaction that is slightly alkaline (7.5 pH). Phosphorus is very low at 2.8 ppm. Values less than 10 ppm can be limiting to normal plant growth and development. A stoniness index determined from penetrometer readings shows most of the rock in the profile to be 8 to 16 inches below the surface. Effective rooting depth was estimated at under 14 inches in 2001. An erosion condition class assessment done in 2001 determined soils to be slightly eroding. Excessive pedestaling around vegetation provides the most evidence of past erosion on the site. Several active gullies also traverse the study.

Browse provides 45% of the vegetation cover on the site. The dominant species is mountain big sagebrush which accounts for 80% of the browse cover. Sagebrush density was estimated at nearly 4,000 plants/acre in 2001. Due to the harrow treatment, sagebrush decadence and poor vigor are relatively high at 39% and 57% respectively. This is consistent with the data collected on study 17R-8, which underwent the same treatment. Young plants are abundant at 660 plants/acre (17% of the population). Use on sagebrush was light in 2001. Annual leader growth averaged just over 2 inches in 2001.

Other browse sampled on the site include stickyleaf low rabbitbrush (3,820 plants/acre), snowberry (240 plants/acre), rubber rabbitbrush (180 plants/acre), and gray horsebrush (80 plants/acre).

The herbaceous understory is abundant and diverse with 11 grasses and 27 forbs being sampled in 2001. Some of the herbaceous species present are native residuals, while others were seeded onto the site as part of the pipe harrow treatment. Grasses provide 37% of the vegetation cover at the site, while forbs provide 17%. Western wheatgrass is the most abundant herbaceous species followed by Salina wildrye. Grasses were difficult to identify in 2001 due to the lack of seedheads on many individuals. Western wheatgrass and Salina wildrye were particularly hard to distinguish from each other. Yellow Indian paintbrush and desert phlox were the most abundant forbs in 2001. Annual species were rarely encountered in 2001. There was noticeable utilization on grasses in 2001, with use being heavy on some individuals.

APPARENT TREND ASSESSMENT

Soil condition is slightly down. Disturbance from the pipe harrow treatment has increased the amount of bare soil over what would normally occur on this site. Erosion is slight, but soils should stabilize after the vegetative community has several years to build. The browse component is in a downward condition due to the pipe harrow treatment. Decadence and poor vigor in the sagebrush population are high at the present time. However, the number of young in the population is encouraging. Decadence should decrease and vigor improve after a few growing seasons. The herbaceous understory is abundant and diverse and appears strong with few annual species present.

HERBACEOUS TRENDS --
Herd unit 17R, Study no: 7

Type	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
G	<i>Agropyron intermedium</i>	9	4	.07
G	<i>Agropyron smithii</i>	208	67	7.38
G	<i>Agropyron spicatum</i>	18	6	.27
G	<i>Carex</i> spp.	-	-	.03
G	<i>Elymus cinereus</i>	2	1	.03
G	<i>Elymus salina</i>	87	27	2.52
G	<i>Oryzopsis hymenoides</i>	4	2	.06
G	<i>Poa fendleriana</i>	4	2	.01
G	<i>Poa pratensis</i>	17	8	.43
G	<i>Poa secunda</i>	20	10	.54
G	<i>Stipa lettermani</i>	17	8	.14
Total for Annual Grasses		0	0	0
Total for Perennial Grasses		386	135	11.49
Total for Grasses		386	135	11.49
F	<i>Antennaria rosea</i>	4	1	.03
F	<i>Arabis</i> spp.	2	1	.00
F	<i>Astragalus cicer</i>	13	9	.41
F	<i>Astragalus convallarius</i>	18	11	.21
F	<i>Astragalus tenellus</i>	1	1	.03
F	<i>Castilleja flava</i>	66	33	1.18
F	<i>Chaenactis douglasii</i>	24	9	.14
F	<i>Chenopodium leptophyllum</i> (a)	15	8	.04
F	<i>Cleome serrulata</i> (a)	-	-	.00
F	<i>Descurainia pinnata</i> (a)	2	1	.00
F	<i>Gilia</i> spp. (a)	4	2	.01
F	<i>Linum lewisii</i>	7	4	.04
F	<i>Lotus utahensis</i>	2	1	.00
F	<i>Machaeranthera canescens</i>	36	18	.43
F	<i>Medicago sativa</i>	4	2	.03
F	<i>Onobrychis viciaefolia</i>	11	3	.06
F	<i>Penstemon caespitosus</i>	71	31	.65
F	<i>Penstemon palmeri</i>	15	6	.40
F	<i>Phlox austromontana</i>	64	27	1.06
F	<i>Polygonum douglasii</i> (a)	2	1	.00

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
F	Potentilla gracilis	7	3	.04
F	Sanguisorba minor	13	8	.18
F	Senecio multilobatus	3	3	.01
F	Sphaeralcea coccinea	39	15	.25
F	Taraxacum officinale	2	1	.03
F	Tragopogon dubius	4	1	.00
F	Trifolium spp.	2	2	.01
Total for Annual Forbs		23	12	0.07
Total for Perennial Forbs		408	190	5.26
Total for Forbs		431	202	5.33

BROWSE TRENDS --

Herd unit 17R, Study no: 7

T y p e	Species	Strip Frequency	Average Cover %
		'01	'01
B	Amelanchier utahensis	0	.00
B	Artemisia tridentata vaseyana	82	11.17
B	Chrysothamnus nauseosus	9	.21
B	Chrysothamnus viscidiflorus viscidiflorus	48	2.52
B	Symphoricarpos oreophilus	5	.00
B	Tetradymia canescens	4	-
Total for Browse		148	13.92

BASIC COVER --

Herd unit 17R, Study no: 7

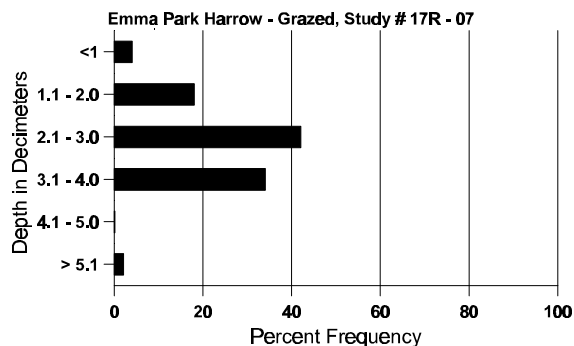
Cover Type	Nested Frequency	Average Cover %
	'01	'01
Vegetation	373	32.43
Rock	36	.14
Pavement	161	.38
Litter	467	46.17
Cryptogams	25	.31
Bare Ground	349	35.73

SOIL ANALYSIS DATA --

Herd Unit 17R, Study no: 07, Emma Park Harrow-Grazed

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.8	60.0 (16.1)	7.5	38.9	31.4	29.7	1.8	2.8	332.8	0.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 17R, Study no: 7

Type	Quadrat Frequency	Pellet Transect	
		Pellet Groups per Acre	Days Use per Acre (ha)
	'01	'01	'01
Rabbit	5	52	N/A
Deer	8	113	9 (22)
Elk	-	9	1 (2)

BROWSE CHARACTERISTICS --

Herd unit 17R, 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				
Amelanchier utahensis																		
M	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	21	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'01	0	Dec:	-			

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	01	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
Y	01	30	-	-	2	-	-	1	-	-	33	-	-	-	660		33	
M	01	88	-	-	1	-	-	-	-	-	50	-	39	-	1780	17	24	89
D	01	77	-	-	-	-	-	-	-	-	2	-	66	9	1540		77	
X	01	-	-	-	-	-	-	-	-	-	-	-	-	-	340		17	
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 57%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'01	3980	Dec:	39%			
<i>Chrysothamnus nauseosus</i>																		
Y	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	19	21	2
D	01	5	-	-	-	-	-	-	-	-	3	-	2	-	100		5	
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 22%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'01	180	Dec:	56%			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	01	157	-	-	1	-	-	19	-	-	176	-	1	-	3540	5	9	177
D	01	8	-	-	-	-	-	-	-	-	7	-	1	-	160		8	
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 01%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'01	3820	Dec:	4%			
<i>Symphoricarpos oreophilus</i>																		
Y	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9	16	3
D	01	4	-	-	-	-	-	-	-	-	3	-	-	1	80		4	
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 08%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'01	240	Dec:	33%			

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			
Tetradymia canescens																	
S	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1
D	01	3	-	-	-	-	-	-	-	-	1	-	1	1	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'01		00%			00%			50%									
Total Plants/Acre (excluding Dead & Seedlings)												'01	80	Dec:	75%		

Trend Study 17R-8-01

Study site name: Emma Park Harrow-Ungrazed

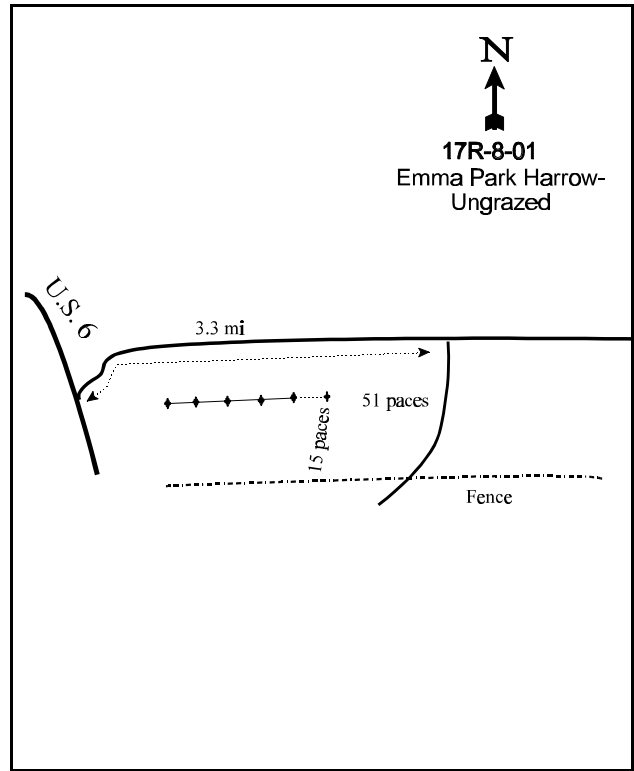
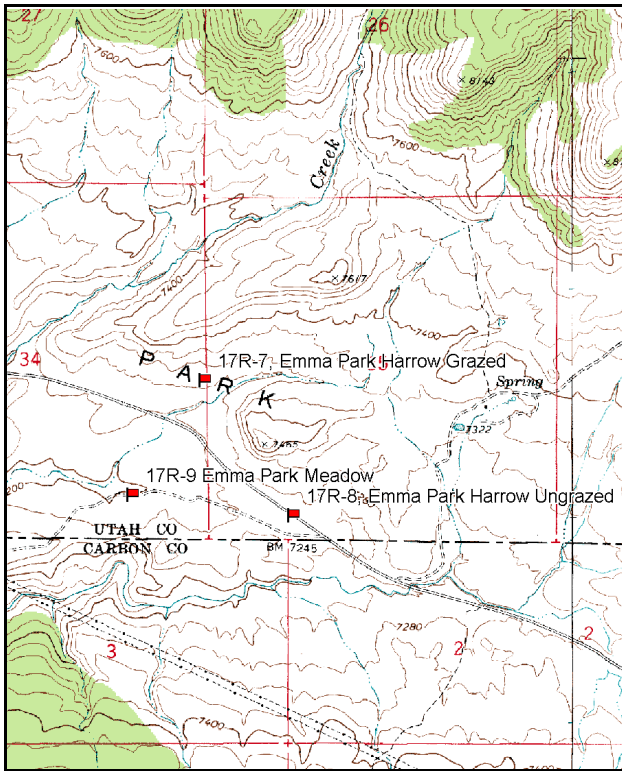
Vegetation type: Harrowed Big Sagebrush

Compass bearing: frequency baseline 298 degrees magnetic.

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

LOCATION DESCRIPTION

From the Kyune turnoff on U.S. 6 travel 3.3 miles to a turnoff on the south side of the road. The study site is located between the road and the fence 51 paces west of the turnoff. The 0-foot stake is 15 paces north of the fence. The 0-foot stake is marked by browse tag #425.



Map Name: Kyune

Diagrammatic Sketch

Township 11S, Range 9E, Section 35

UTM 4406912 N 509391 E

DISCUSSION

Trend Study No. 17R-8

The Emma Park Harrow - Ungrazed study is located about 3½ miles east of the junction of Highway 6 and Kyune in Spanish Fork Canyon. This study was established in 2001 to monitor a sagebrush pipe harrow treatment conducted by the Bureau of Land Management and Utah Division of Wildlife Resources. This area had been pipe harrowed one-way and seeded prior to site placement. This study was paired with study 17R-7 to monitor site differences with and without livestock grazing following a pipe harrow treatment. Cattle grazing is not supposed to occur on this site, but will on study 17R-7. A pellet group transect read along the vegetation baseline in 2001 estimated 12 deer days use/acre (30 ddu/ha), and less than 1 elk day use/acre (2 edu/ha). No cattle pats were sampled in 2001.

Elevation at this study is approximately 7,200 feet with nearly flat terrain. Soils are clay loam in texture with a soil reaction that is slightly alkaline (7.6 pH). Phosphorus is very low at 2.9 ppm, where values less than 10 ppm can be limiting to normal plant growth and development. Effective rooting depth is estimated at over 17 inches, which is considerably deeper than study 17R-7. A stoniness index determined from penetrometer readings shows most of the rock in the profile to be 8 to 20 inches below the surface. An erosion condition class assessment determined soils to be stable in 2001. Moderate pedestaling around vegetation provides the past evidence of erosion.

Browse provides 54% of the total vegetation cover on this site. The dominant species is mountain big sagebrush which accounts for 69% of the browse cover in 2001. Sagebrush density was estimated at just over 4,500 plants/acre. Due to the pipe harrow treatment in 2001, sagebrush decadence and poor vigor were understandably high at 42% and 72% respectively. This is consistent with the data collected at study 17R-7, which underwent the same treatment. Young plant abundance is moderately high at an estimated 560 plants/acre (12% of the population). Use on sagebrush was light in 2001 and annual leader growth averaged just under 2 inches.

Other browse sampled on the site include stickyleaf low rabbitbrush (6,440 plants/acre), snowberry (40 plants/acre), rubber rabbitbrush (840 plants/acre), and gray horsebrush (60 plants/acre). The density of low rabbitbrush is 41% higher on this study compared to study 17R-7. Rubber rabbitbrush density is nearly five times higher on this study as well.

The herbaceous understory is not as diverse on this study as it is on study 17R-7. In 2001, 9 grasses and 18 forbs were sampled. Grasses provide 40% of the vegetation cover at the site, with forbs providing only 6%. Western wheatgrass was sampled in nearly three-fourths of the quadrats and provided 12% average cover in 2001. Bluebunch wheatgrass was second in abundance, contributing 2% average cover. All other grasses were sampled infrequently. Two milkvetch species and desert phlox were the most abundant forbs on the site in 2001, while annual species were rarely encountered. There was no noticeable utilization on the herbaceous species in 2001.

APPARENT TREND ASSESSMENT

Soils appear to be stable. Disturbance from the pipe harrow treatment has increased the amount of bare soil over what would normally occur on this site. Even with the treatment, vegetation and litter cover are adequate and erosion minimal. Browse, primarily mountain big sagebrush, is in a downward condition due to the pipe harrow treatment. Decadence and poor vigor are high at the present time. However, the number of young in the population is good. Percent decadence should decrease and vigor improve after a few growing seasons. Diversity for herbaceous species should improve in the future. Annual species are nearly nonexistent.

HERBACEOUS TRENDS --
Herd unit 17R, Study no: 8

Type	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
G	<i>Agropyron smithii</i>	243	73	12.08
G	<i>Agropyron spicatum</i>	53	16	2.00
G	<i>Agropyron trichoporum</i>	3	2	.03
G	<i>Bromus inermis</i>	1	1	.00
G	<i>Carex</i> spp.	2	1	.00
G	<i>Poa fendleriana</i>	-	-	.00
G	<i>Poa pratensis</i>	1	1	.00
G	<i>Poa secunda</i>	1	1	.00
G	<i>Stipa lettermani</i>	10	4	.24
Total for Annual Grasses		0	0	0
Total for Perennial Grasses		314	99	14.40
Total for Grasses		314	99	14.40
F	<i>Achillea millefolium</i>	8	4	.09
F	<i>Astragalus cicer</i>	25	11	.66
F	<i>Astragalus tenellus</i>	13	7	.21
F	<i>Chenopodium</i> spp. (a)	5	1	.00
F	<i>Cirsium</i> spp.	3	1	.00
F	<i>Erigeron</i> spp.	4	2	.01
F	<i>Lappula occidentalis</i> (a)	-	-	.00
F	<i>Lactuca serriola</i>	2	1	.00
F	<i>Linum lewisii</i>	9	3	.01
F	<i>Machaeranthera canescens</i>	2	2	.01
F	<i>Medicago sativa</i>	3	1	.03
F	<i>Onobrychis viciaefolia</i>	6	4	.21
F	<i>Penstemon caespitosus</i>	31	14	.19
F	<i>Phlox austromontana</i>	34	17	.60
F	<i>Potentilla</i> spp.	7	6	.03
F	<i>Sanguisorba minor</i>	6	3	.04
F	<i>Taraxacum officinale</i>	1	1	.00
F	<i>Trifolium</i> spp.	2	1	.00
Total for Annual Forbs		5	1	0.00
Total for Perennial Forbs		156	78	2.13
Total for Forbs		161	79	2.14

BROWSE TRENDS --
Herd unit 17R, Study no: 8

Type	Species	Strip Frequency	Average Cover %
		'01	'01
B	Artemisia tridentata vaseyana	77	13.20
B	Chrysothamnus nauseosus	26	2.26
B	Chrysothamnus viscidiflorus viscidiflorus	57	3.26
B	Gutierrezia sarothrae	3	.41
B	Symphoricarpos oreophilus	1	-
B	Tetradymia canescens	1	.03
Total for Browse		165	19.18

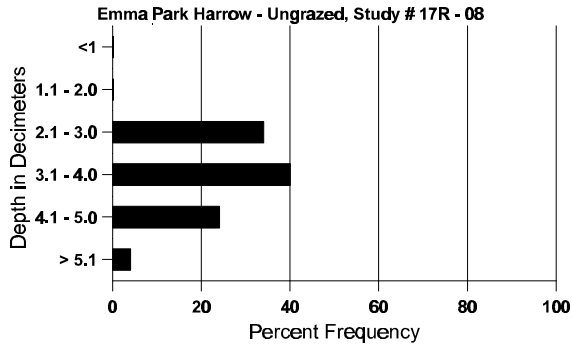
BASIC COVER --
Herd unit 17R, Study no: 8

Cover Type	Nested Frequency	Average Cover %
	'01	'01
Vegetation	343	34.19
Rock	12	.02
Pavement	38	.10
Litter	467	55.72
Cryptogams	22	.85
Bare Ground	298	28.29

SOIL ANALYSIS DATA --
Herd Unit 17R, Study no: 08, Emma Park Harrow-Ungrazed

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
17.2	55.8 (18.1)	7.6	33.9	32.4	33.7	2.2	2.9	297.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 17R, Study no: 8

Type	Quadrat Frequency '01	Pellet Transect	
		Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	39	444	N/A
Deer	5	157	12 (30)
Elk	-	9	1 (2)
Sage grouse	-	9	N/A

BROWSE CHARACTERISTICS --

Herd unit 17R, 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 tridentata vaseyana												
S	'01	1	-	-	-	-	-	-	1	20		1
Y	'01	28	-	-	-	-	-	-	28	20	8	28
M	'01	102	-	-	1	-	-	-	103	40	63	103
D	'01	95	1	-	-	-	-	-	96	3	72	96
X	'01	-	-	-	-	-	-	-	27	-	-	27
% Plants Showing '01		<u>Moderate Use</u> .44%		<u>Heavy Use</u> 00%		<u>Poor Vigor</u> 72%		<u>%Change</u>				
Total Plants/Acre (excluding Dead & Seedlings)						'01	4540	Dec:	42%			

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>Chrysothamnus nauseosus</i>																		
Y	01	7	-	-	2	-	-	-	-	-	9	-	-	-	180		9	
M	01	28	-	-	2	-	-	-	-	-	30	-	-	-	600	17	22	30
D	01	3	-	-	-	-	-	-	-	-	1	-	2	-	60		3	
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 05%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	840	Dec:	7%	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	01	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	01	265	-	-	17	-	-	9	-	-	258	-	33	-	5820	6	9	291
D	01	22	-	-	-	-	-	-	-	-	9	-	9	4	440		22	
X	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 14%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	6440	Dec:	7%	
<i>Gutierrezia sarothrae</i>																		
M	01	8	-	-	-	-	-	-	-	-	8	-	-	-	160	4	7	8
D	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	180	Dec:	11%	
<i>Symphoricarpos oreophilus</i>																		
Y	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	40	Dec:	-	
<i>Tetradymia canescens</i>																		
D	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
% Plants Showing '01		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'01	60	Dec:	100%	

Trend Study 17R-9-01

Study site name: Emma Park Meadow.

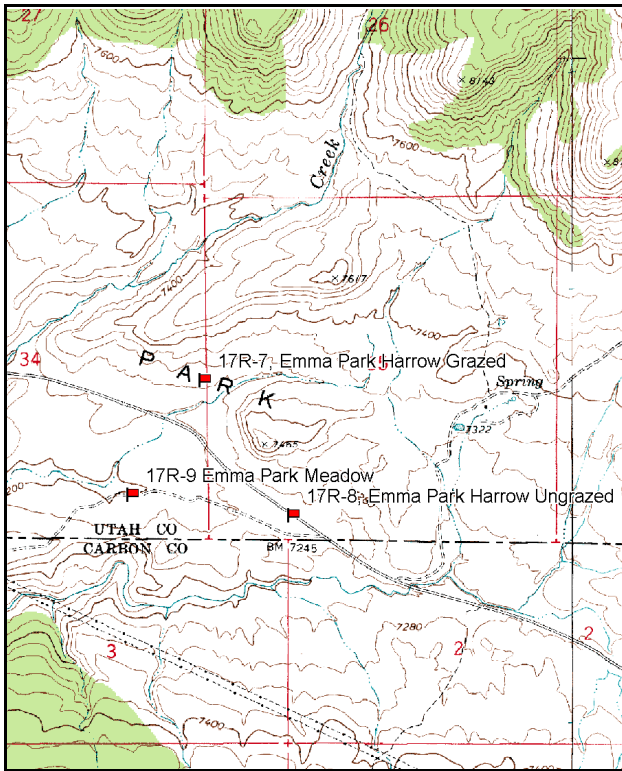
Vegetation type: Dry Meadow.

Compass bearing: frequency baseline 271 degrees magnetic.

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

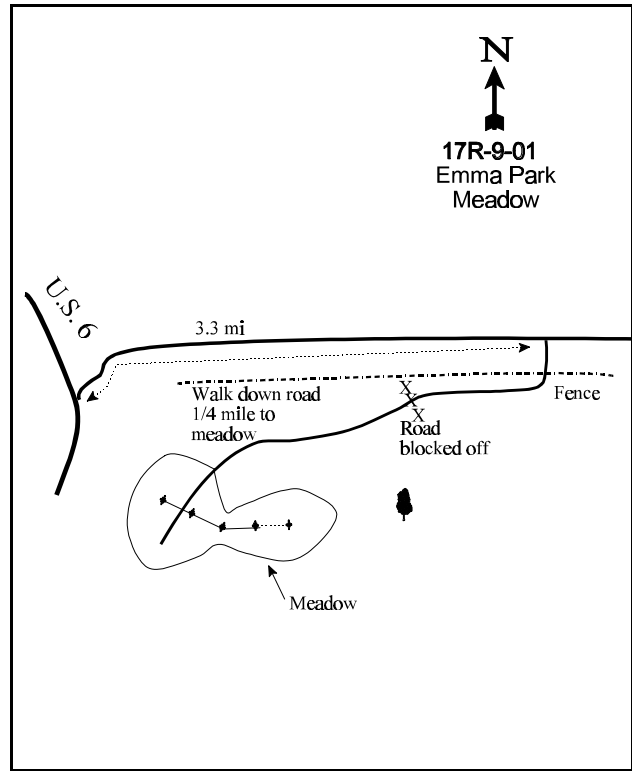
LOCATION DESCRIPTION

From the Kyune turnoff on U.S. 6 travel 3.3 miles to a turnoff on the south side of the road. Continue on this road through a gate and head back to the west until the road is blocked off. From here walk down the old road 1/4 mile to a meadow. The 0-foot stake is on the east side of the meadow and marked by browse tag #430.



Map Name: Kyune

Township 11S, Range 9E, Section 34



Diagrammatic Sketch

UTM 4407006 N 508648 E

DISCUSSION

Trend Study No. 17R-9

The Emma Park Meadow study is located just over 3 miles from the junction of Kyune and Highway 6 in Spanish Fork Canyon. Study 17R-8 is about one-half mile to the east. This transect lies in a small depression and is best classified as a dry meadow. The BLM plans to convert this site to more of a wet meadow type by raising the water table with small check dams along the gullies that run through the area. This study was established in 2001 to monitor the changes in vegetation during this transition period. Site elevation is about 6,900 feet on terrain that slopes gently to the northwest. Wildlife and livestock use of the area appears to be low. A pellet group transect read along the vegetation baseline in 2001 estimated 4 deer days use/acre (10 ddu/ha), 3 elk days use/acre (8 edu/ha), and 2 cow days use/acre (5 cdu/ha). Grouse pellets were also noticed in the dry meadow type.

Soils at the site are clay loam in texture with a soil reaction that is neutral (7.3 pH). Effective rooting depth is estimated at just under 15 inches. There is very little rock and pavement on the surface or within the profile. Vegetation cover is high at an estimated 55% average cover in 2001. Litter cover is lower than anticipated at 23%. Percent bare ground is moderately high at nearly 30% cover. Phosphorus is fairly low at 6.7 ppm as values less than 10 ppm can be limiting to normal plant growth and development. The BLM has installed several check dams throughout the area. A gully several hundred feet away shows signs of active cutting.

Browse is limited on the site itself, being sampled mainly on the edges of the meadow. However, sagebrush is fairly abundant and surrounds the site in all directions, except for several small meadows such as the one this study monitors. Mountain big sagebrush had an estimated density of 1,240 plants/acre in 2001. Decadence and poor vigor in the population are high at 39%. As most of the decadent plants occur on the meadow's edge, high decadence and poor vigor are likely due to the higher water table that exists within the meadow. Young plants make up an additional 16% of the population (200 plants/acre). Other browse sampled on the site include silver sagebrush, stickyleaf rabbitbrush, rubber rabbitbrush, and cinquefoil.

The site is dominated by low growing grasses and forbs, many of which are increasers. Sandberg bluegrass, Kentucky bluegrass, western wheatgrass, Prairie junegrass, a sedge, and a rush are the most common grasses sampled. An *Aster* and yarrow dominate the forb component. In 2001, production was relatively low and seed stalks were few on herbaceous species.

HERBACEOUS TRENDS --
Herd unit 17R, Study no: 9

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'01	'01	'01
G	Agropyron smithii	189	55	4.15
G	Carex spp.	72	28	1.58
G	Juncus spp.	76	22	1.27
G	Koeleria cristata	43	15	.27
G	Poa pratensis	23	11	.49
G	Poa secunda	332	87	8.34
G	Stipa lettermani	16	7	.13
Total for Annual Grasses		0	0	0
Total for Perennial Grasses		751	225	16.26
Total for Grasses		751	225	16.26
F	Achillea millefolium	327	95	9.56
F	Antennaria rosea	25	10	.29
F	Aster spp.	432	99	21.88
F	Astragalus spp.	31	9	.27
F	Orthocarpus spp. (a)	235	75	4.39
F	Penstemon spp.	52	23	.76
F	Phlox austromontana	17	5	.48
F	Phlox longifolia	4	1	.00
F	Potentilla gracilis	1	1	.00
F	Taraxacum officinale	11	5	.10
Total for Annual Forbs		235	75	4.39
Total for Perennial Forbs		900	248	33.37
Total for Forbs		1135	323	37.76

BROWSE TRENDS --
Herd unit 17R, Study no: 9

Type	Species	Strip Frequency	Average Cover %
		'01	'01
B	Artemisia cana	2	-
B	Artemisia tridentata vaseyana	26	1.82
B	Chrysothamnus nauseosus	6	.30
B	Chrysothamnus viscidiflorus viscidiflorus	1	-
B	Potentilla fruticosa	1	-
Total for Browse		36	2.12

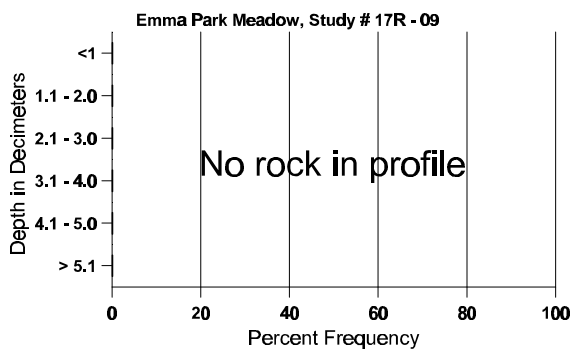
BASIC COVER --
Herd unit 17R, Study no: 9

Cover Type	Nested Frequency	Average Cover %
	'01	'01
Vegetation	475	55.73
Rock	6	.04
Pavement	30	.29
Litter	424	23.79
Cryptogams	122	6.00
Bare Ground	336	29.82

SOIL ANALYSIS DATA --
Herd Unit 17R, Study no: 09, Emma Park Meadow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.7	52.4 (16.1)	7.3	23.9	38.4	37.7	4.3	6.7	214.4	1.1

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 17R, Study no: 9

Type	Quadrat Frequency	Pellet Transect	
		Pellet Groups per Acre	Days Use per Acre (ha)
		'01	'01
Rabbit	50	505	N/A
Elk	7	44	3 (8)
Deer	3	52	4 (10)
Cattle	9	26	2 (5)

BROWSE CHARACTERISTICS --

Herd unit 17R, 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									
<i>Artemisia cana</i>														
M	'01	1	-	-	-	-	-	-	1	1	20	10	9	1
D	'01	1	-	-	-	-	-	-	-	-	1	-	-	1
% Plants Showing '01		<u>Moderate Use</u> 00%		<u>Heavy Use</u> 00%		<u>Poor Vigor</u> 50%		<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'01	40	Dec:	50%
<i>Artemisia tridentata vaseyana</i>														
Y	'01	10	-	-	-	-	-	-	-	10	-	-	-	10
M	'01	27	-	1	-	-	-	-	-	21	-	6	1	28
D	'01	24	-	-	-	-	-	-	-	7	-	6	11	24
X	'01	-	-	-	-	-	-	-	-	-	-	-	-	12
% Plants Showing '01		<u>Moderate Use</u> 00%		<u>Heavy Use</u> 02%		<u>Poor Vigor</u> 39%		<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'01	1240	Dec:	39%
<i>Chrysothamnus nauseosus</i>														
Y	'01	3	-	-	-	-	-	-	-	3	-	-	-	3
M	'01	4	-	-	-	-	-	-	-	3	-	1	-	4
% Plants Showing '01		<u>Moderate Use</u> 00%		<u>Heavy Use</u> 00%		<u>Poor Vigor</u> 14%		<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'01	140	Dec:	-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>														
M	'01	1	-	-	-	-	-	-	-	1	-	-	-	1
% Plants Showing '01		<u>Moderate Use</u> 00%		<u>Heavy Use</u> 00%		<u>Poor Vigor</u> 00%		<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'01	20	Dec:	-

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				
Potentilla fruticosa																		
M	01	1	-	-	-	-	-	-	-	-	-	-	1	-	20	11	18	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'01		00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)														'01	20	Dec:	-	

Special Studies - Summary

Trend Summary - Northern Region

	Category	1997	2001
4R-1 Deseret Land and Livestock - Main Gate	soil	est	3
	browse	est	3
	herbaceous understory	est	3
4R-2 Deseret Land and Livestock - Burn	soil	est	5
	browse	est	2
	herbaceous understory	est	3

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = established, (n/a) = no trend

Trend Summary - Northeastern Region

	Category	1997	2001
9R-2 Buckhorn Canyon	soil		est
	browse		est
	herbaceous understory		est
17R-4 Rabbit Gulch	soil	est	3
	browse	est	2
	herbaceous understory	est	3

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = established, (n/a) = no trend

Trend Summary - Southern Region

	Category	1997	2001
22R-1 & 2 Tushar Mountain Goats	soil	est	n/a
	browse	est	n/a
	herbaceous understory	est	n/a
	Category	2000	2001
28R-7 Sage Hen Hollow	soil	est	3
	browse	est	3
	herbaceous understory	est	3

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = established, (n/a) = no trend, refer to written summary

Trend Summary - Southeastern Region

	Category	1999	2001
10R-31 Hay Canyon Burn	soil	est	4
	browse	est	4
	herbaceous understory	est	1
14R-1 Cathedral Butte	soil		est
	browse		est
	herbaceous understory		est
14R-2 Jerry Hines CRP	soil		est
	browse		est
	herbaceous understory		est
16R-10 Gordon Creek Burn	soil	est	4
	browse	est	5
	herbaceous understory	est	1
17R-7 Emma Park Harrow - Grazed	soil		est
	browse		est
	herbaceous understory		est
17R-8 Emma Park Harrow - Ungrazed	soil		est
	browse		est
	herbaceous understory		est
17R-9 Emma Park Meadow	soil		est
	browse		est
	herbaceous understory		est

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
 (est) = established, (n/a) = no trend

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